Program no. 1-01

The massage in children with cancer: Effectiveness of a protocol

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Pain is one of the most common symptoms associated with cancer, and nurses can and should play an important role in its management. Massage can contribute to pain relief, although empirical evidence on this is scarce and contradictory 1,2,3. This study aimed to assess the effectiveness of the massage protocol in relieving pain in children hospitalized with cancer.

A randomized and controlled study with blinded evaluation was conducted. The sample was composed of 52 children, aged between 10 and 18 years, hospitalized in a pediatric oncology ward. The intervention consisted of the implementation of a massage protocol of three 20-30 minute sessions every other day during a week. The effectiveness of the protocol was measured by assessing pain using the adapted Brief Pain Inventory, and the effectiveness of each massage session was measured using the Visual Analogical Scale (VAS).

Despite having contributed to decrease pain and its interference in children's activities, the massage protocol was only effective in decreasing the interference of pain while walking ($p<0.05$). Pain intensity always decreased after each massage session ($p<000.1$).

Despite the small sample size, massage seems to be a useful intervention in relieving pain in children with cancer, although some doubts remain as to the efficacy of this massage protocol. However, the authors recommend its use because of it promotes children's well-being and quality of life.

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Program no. 1-03

Headache syndrome and Venous discirculation of children and teenagers

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The problem of venous brain circulation disorder in childhood is of high priority at present.

Research objective: Assessment of cerebral venous hemodynamics in children and teenagers having cranialgia with updating cause-effect relations of venous discirculation.

According to the data of Ultra Sonic Testing (in C- and PW- modes) 109 patients (at the age from 2 to 18) it was found that discirculation in the system of vertebral veins is

linked with apparent extravasal effects on bloodstream in internal jugular vein (with vessel compression on the side of vasoconstriction registration) ($r = +0.67$; $p<0.05$), spasms of posterior cerebral artery ($r = +0.63$; $p<0.05$), coiling of internal carotid artery and vertebral artery ($r = +0.20 - +0.32$, $p<0.05$). In case of discirculation in the system of internal jugular vein, the changes mentioned are interrelated with extravasal compression on the level of internal jugular vein sorrunding soft tissues or compression in the bone canal ($r= +0.76$; $p<0.05$), anterior cerebral artery spasms, hyperperfusion of vertebral artery and posterior cerebral artery ($p<0.05$). Intracranial venous discirculation depends on the straightness of vertebral artery in the bone canal (for left vertebral artery $r= +0.33$; $p<0.05$), discirculation intensity on the level of vertebral vein (for Vmax right vertebral vein $r= +0.73$, $p>0.05$).
Vasoconstriction in the vein of Galen is accompanied by ipsilateral hypersthenia of vertebral artery, internal carotid artery and middle cerebral artery (effect of reflectory changes), and is also interrelated with flexures, sigmoid coiling of internal carotid artery. The link of “headache syndrome” with accelerated venous blood flow along the veins of Galen turned out to be quite low ($r = +0,22$, $p<0,05$).
Conclusion. Main causes of children’s vasoconstriction are either congenital pathology of cervical spine (with arcuation and tortuosity of bone canal), or “birth injuries with pseudo-luxation of cervical vertebrae”.

Program no. 1-04
Lidocaine 5% patch for localised neuropathic pain: an evaluation of use in paediatrics.
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Chronic neuropathic pain in paediatrics results from a variety of medical conditions. Neuropathic pain frequently causes great distress, compromises quality of life and often responds poorly to standard analgesics. Adjuvant analgesics such as antidepressants and anticonvulsants are often effective but tolerability is frequently a problem due to unpleasant side effects.
Studies in adults have demonstrated that lidocaine 5% patches can reduce the intensity of neuropathic pains.
This service evaluation was initiated to document the usage and efficacy of the 5% lidocaine patch in paediatric patients being managed by paediatric pain teams in the UK. No change to current clinical practice was required.
A two year service evaluation was initiated by the British Pain Society’s Pain in Children Special Interest Group supported by an unrestricted educational grant from Grunenthal. Co-ordination of the project was at Sheffield Children’s Hospital, where the service evaluation was registered with the Trust’s clinical audit and effectiveness department. The database was registered with the Healthcare Quality Improvement Partnership. Invitations to take part along with questionnaires to be used were distributed to 13 paediatric pain teams across the UK.
Anonymous pre-treatment data included: Age, sex, weight, location & type of pain, diagnosis, duration of pain, pain score 0-10, current medication, previous medication,

application site, duration and time of application planned. Follow up data were collected approximately 3 to 6 months post treatment. They included current pain score, length of time patch used, side effects, reduction in other medication, satisfaction score and any improvements in sleep and function.
Interim data from the first year of the evaluation are presented for 46 patients; 31 females and 15 males with a mean age of 12 years 9 months. Diagnoses and causes for neuropathic pain were varied as were the sites of application. Pain descriptors were typical for neuropathic pain. Complex regional pain syndrome was the most common diagnosis (8 patients); the back was the most common site of application (10 patients). Analysis of interim data suggests that Lidocaine 5% patch (Verstais) is helpful in treating localised neuropathic pain in children and adolescents. Over 50% of children and adolescents reported benefit to their pain symptoms with concomitant improvement in physical function and sleep. Only local side effects were reported in a few patients. Given the risk / benefit ratio of this treatment, the only issues with this treatment in children and adolescents with localised neuropathic pain would seem to be cost and lack of marketing authorisation.

Program no. 1-05
Pain following Mild to Moderate Traumatic Brain Injury in Adolescents
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Co-author(s): Tonya Palermo, Seattle Children's Research Institute, University of Washington Anesthesiology, Co-author(s): Monica Vavilala, Anesthesiology, Co-author(s): Frederick Rivara, University of Washington, Pediatrics, United States
Introduction & Aims: Traumatic brain injury (TBI) is a global public health concern, estimated to involve up to 42 million children and young adults annually. Recovery may be complicated by neurological, psychological and neurobehavioral deficits. Pain has recently been recognized as a common sequela in adults, but the prevalence of pain and its impact following pediatric TBI is unclear. This study aimed to characterize pain in adolescents at 3 to 12 months after mild to moderate TBI and identify clinical and behavioral factors associated with pain. Methods: Adolescents with TBI were recruited from a hospital trauma registry in Northwestern United States. A comparison cohort of age- and sex-matched healthy adolescents was recruited from the community. Adolescents completed assessments of pain, depressive symptoms and pain-related functional impairment. Results: Participants were 98 adolescents, 49 with TBI (47 with mild TBI, 2 with moderate TBI) and 49 healthy adolescents (mean age=15.6 years, SD=1.9, 73% male). Mean time since injury was 8.6 months for adolescents with TBI. There were no group differences on age, gender, race, ethnicity or household income. Both groups reported experiencing pain in the preceding three months, with youth with TBI rating mean pain intensity slightly higher compared to healthy adolescents (M=3.9, SD=2.2 vs. M=3.2, SD=2.0, p=0.08). A larger proportion of adolescents with TBI reported headaches compared to healthy youth (n=17, 34.7% vs. n=8, 16.3% p=0.03). Other pain locations were similar, involving the lower limbs and back. Frequent pain (3x/week or greater) was experienced by 18.4% of adolescents with TBI, compared to 8.2% of healthy adolescents. Greater pain-related functional impairment and depressive symptoms were reported by adolescents with TBI compared to healthy adolescents

(p=0.03 and p=0.006 respectively). A linear regression was conducted to examine a multivariate model (age, sex, depressive symptoms) predicting pain in the TBI group. Only higher depressive symptoms (β=0.59, p
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Program no. 1-06
The journey of pain relief - A neuroblastoma girl with severe neuropathic pain
Main author: Ya-Lan Wang, National Taiwan University Hospital, Pediatric Oncology Unit, Taiwan
Neuropathic pain is one of the difficult-managed symptoms of pediatric oncology patients. Antidepressants and anticonvulsants such as amitriptyline and gabapentin are considered the first-line medications, other adjuvants such as ketamine and lidocaine are not well accepted by physicians due to the potential risks, such as seizures, arrhythmias, and cardiovascular collapse.
This case study was about a 15kg, 5-year-old girl, with multiple metastatic neuroblastoma. Pain became her major symtom and the main reason for hospitalization since 2010/11. Continuous intravenous morphine was given at the beginning, and was changed to Fentanyl patch since 2011/2, then the girl's pain was under adequate control by adjusting the dose of anesthesia.
In 2011/5, the girl was admitted for palliative chemotherapy and symtom management. At that time, her pain medications were Fentanyl patch 112.5 mcg, Morphine sulfate 10mg po q6h. However, the pain was even worse after chemotherapy, so we increased the dose of Fentanyl patch and morphine gradually, and added steroids as adjuvants since 6/17.
At 6/28, her pain got worse, and cannot be eased after repeated high dose morphine injection (20mg/dose). Due to the poor response to morphine, we discussed with her parents, and continuous intravenous infusion of midazolam was given for terminal sedation from 7/1, started at 0.1mg/kg/hr, then increased to 0.16mg/kg/hr. However, the girl was still irritable and couldn’t be sedated due to the severe neuropathic pain. Continuous intravenous infusion of lidocaine was given from 7/1, started at 1.6mg/kg/hr for an hour, to test if the girl could tolerate well. At 7/4, the dose was increased to 1.6mg/kg/hr for 4 hours, and we found the girl could fall asleep during the infusion period. After discussed with her parents, we started high dose intravenous lidocaine (3mg/kg/hr) from 7/5 morning. The girl was finally eased and deeply slept undre the use of lidocaine, and she expired in the evening of the same day, rested in peace with her parents by her side.
Although the efficacy and safety of continuous intravenous infusion of lidocaine was not examined in this case. Our experience with this patient suggests that after well-explained the potential side effects to the parents, intravenous infusion of lidocaine may be an treatment option of severe neuropathic pain to terminal pediatric oncology patients.
Reference
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Program no. 1-07

Recurrent pain, stress, tender points, and fibromyalgia in childhood

Main author: Gösta Alfvén, SBSF, Astrid Lindgrens Children Hospital, Sweden

Introduction and Aims:

Fibromyalgia is a major pain problem also reported in childhood. Stress, pain spread and pain amplification are of aetiological importance. The aim was to study the occurrence of tender points (TP) in fibromyalgia , and how they relate to the occurrence of a stress-related tender point pattern (stress TP), observed in children with psychosomatic recurrent pain.

Methods:

47 children 6-17 years old, with psychosomatic recurrent abdominal pain according to defined criteria, most of them with multiple pains, were examined for stress TP score (0-9) and fibromyalgia TP score (0-18), and also for allodynia of the abdominal wall as a sign of pain amplification. Allodynia was tested for by gentle nipping with a pressure not normally inducing pain. Forty-five children underwent psychosoma treatment (integrated psychological and somatic therapy) and two consulting and therapeutic advice. At follow-up after one year 44 were examined for stress TP, and the latter two third of the cohort also for fibromyalgia TP and allodynia.

Result:

A stress TP pattern was found in all children with a mean score of 8.6 (5-9). Pain duration and the number of pain locations correlated to fibromyalgia TP score ($R = 0.35$, $P < 0.05$ and $R = 0.37$, $P < 0.01$). Eight children fulfilled the criteria for fibromyalgia. Fibromyalgia TP score correlated to stress TP score ($R = 0.42$, $P < 0.005$). The children with allodynia had significantly higher fibromyalgia TP score than those without.

At follow-up stress TP and fibromyalgia TP scores and the number of children with allodynia decreased significantly. The 25 children who were painless at follow-up had significantly lower stress TP and fibromyalgia TP scores, and less frequent allodynia than those who were not free of pain.

Discussion and Conclusion:

Stress TP pattern were present in all children and fibromyalgia were found in 16 % of the children. A longer duration of pain and more pain locations increased this risk. At follow-up, children free of pain had significantly decreased stress TP score and fibromyalgia TP score and sign of allodynia.

This study underlines the importance of examining children in psychosomatic pain for fibromyalgia and for sign of pain amplification, and the importance of early therapeutic intervention.

Reference: Alfvén G. Recurrent pain, stress, tender points and fibromyalgia in childhood: an exploratory descriptive clinical study. Acta Paediatr. 2012 Mar; 101(3): 283-91.

Program no. 1-08
Outcomes of Pain and Function in a Multi-Modal Amplified Pain Treatment Program
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Introduction & Aims: Management of Amplified Pain Syndromes (APS) in children (i.e. juvenile primary fibromyalgia, complex regional pain syndrome, neuropathic pain, central sensitization) remains controversial. Common practice includes the combination of potent medications with physical and behavioral therapy. We hypothesize that functional restoration and pain reduction in patients with APS does not require potent medications. The objective of this study is to describe a cohort of children with APS treated with a non-pharmacological highly structured protocol and to test whether previous utilization of pharmacotherapy (as a marker of initial severity) predicts subsequent treatment program outcomes.
Methods: We conducted a retrospective inception cohort study of children with APS treated with a non-pharmacological multidisciplinary program at The Children's Hospital of Philadelphia between January 2008 and December 2011. All pain medications were discontinued prior to program entry. The primary outcome, function, was measured with the Functional Disability Inventory (FDI) and Bruce Treadmill Score. We tested whether previous utilization of pharmacotherapy predicted treatment outcomes using mixed effects linear regression.
Results: We identified 168 individuals with APS treated over 4 years. The median age was 15 (range 8-18 years), and three-quarters of the patients were females. The median pain duration was 18 months (IQR: 1.5-96 months) and the median pain score 0-10 at program entry was 7 (IQR: 5, 8). Previous pharmacologic drug therapy exposure included opioids (N=90, 53%), immunosuppresssants (N=51, 30%), neurotropics (N=87, 52%), and psychotherapeutics (N=91, 54%). Median FDI at baseline and program completion were 28 (IQR: 19, 34) and 7 (IQR: 3, 14), respectively. Median Bruce Treadmill Score at baseline and program completion were 9.6 (IQR: 7, 11 minutes) and 13 (IQR: 11, 15 minutes), respectively. Median pain score at program completion was 3 (IQR 0, 7), which is significantly improved from baseline (P=0.01). Change in FDI and Bruce Treadmill Score from start to finish of the program were significantly improved (P<0.001). There was no significant variation in functional outcome associated with previous exposure to pharmacotherapy for the Bruce Treadmill Score (P=0.7) or Functional Disability Inventory (P=0.37).
Discussion & Conclusion: These results suggest that in comparison to those children whom were medication naïve and "less severe", those children with "more severe" disease who were receiving potent pain medications prior to the start of the program were as likely to have restoration of function. Additionally, these results demonstrate that regardless of treatment before program entry, children with AMP have successful restoration of function without pharmacotherapy. Prospective studies are warranted to determine long-term efficacy and effectiveness of this multi-disciplinary program.

Program no. 1-09
Impact of Pediatric Pain Rehabilitation on Analgesic Use in Chronic Pain Syndromes
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Introduction and Aims:
Children with CBP have higher use of medical care services. An epidemiological survey reported that 50% of children with CBP used analgesics and the prevalence of physician visits and analgesics use increased with age.[1] The overuse of these services represents a major economic burden on patients, families and society. It has been suggested that overuse of conventional healthcare services does not necessarily eliminate pain or improve the quality of life of children with CBP. Therefore, we hypothesized that treatment of CBP in an intensive Pediatric Pain Rehabilitation Center (PPRC) for a few weeks might reduce analgesic utilization after discharge.
Methods
We reviewed analgesics utilization of 268 patients (mean 14.4 years [8.4-20]; 85% females) at admission and discharge and of 199 at one-month follow-up. These patients attended PPRC for management of chronic painful musculoskeletal and neuropathic disorders for a mean of 3.6 weeks (1-10 weeks). The medications included opioids, acetaminophen, benzodiazepine, non-steroidal anti-inflammatory agents [NSAIDs], tricylic antidepressants [TCA], selective or norepinephrine serotonin reuptake inhibitors [SSRI or NSRI], anticonvulsants and topical analgesics. A subgroup of 96 patients received interventional regional nerve blockade of sympathetic ganglia 19%, peripheral nerves 12%, intravenous Beir-blockade 6% and intravenous ketamine infusion 5%. The data are presented as proportion of patients who discontinued the various medications at discharge and one-month follow-up (figure).
Results
At one-month follow-up there was significant reductions (P
Discussion and Conclusion
The administration of intensive interdisciplinary treatment for management of CBP disorders in children effectively reduced consumption of analgesics and eliminated the invasive therapies at one-month follow-up. The PPRC can provide significant savings in costs of healthcare and potentially reduce medication side-effects and iatrogenic complications from invasive therapies.
References: Roth-Isigkeit et al., Pediatrics 2005
Conflict of Interest: none
Acknowledgement: Supported by Sara Page Mayo endowment for study of pain.

Program no. 1-10
Subgroups of pediatric chronic pain patients: a cluster analytic approach.
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Southampton, School of Medicine, United Kingdom, Co-author(s): Silja Vocks, Osnabrück University, Department of Psychology, Clinical Psych, Co-author(s): Tanja Hechler, Children's and Adolescents' Hospital, German Paediatric Pain Centre, Germany
Introduction and Aims:
For children with chronic pain a variety of treatments is offered differing with regard to therapy focus and intensity.
The treatment allocation is currently based on the therapist's clinical judgment and cannot revert to a validated tool for treatment allocation. In order to provide treatment matching the child's needs it may be important to
identify patient groups with different degrees of impairment and patterns of the pain problem. To make a first step into this direction, it was the goal of this study to identify subgroups of adolescent chronic pain patients differing
with regard to pain-specific characteristics.
Methods:
Within a sample of 266 adolescents, subgroups were identified by means of cluster analysis. The stability of the classification was tested in a cross-validation with a second independent sample (N=108). Differences between
the groups were tested with regard to pain characteristics, health care utilization and emotional impairment.
Results:
Five distinct subgroups were identified differing in pain intensity, school absence, pain-related disability, passive pain coping and affective pain perception: Cluster 1) low pain problem severity, i.e. all parameters low, and especially low passive pain coping (18%); Cluster 2) low pain problem severity, but a pronounced increase in passive pain coping compared to Cluster 1 (26%); Cluster 3) moderate pain problem severity, characterized by high school absence and pain-related disability, while affective pain perception is low, and pain intensity and passive pain coping
are moderate (14%); Cluster 4) high pain severity, i.e. all parameters high, with the exception of school absence which is low (31%); Cluster 5) high pain severity along with very high school absence (10%).
The cross-validation achieved a very good agreement indicating stability of the cluster solution across samples (Kappa=.638). Group assignment was not associated with pain duration or pain location. The high severity cluster 4 and 5 reported high psychological distress. Two of the five cluster groups were well associated with inpatient (Cluster 5) and outpatient (Cluster 2) treatment recommendation.
Discussion and Conclusion:
Group assignment is not based on pain duration, but on other specific characteristics of the patients' chronic pain
condition. The classification may be a good basis for stratifying treatment options for adolescents with chronic pain. Future studies are warranted to identify more clearly which specific treatment approach can be useful for each
group and whether this classification needs further adaptation.

Program no. 1-11

SETTING UP CLINICAL TRIALS FOR ANALGESICS IN CHILDREN WITH SEVERE CHRONIC PAIN

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BACKGROUND. Clinical trials to assess effectiveness of drug therapy in children are challenging, especially given that the targeted condition is rare. Although there are few children with advanced cancer requiring chronic continuous treatment (Berde 2012); they represent most pediatric patients requiring long term strong opioid treatment. To study centrally acting analgesics in children suffering from chronic pain, this population and the study design have to be carefully considered.
OBJECTIVES. In preparation of a pediatric development program for tapentadol, we evaluated how to best manage the dilemma between standardizing the patient population while allowing inclusion of as many patients as possible and optimizing study design.
METHODS. We performed an in-depth literature research (MEDLINE, clinicaltrials.gov and scientific networks for pediatric pain and oncology) and interviewed 10 experts in the respective fields.
RESULTS. Most children with chronic pain suffer from cancer. This requires specific clinical trial conditions.
All interviewees confirmed that most of young oncology patients are included in therapy optimization trials. Therefore in contrast to clinical trials in adults, that commonly exclude participation in other trials, concomitant use of investigational drugs with marketing authorization“ irrespective of their indication or target population-, should be considered for pediatric chronic pain studies.
In adults, chronic pain is commonly defined as persistent pain for 3 months. Usually chronic pain trials are 12 weeks long. In a two week chronic pain study in children with 12 weeks extension, 53 out of 199 children died during the study (Finkel 2005). Therefore we propose to define chronic pain in children as pain existing for 7 days and to assess the primary endpoint after 14 days of treatment while offering treatment for up to 12 months.
CONCLUSION. Chronic pain in children requires a different definition and a different trial design compared to adults to be successful in completing clinical studies.
A.W., R.R., C.L. and J.G. are employees of Grünenthal GmbH. R.H. has received consultancy fees from Grünenthal GmbH.

Program no. 1-12

Physical and psychosocial needs of children with cancer in palliative care

Main author: Flaviany Faria, University of Sao Paulo, Brazil
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Nursing is a discipline designed to care and therefore proposes the establishment of interaction and close link with the patient, identifying their needs and their families by providing care that involves physical, emotional, psychological and spiritual aspects. Thus, arises the interest in evaluate which are the principal physical and psychosocial needs of children with cancer in palliative care. This work focused on a bibliographic review on Integrative Psychosocial and Physical Needs of Children with Cancer in Palliative Care with the following objectives: identify the main physical, psychosocial and spiritual needs of children with cancer in palliative care. Data were obtained through MEDLINE, CINAHL, LILACS AND PSYCINFO. In researching we used the terms: cancer, children, palliative care and needs. Analysis was carried out through the cataloging of the selected jobs. The data analyzed were: year of publication, country, language of the article, methodology, approach and population. Was analyzed 51 articles, mostly in English (98%), with a higher proportion of clinical studies (57%), predominantly in the year 2011 (19%) and of the regions of the United States (80%), England (10%), Australia (4%), Netherlands, Greece and Brazil (2%). The study population were children (100%).It was observed in the study, that the multidisciplinary team focuses mainly on the physical symptoms of the child, however, it is known that the control and/or relief of symptoms psychosocial distressing for the child should be implemented. The main physical needs of children with cancer in palliative care found in the study were: relieving symptoms such as pain, nausea, fatigue, loss of appetite, sleep disturbance, and neurological symptoms. Factors associated with relief and control of the anguish felt by the child and his family appears as the principal psychosocial needs. The fear and concern seem as a result of imminent death. It is important to maintain clear communication, honest and sincere with the child and his family. It is noteworthy that identify and understand the expectations and hopes of the child is essential, as well as previous experiences and identify needs for spiritual support. Concerning the spiritual needs, the goal is to respect the religion of the child and his family; respect the spirituality of these; provide a dignified death for the child; ease the anxiety and fear concerning the end of life.

Reference

Schiessl C, Gravou C, Zernikow B, Sittl R, Griessinger N. Use of patient-controlled analgesia for pain control in dying children. Support Care Cancer 2008; 16:531-6

Program no. 1-15

Review of Back Pain in a Paediatric Chronic Pain Clinic

Main author: Helen Neary, Alder Hey Childrens Hospital, Anaesthesia, United Kingdom
Co-author(s): Joelle Desparmet, Montreal Childrens Hospital, Anaesthesia, Canada

Introduction

The prevalence of back pain in adolescents is estimated between 16-26%. Levels of difficulty experienced with activities reported as 18-94%. The few longitudinal studies that exist suggest a future risk of further chronic pain or psychological problems in adult life (Hestbaek L et al, 2006).Aim - review patients with back pain, particularly relating to impairment of function and outcome following treatment program with a multidisciplinary team.

Method

The chronic pain clinic at Montreal Childrens Hospital is a multidisciplinary model. A database of all patients attending this clinic has been maintained at since 2001. Inclusion criteria - patients presenting with back pain as primary complaint or in conjunction with other sources of pain. Additional information included the impact of pain on activities of daily living including school attendance, social activity and sport participation, and interference with sleep pattern. Data was extracted from Microsoft Access it was analysed using Microsoft Excel.

Results

398 patients attended over 11 years, 99 (24.9%) had back pain as at least one presenting complaint. Mean age 14.8 years, female:male almost 3:1 (73F:26M). 40.4% had isolated back pain; whereas 59.6% had other additional pain complaints predominantly lower limb pains, neck pain and headaches. 49/99 could identify no precipitating event. 93% had tried medications, with 2/3 using NSAIDs, 11.1% had already commenced strong opioids (morphine, oxycodone) prior to attending clinic. 24/99 had sought out complementary medicine treatments.

Impairment of at least one aspect normal activity was reported in 94.9% patients, with over 60% reporting pain limiting all three areas: sports participation, school attendance/achievement and sleep disturbance.

The majority received physiotherapy (82.2%); 71.7% medications, 33/71 receiving NSAIDs and 32/70 anticonvulsants such as gabapentin; and 47.8% had psychology interventions. 68.7% patients were followed in pain clinic for under 12 months, of these 70.6% were discharged fully or greatly improved.

Conclusion

Back pain is a real problem affecting a number adolescents, and can have significant impact on normal activities, particularly schooling, sports involvement and sleep. A treatment strategy combining physiotherapy, medical and psychology expertise was effective in many of these patients. Impact on education and reduction in physical activity during adolescence could have lasting consequences in adult life, including achievement, employment, obesity, predisposition to chronic pain in adulthood and adverse psychological consequences. Incorporating physiotherapy and psychology input into management

is essential. Further impact investigations and longitudinal studies into adulthood are needed.

Program no. 1-16
Interventional studies for children and adolescents with oral mucositis
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Co-author(s): Tove Kamsvåg Magnusson, Women's and Children's Health, Co-author(s): Ann-Carin Svanberg, Medical Sciences, Co-author(s): Louise von Essen, Public Health and Caring Sciences, Co-author(s): Gustaf Ljungman, Uppsala University, Women's and Children's Health
Background and aims: Oral mucositis (OM) is a common adverse effect of chemotherapy, radiotherapy and conditioning regimens before Hematopoietic Stem Cell Transplantation (HSCT), mainly affecting patients on cancer treatment. Nearly 90 % of pediatric patients undergoing HSCT are afflicted with OM. The condition is highly debilitating and painful often causing difficulties eating, drinking and talking and affecting the patient's well-being. It reduces treatment intensity and increases incidence of infection and nutritional problems. Beyond a significant suffering for the patient it is hence associated with higher costs for health care and increased mortality. The current scientific situation regarding prevention and treatment of OM has been summarized in Cochrane reports showing limited data on adults and practically missing data on children and adolescents. Concluding guidelines from these reports emphasize the need for well conducted randomized controlled trials (RCT's) to evaluate and refine treatments in order to establish evidence based interventions.
In line with previous research and international guidelines, the aim of this study is to investigate the effect of both medical and psychological interventions for children and adolescents with OM.
Methods: The effect on OM related pain and discomfort of three medical interventions and one psychological will be evaluated in four RCT's. The interventions evaluated are determined in accordance with available research. All children and adolescents, aged 4-18, undergoing HSCT in Sweden are eligible for participation. One intervention is already actuated evaluating cryotherapy. An acceptance based internet delivered psychological intervention targeting pain experience will be launched during 2014. Two medical interventions will follow according to up-to-date research.
Results: The study is on-going and results from the separate RCT's will be reported continuously from 2014.
Discussion and conclusion: There is presently limited knowledge about prevention and treatment of OM, particularly for the pediatric population. The results from the present study will contribute to the process of establishing a more evidence based care of OM for children and adolescents.

Acknowledgments: The study has been funded by The Swedish Childhood Cancer Foundation.
Conflict of interest: The authors declare no conflict of interest.

Program no. 1-17

Diffuse Widespread Pain (DWP) Presenting to a Pediatric Chronic Pain Clinic

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Introduction

Musculoskeletal pain in children is common, prevalence between 5-38% (Schanberg LE, 2003). Pain in childhood can have a number of consequences both on the child and the family. Adolescents with pain at multiple sites have more disabilities than those with single site pain; and El-Metwally A et al, 2004, reports a 4 year recurrence rate as high as 65%. Aim - review patients with DWP, particularly relating to impairment of function and outcome following treatment program with a multidisciplinary team.

Method

The chronic pain clinic at Montreal Children's Hospital is a multidisciplinary model. A database patients attending the clinic has been maintained at since 2001. Inclusion criteria were patients presenting with DWP as primary complaint or combined with other sources of pain, idiopathic or non-idiopathic. DWP was defined as musculoskeletal pain in 3 or more areas, experienced at least once per week. Additional information included impact of pain on daily activities including school attendance, social activity and sport participation, and interference with sleep pattern. Data was extracted from Microsoft Access, analysed using Microsoft Excel.

Results

39 (9.8%) patients presented with DWP of a total of 398 over 11 years. 92.6% female (p=0.0002), age range 7.4- 17.7 years, mean 14.4 years. Mean duration of time child had experienced pain 2.4 years (0.17-8.4 years). 64.1% (25/39) identified no precipitating event; 7 (17.9%) following surgery; 7 due to disease process. 1 in 5 complained of additional sources of pain, most commonly headaches, affecting 10.3% patients overall.

An adverse effect on schooling (67%), sports participation (69%) and sleep (74%) was seen; with 3 in 10 of total having all 3 areas affected. Medications and psychology was provided for 75.8%. Physiotherapy was accepted by 20/39, 90% these included a stretching or an exercise training program, 65% postural correction and 60% strengthening exercises. 63.6% patients were discharged fully recovered or greatly improved.

Conclusion

Diffuse pains during childhood are common, but some children they can have serious deleterious consequences which impact on many aspects of their lives. Our clinic model, with integrated input from psychology and physiotherapy, produced successful outcomes with almost 2/3 patients functioning normally at discharge. Studies are questioning if widespread pain in childhood predisposes towards chronic widespread pain in adults. Greater efforts are needed to provide effective treatment combinations early, therefore multidisciplinary approach is essential to combat the multifactorial nature of diffuse widespread pain.

Program no. 1-18

Distress related to oral mucositis during stem cell transplantation in children

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Introduction and aims: Oral mucositis (OM) is a common adverse effect of chemo- and radiotherapy, which is highly debilitating and painful for the patient and threatens the effectiveness of therapy. There is limited knowledge about the impact of mucositis in children who undergo hematopoietic stem cell transplantation (HSCT) today and there are no guidelines for the treatment of OM in children. The aim of this study is to investigate the experience and treatment of oral mucositis in children and adolescents who have undergone HSCT.
Methods: Questionnaires addressing symptoms, consequences, and treatment of mucositis were sent to families of children (0-18 years old) who had undergone HSCT in Sweden 2008-2011. A total of 127 parent-proxy-questionnaires and 69 child-questionnaires (children ≥7 years) were sent out.
Results: The response rate was 56 % for parents and 51% for children. The mean age of the child was 9.1 years in the parent-proxy version and 12.7 years in the child version. OM was next to nausea ranked as the most distressing condition during treatment. Mouth pain was reported by the vast majority of parents and children (86 and 83 % respectively). Half of the parents and 82 % of the children reported mouth ulcers and dysgeusia (taste perceptions alterations) was reported by 93 % of the parents and by all children. Most pain was associated with eating, brushing teeth and oral examination. Almost half of the parents reported that their child had problems eating solid food and one third reported that their child had problems ingesting liquids due to mouth pain. According to the parents, a third of the children had received prophylactic treatment against OM. A majority of the parents reported daily assessments of their child’s oral status and half of them reported that their child had needed analgesia for mouth pain. Forty percent of the parents reported dissatisfaction with the pain-treatment that had been given to their child.
Conclusions: OM affects many children undergoing HSCT causing much pain and discomfort. Treatment of OM and its symptoms in children and adolescents is presently insufficient, more evidence of such treatment is needed, and subsequently there is a need to establish a more evidence-based care.

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Program no. 1-19

Long-term participation in adulthood with chronic pain and fatigue during adolescence

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Introduction & Aims: Chronic pain and fatigue are both common complaints in childhood and adolescence. Furthermore there is a lack of knowledge on the future functioning and participation once they have entered
adulthood. Knowledge on the course of participation and even more important knowledge on predicting factors for this future participation would help to improve current rehabilitation programs, but is currently not available. The
aims of this long-term follow-up study are to gain insight into the current situation of these young adults regarding functioning and participation, to discuss differences between the current chronic pain/fatigue group and the
group without complaints and to identify predictors for participation.
Methods: Data collection was performed in young adults who all received an inpatient rehabilitation treatment for chronic musculoskeletal pain or fatigue between 1991 and 2005. Participation, our primary outcome, is measured with the Impact on Participation and Autonomy (IPA). For the analysis, participants were categorized in two groups: a group with current chronic pain/fatigue, and a second group without these complaints. Differences between these two groups ($p<0.05$) were verified on the following variables: age, gender, health care
utilization, education level, paid job, activity level (SQUASH), participation (IPA) and quality of life (RAND36). Linear regression analysis with the IPA subscale work and education as dependent variables is performed. As potential predictors and confounders, gender, age, time since treatment, education level, pain/fatigue, duration of complaint, family pain/fatigue history, family situation and presence of brothers/sisters, were integrated in the
regression analysis.
Results: 94 young adults (91.5% girls, mean age: 26.6 years) participated. 63.4% of the participants still had pain/fatigue complaints. Differences between those with current chronic pain/fatigue group and those without complaints ($p<0.05$) were found regarding gender ($Z=-1.98$), having consulted a social worker in the past three months ($Z=-3.50$), medication use ($Z=-2.81$), having a paid job ($Z=-3.01$), IPA subscale work and education ($F=9.61$), RAND36-physical functioning ($F=11.95$) and RAND36-role functioning physical ($F=12.38$). It appeared that the level of pain/fatigue in adolescence is a predicting factor for the IPA subscale work and education in adulthood ($\beta(SE)=0.015(0.007)$, $p=0.03$, $R2=0.244$).
Discussion & Conclusion: A considerable number of young adults who were confronted with pain and fatigue in adolescence still had complaints in adulthood. Young adults

who had ongoing pain/fatigue complaints in adulthood and those who recovered differed in health care utilization, participation and quality of life. The only predictor for long-term participation was the amount of pain/fatigue in adolescence.

Program no. 1-20
Predictors for successful treatment in adolescents with chronic pain and fatigue
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Introduction & Aims: In the Netherlands adolescents with a high level of disability due to nonspecific musculoskeletal chronic pain or fatigue are regular treated in an inpatient rehabilitation setting. Whether rehabilitation treatment for adolescence with pain/fatigue has the potency to result in clinical relevant improvement in the level of complaints and quality of life is currently unclear. In addition, it is unclear which pre-treatment factors will predict a positive result of treatment. Therefore the aim of the present research is to study predictors for a positive treatment result of adolescents with chronic pain and fatigue.
Methods: Data collection was performed in a population of adolescents with nonspecific chronic pain and fatigue referred for inpatient rehabilitation treatment in five rehabilitation centers from 2001 till 2005. Treatment success was defined positive in case 2 out of 4 outcome measures showed a clinically relevant change and the other two did not show a decrease. The outcome measures are the level of pain or fatigue, school absence (three categories) and the summary scales physical functioning and psychosocial functioning of the Child Health Questionnaire 50-item Parent Form (CHQ-PF50). We defined a 10 mm decrease on the VAS for pain or fatigue and an upgrade in category for school absence clinically relevant. Also when the two CHQ-PF50 summary scales reached the healthy population norm values this is regarded as a clinically relevant change. Potential predictors for treatment success were selected based on scientific literature and expert opinion. A stepwise logistic regression analysis was performed with treatment success as independent variable. The dependent variables in this analysis were age, gender, level of pain/fatigue, duration of complaint, family pain/fatigue history, life events, a coping style, personality traits, anxiety, paternal work level and paternal marital status.
Results: 172 adolescents (85.5% girls, mean age: 16.2 years) with nonspecific chronic pain and fatigue participated. For all four outcome measures, pain or fatigue, school absence, physical functioning and psychosocial functioning, statistically significant differences ($p<0.000$) between pre and post treatment were found. Based on our criteria, 57.7% of the participants achieved a positive treatment result. The presence of family pain/fatigue history appeared to be the only predictor for a positive treatment result ($\beta(SE)=2.13(1.09)$; $p=0.05$; $R2=0.580$).
Discussion & Conclusion: Following the definition of a positive treatment result, considering clinical relevance, more than half of the participants was successfully

treated for their chronic pain and fatigue complaints. Only family pain/fatigue history predicted this treatment success.

Program no. 1-21

A Randomized Trial of Amitriptyline versus Gabapentin for Neuropathic Pain in Children

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Introduction and Aims:
Treatment of neuropathic pain and complex regional pain syndrome requires a multimodal approach of pharmacologic, physical, and psychological therapies. While amitriptyline and gabapentin are our front line drugs for treating neuropathic pain, no studies have yet compared them directly to determine which drug might be better for relieving pain, disability and sleep disturbances.
Objectives:
Our primary study objective was to compare the efficacy of amitriptyine and gabapentin for treating neuropathic pain in children in a randomized controlled trial (RCT). Secondary objectives were to evaluate changes in children's disability and sleep.
Methods:
Eligible participants ranged from 8 to 17 years of age. Diagnosis of neuropathic pain (pre 2011 NP classification) was made at The Hospital for Sick Children's Chronic Pain Clinic. Electrocardiograms were performed on all patients prior to study to rule out conduction abnormalities. Patients were prescribed a regimen of pharmacologic, physical, and psychological therapy. Patients received either amitriptyline (10 mg qhs) or gabapentin (300 mg tid) with capsules matched for size and dosing regimen matched with appropriate placebos for a 6-week, triple-blind (patient, physician, data analyst) RCT. Patients completed weekly interviews to obtain outcomes and attended an in-hospital interview at 6 weeks. Primary outcome was a change in usual (i.e., past week) pain intensity from baseline to 6-weeks as measured by an 11-point Colored Analog Scale.
Results:
Thirty-four patients (82% female) were randomized to amitriptyline or gabapentin. Two patients allocated to the amitriptyline group were ineligible due to a contraindicated condition identified at start of trial. Three participants were discontinued from amitriptyline and gabapentin groups (1 and 2, respectively) due to adverse events deemed unrelated to study medications. The primary analysis was based on 29 patients having completed the study. Mean pain intensity at baseline was comparable for 2 groups: 6.5±1.4 for amitriptyline and 5.3±2.6 for gabapentin. At the end of the 6-week trial, mean usual pain intensity was 5.0±3.0 for amitriptyline (a difference of -1.5 from baseline) and 3.3±2.4 for gabapentin (a difference of -2.0 from baseline). Usual pain scores did not differ significantly between groups ($p > .05$, independent sample t-tests).
Discussion and Conclusion:
Based on our data, our standard dose of amitriptyline and gabapentin are effective in

reducing usual pain intensity ratings in a 6 week trial for children and adolescents with neuropathic pain.
Funding: Canadian Institutes of Health Research New Emerging Team Grant (GHL - 63209)

Program no. 1-22
Self-oriented and socially-prescribed perfectionism in pediatric chronic pain
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Introduction: Perfectionism is a multidimensional construct that can be classified as self-oriented perfectionism (SOP: pursuing personal standards of perfection) or socially prescribed perfectionism (SPP: belief that others demand perfection from the self) (Hewitt & Flett, 1991). Perfectionism is associated with increased disability and pain severity in adults (Flett et al., 2011; Hadjistavropoulos, 2007) and greater pain severity in children with headache (Kowal & Pritchard, 1990). Clinically, many pediatric patients with chronic pain are perfectionistic; yet little research has examined linkages between perfectionism, pain and psychosocial correlates in children with chronic pain.

Aims: To describe the relationships between SPP, SOP and physical, emotional, and behavioural symptoms in a pediatric chronic pain sample.

Methods: Retrospective chart review of 146 patients who received a psychosocial assessment at a pediatric chronic pain clinic. Questionnaire data was examined with respect to pain symptoms (Pain Intake Form), functional disability (Sick Kids Disability Scale), perfectionism (Child and Adolescent Perfectionism Scale), psychosocial symptoms (Behavior Assessment System for Children-2), and family functioning (Family Assessment Measure-III).

Results: Of the total sample (mean age 13.7 ±2.7 years, 75% female, usual pain: 6.37±1.90), mean SPP and SOP were within the normal range (Z= -0.42 ± 0.97; Z= -0.29 ±1.09 respectively). Twenty-nine patients (19.86%) had high SPP and 32 patients (21.91%) had high SOP (1SD above the mean respectively). SPP and SOP did not vary based on children's age, gender, pain diagnosis or pain intensity. The majority of significant findings were associated with emotional and behavioural factors, particularly for SPP. SPP was significantly correlated with higher somatization (r = 0.24), poorer attitude towards teachers (r = 0.37), lower locus of control (r = 0.65), increased sense of inadequacy (r = 0.40), social stress (r = 0.45), and less school disruption (r = -0.21). SPP was also significantly correlated with poorer child rated family relations (r =0.50) and higher parent rated child aggression (r = 0.21). Both SPP and SOP were associated with depression (SPP r = 0.35; SOP r = 0.27) and anxiety (SPP r = 0.34; SOP r = 0.49). SOP was correlated with lower self-esteem (r = -0.18). All p-values were less than 0.05.

Discussion and Conclusion: Socially-prescribed perfectionism was associated with more

emotional and behavioural problems than self-oriented perfectionism. Clinically, this finding highlights the importance of assessing the perceived pressures to perform that children experience from others. Further research is necessary to elucidate predictive relationships between SPP and chronic pain.

Program no. 1-23
Feasibility of a six week resistance training program in juvenile idiopathic arthritis
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Introduction and aims: Children with juvenile idiopathic arthritis (JIA) are less physically active than healthy children, consequently compromising their musculoskeletal health and quality of life (4). Resistance exercise can improve pain symptoms (via exercise induced hypoalgesia) and musculoskeletal fitness (1,2), but there is a paucity of research in children with JIA. The purpose of this study was to investigate the feasibility of a six week resistance training program in JIA patients. Methods: 15 participants (8-18 years) with any subtype of JIA, as well as active or inactive, are currently being recruited from Dr. Alan Rosenberg's (pediatric rheumatologist) patient base. Via DVD videos, participants will follow a 45 minute, 3 days per week, 6 week resistance training program. Pain is the primary outcome measured using an electronic pain diary (PInGo©) for Android tablets, developed in collaboration with Dr. Susan Tupper. The app is based off previous work of Dr. Stinson for measuring chronic pain (3). Participants answer questions once a day on non-exercise days and three times a day (before exercise, after exercise, and end of day) on exercise days. This will allow real-time data collection on pain less subject to recall bias. Other variables include inflammation (using Doppler ultrasound), muscle size (using B-mode ultrasound), muscle strength (using a dynamomter), and functional capacity (using the childhood health assessment questionnaire), all measured pre and post the exercise program. A closing questionnaire is also being given to understand the user-friendliness of PInGo©. Finally, baseline physical activity is being accounted for using accelerometers to estimate 7 day physical activity patterns one week before the exercise program begins. This will then be factored in as a covariate in the analysis. Results: Data collection has been staggered due to the limited number of devices and in total will take 4 months. Discussion and Conclusion: This study will allow clinicians and researchers to understand the safety and therapeutic benefit of resistance exercise in JIA patients. By measuring pain through an electronic pain diary, a better understanding of pain variability in a naturalistic setting will also be attained. Further research can then be performed with larger populations using randomized control trials to give accurate resistance training recommendations for children with JIA.
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Program no. 1-24

Does chronic pain in adolescents persist in adulthood? Follow-up of 81 patients

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Introduction and aims : The aim of this study is to describe a population of adolescents who accessed to an out-patient pain clinic for unexplained musculoskeletal pain or Complex Regional Pain Syndrome, their evolution 5 to 15 years later, and to identify factors associated with persistent pain in adulthood.

Methods The data of 129 adolescents in pain were collected and these former patients were contacted by telephone.

Results 81 subjects were finally included. At the first consultation the average age was 13 years, 80% were female, 58% were in pain since more than 6 months, with a severe or very severe intensity in 85%. 72% missed school days because of pain. Therapeutic propositions consisted in psychological approaches in 80%, amitriptyline in 34% and pain medication in 25%.

Today the mean age is 23 years, 85% are female. The average follow-up is 10 years. 68% report continuing pain, 75% once a week or more. The pain intensity is lower than in childhood: severe or very severe intensity in 56%. 50% have school or work absenteeism because of pain, 9 days on average during the last 6 months. 62% went at least one time to their doctor for pain, never to a pain specialist. 57% use pain killers once a week or more. 20% report poor health, 44% are very hampered in physical activities, ¼ are hampered in social relationships and 62% have nighttime awakenings. Nevertheless most report going much better than before.

Those who are still in pain have a significantly worse health (p=0,02) and are significantly hampered in physical effort (P The only significant factor associated with a poor evolution is an older age of first consultation: the risk of persistent pain is 11 times higher for those who consulted at 15 years and more compared with the 10-12 years old group (OR=11.4, 95% CI = 2.3-57). It is 4 times higher for the 13 -14 years group (OR=4.2, 95% CI =1.3-13.1). However the duration of pain is not a significant factor associated with the persistence of pain.

Discussion and Conclusion 2/3 of the former patients are still in pain especially if pain appeared after 13-14 years and even more after 15 years. Explanations could be discussed like different pathologies in cause according to age, cerebral plasticity€¦The impact of pain is variable but half are hampered in daily life. The study will be completed by new inclusions and a long-term follow-up to precise the evolution.

Program no. 1-25

Treating Adolescent Chronic Fatigue Syndrome: Multidisciplinary Chronic Pain Model

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Chronic fatigue Syndrome (CFS) is defined as severe chronic fatigue of 6 months or greater with concurrent symptoms leading to pain, unrefreshing sleep, and/or malaise. CFS occurs in 4.4 percent of adolescents in the United States and can significantly impact physical, emotional and social function of the adolescent. Treatment recommendations for CFS in adolescents encompass a variety of modalities.
This poster will discuss three clinical cases of adolescents with CFS along with their treatment approaches in the multidisciplinary outpatient pain clinic at Nationwide Children's Hospital and the patient outcomes.
The primary focus of treating CFS has been to try to combat the debilitating fatigue that characterizes it. Yet, chronic pain can be just as persistent and troublesome to those who suffer from it and is reported in 80-90% of cases. While graded exercise therapy and cognitive behavior therapies are routinely recommended for people with CFS, many patients routinely seek other
nonpharmacologic complementary and alternative therapies known collectively as CAM.
Graded Exercise Therapy
Patients participated in an individually structured graded activity and exercise program supervised by the teams physical therapist. Patients were exposed to a gradual systematic progression of activity and exercise from an initial tolerable level. Activity pacing strategies, therapeutic education, and explicit patient-centered goals were also incorporated into each patients treatment program.
Acupuncture
Patients received acupuncture treatments based on their diagnoses and primary symptoms as administered by the teams licensed acupuncturist. Patients and their parents were routinely taught how to safely perform home moxibustion, the stimulation of acupuncture points via an external heat source applied to the skin, in order to capitalize upon the frequency of treatment that CFS necessitates.
Psychology
Sessions with patients and their parents focused on three interventions. One, sleep hygiene was reviewed and modifications recommended, with individual goals set between sessions. Two, daily activity schedules were constructed in terms of school attendance/performance, peer/family interactions and home responsibilities. Three, biofeedback training was conducted to assist in energizing physiological responses. Consequences for following recommendations and meeting goals were established as well.
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Wyller VB. (2007). The chronic fatigue syndrome “ an update. Acta Neurol Scand, 115 (187), 7-14.

Program no. 1-26

Analgesic Control with transdermal fentanyl. Report of our experience.

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Introduction & Aims,:The treatment of pediatric intense pain is a constant challenge for those who treat childrens's pain. In specific cases the use of transdermal fentanyl is an option for treatment that helps in relieving cancer pain and the consequent improvement in quality of life. Transdermal fentanyl is a strong opioid, 75 to 100 times more potent than morphine. Its use is released in children above 2 years when the control of pain is difficult. Because the pharmacokinetics of this peculiar age, their trade can be made every 48 rather than every 72 hours. The aim of this study was to report the monitoring of a pediatric oncology patient, in palliative care that use transdermal fentanyl, showing the benefits of its use in this population. Methods: Case Report

Results:KRS, female, 15 years old, with neuroblastoma with bone metastases, in exclusive palliative care for 1 year. She was met at the clinic fortnightly, with few hospitalizations in the last year. Resulting from bone metastases, analgesia was increased to maintain their quality of life and autonomy. The patient has arrived for the pain group receiving morphine, with random intervals , in the beginning with a dose of 5 mg PO every 6hs. As, with the disease progression, the interval use of morphine has been decreasing and increasing the dose of morphine until the daily dose of morphine be all right. When the total daily dose of morphine became similar to transdermal fentanyl 25mcg/kg/h it was made the converting of the medication and placed the first adhesive of fentanyl. That was being changed every 48 hrs. Other analgesics were also used: ketamine (dose for neuropathic pain), gabapentin, amitriptyline. The dose of fentanyl reached up to 125 mcg / kg / h, always associated with morphine for pain rescue. The patient was hospitalized six days before her death to better pain control and support for the process of dying.

She died in the ward, without pain, with complications resulting from the underlying disease.

Conclusion:Following K.R.S. and their families, we conclude the importance of good control with transdermal fentanyl, reducing the length of hospital stay of the patient as well as the amount of oral medications.

We provide this family autonomy to continue their usual tasks and time to organize their plans.

Reference:

Zernikow B, Michel E, Craig F, Anderson BJ.Pediatric palliative care: use of opioids for the management of pain. Paediatr Drugs. 2009;11(2):129-51

Program no. 1-27

Physical activity and sleep quality in children and adolescents with chronic pain

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Introduction and Aims

A large number of children and adolescents suffer from chronic pain. For many, pain results in substantial disability. Often, daily activities such as school and extracurricular activities (i.e. sports, meeting friends etc.) as well as the quality of sleep are greatly affected. In this population, traditionally, measures of daily activity and sleep pattern has for the most part been limited to subjective ratings by the children/adolescents themselves and/or their care-givers. Actigraphy (accelerometer) is a more objective method for estimating daily physical and nocturnal activity. However, research using actigraphy in the study of children and adolescents with chronic pain is fairly limited. Preliminary results indicate that this could be a useful methodology for use in pediatric populations, where the common reliance on subjective and/or parental report alone may limit the range and accuracy of information.

This poster will present preliminary results from a cross-sectional study on pediatric chronic pain patients, using pre-treatment assessments. The primary aim of this study is to examine the correlation between self-reported data of physical activity and sleep and data collected using the actigraph. Also, we will analyze how actigraph assesments are related to disability and depression.

Methods

Data will be collected from 30 pediatric chronic pain patients wearing an actigraph consequently during one week as part of a pre-treatment assessment. During the same period, subjective ratings of activity and sleep as well as treatment outcome measures will be collected. Collection of data will be ongoing during January 2013 through April 2013. Preliminary results will be analysed in April/May 2013.

Results

In short, simple correlational analyses are conducted to investigate the relation between subjective and objective measures of daily activity and sleep. Furthermore, analyses will be conducted to explore relations between activity, sleep, and relevant treatment process and outcome measures.

Discussion and Conclusion

Implications for treatment will be discussed based on these findings.

Program no. 1-29

Prevalence of chronic pain in pediatric ADHD and Asperger Syndrome

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Introduction and Aims:

Clinical reports of chronic pain are more frequent in children with ADHD or Asperger

Syndrome (AS) compared to an undiagnosed population. A recent study in a large sample of female patients with fibromyalgia, found a significantly higher frequency of ADHD symptoms in childhood compared to the normal population (Reyero et al., 2011). Furthermore, at the Clinic for Behavioral Medicine, Pain Treatment Services at Karolinska University Hospital, ADHD and AS traits are seen to a relatively large extent in pediatric patients compared to a general population and case reports from other pain clinics testify to the same result (Bursch, B. et al., 2004). Undoubtedly this pattern could be observed in pain clinics and neuropsychiatric care everywhere. In a recent review on AS (Dubois, A. et al. 2010) the authors revealed the need for more research in this field and concluded that it was underexploited by the scientific community. From a clinical point of view, more knowledge about pain in people with neurodevelopmental disorders and vice versa, should enable the development of better assessments and, consequently, entail better pain management in daily care.
The aim of the current research is to establish the prevalence of chronic pain in a pediatric population diagnosed with ADHD and/or Asperger Syndrome
Methods:
In a sample of 400 children diagnosed with either ADHD or AS and their parents in an cross-sectional study currently starting up at the Clinic for Behavioral Medicine, Pain Treatment Services at Karolinska University Hospital in collaboration with PRIMA Child and Adult Psychiatry in Stockholm, the prevalence of chronic pain is assessed using a self-report questionnaire.
Results:
Data will be collected starting from February 2013 and preliminary results will be available in June 2013.
Discussion and Conclusion:
This poster will present the results from the analyses of the above research and discuss implications for future interventions and research.
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Program no. 1-30
Value-based Living, Disability and Pain in Children with Sickle Cell Disease: Does child sex matter?
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Introduction and Aims: Sickle Cell Disease (SCD) is a blood disorder with acute and chronic pain symptoms, which can influence many facets of one's life e.g.,

emotional functioning and relationships). Recent studies suggest that Acceptance and Commitment Therapy can improve functioning in children and with disease-related pain through emphasizing successful value-based living in the presence of pain and other distressing symptoms. The aim of this study was to examine the relations among functional disability, values-based living, pain and sex in children with SCD.
Methods: The institutional ethical review board approved the current study. Participants included 28 8 to 18-year-olds diagnosed with SCD who were attending a clinic visit. Children completed the Functional Disability Inventory, the Chronic Pain Values Inventory, a Visual Analog Scale to indicate their normal pain, and parents reported the number of pain crises per month.
Results: Correlational analyses revealed a significant positive relation between child sex and disability, $r = .44$, $p \leq .05$ and no significant relationships among pain and other outcomes. A t-test showed that girls reported higher disability than boys, $t = -2.29$, $p < .05$. Total success in living according to values and pain did not differ by sex. A hierarchical regression found a significant disability by sex interaction as a predictor of success, $F (3, 22) = 5.91$, $p < .01$. Controlling for normal pain, pain crises and disability, the disability by sex interaction significantly predicted success in living ($B=-2.17$, $SE=.36$, $p < .01$) in boys, but not in girls.
Discussion and Conclusion: Both groups endorsed similar rates of pain and success in living according to their values, and pain was not related to disability or value-based living. Even though girls reported more disability, boys' level of disability was more strongly linked to their success in living a value-based life and, as such, should be targeted for intervention to help prevent negative outcomes. The results of this study highlight important sex differences in children with SCD and suggest child sex may influence beliefs about disability and the ability to lead value-based lives above and beyond pain.
Acknowledgments: This study was supported by the U.S. Department of Health and Human
Services (DHHS), Health Resources and Services Administration (HRSA; D40HP19643).
Conflict of Interest: Authors have no conflict of interest.

Program no. 1-31
CT guidance for thoracic nerve root neurolysis in a 13 year old female with osteosarcoma
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CT guidance to maximize efficacy and safety in thoracic nerve root neurolysis for a 13 year old female with osteosarcoma and chest wall pain
Introduction and Aims

Neurolytic nerve blocks carry the risk of causing harm to adjacent nerves and other tissue. Yet, in the cancer patient with significant pain and a poor prognosis of cure, they can greatly improve quality of life.
The patient is a 13 year-old female with left sixth rib osteosarcoma with diffuse pulmonary, bone, and brain metastasis. Three months after diagnosis, she developed severe right chest wall pain, a pleural effusion and increased pulmonary and rib metastasis. Her pain was well circumscribed, but was poorly controlled on methadone and hydromorphone, with dose limiting side effects of sedation and nausea.
Method
Neurolytic blocks of right nerve roots T5 thru T7 were performed under general anesthesia in the prone position. A radio-opaque grid was utilized to map the trajectory of the 22 gauge spinal needle. Once needle position was verified, one milliliter of Isovue-M200 was injected to assure placement at the nerve roots with limited spread into adjacent tissue and the epidural space. One milliliter of 98% alcohol was injected at each nerve root. Lastly, 0.5 milliliters of 1% lidocaine was injected prior to withdrawal of the spinal needle. A final image confirmed that the spread of contrast was limited to the paravertebral space.
Results
She was immediately pain free post procedure. She was without signs of adjacent nerve injury or neuritis such as right chest wall paraesthesia or burning. Opiates were discontinued post procedure day one, and she was discharged to home on oxycodone once daily to prevent withdrawal. At two months, she remains pain free. She continues to use non-opiate therapy for baseline back pain.
Discussion and Conclusion
Thoracic nerve root blocks have been used to treat recalcitrant pain in the adult cancer population. In the adult population paravertebral blocks are done via loss of resistance. Neurolytic paravertebral blocks utilize a technique that elicits paraesthesia to assure accuracy of block placement. In the pediatric population this awake technique would not be well tolerated or safe.
The use of neurolytic blocks within the pediatric population remains limited to unremitting pain in cancer patients with poor prognosis. The skill of the pain physician coupled with confirmation of appropriate spread by CT guidance allowed the patient to have excellent pain relief without side effects.

Program no. 1-32
Predictors of Health Care Utilization in Adolescents with Chronic Pain
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Introduction & Aims
The Pediatric Initiative on Methods, Measurement, and Pain Assessment (Ped-IMMPACT) identified economic factors as an important outcome of interest for chronic pain trials and encouraged further research in this area. However, given the paucity of information on economic factors in this population, there is a great need for foundational research on factors that influence health service use (and associated costs) among

children and adolescents with chronic pain. The aim of this study was to examine demographic, individual, and clinical factors associated with health service use among a sample of adolescents with non-disease chronic pain.
Methods
The sample for this study consisted of 182 adolescents, aged 11-16 years (M=14.34 years, SD=1.58) with chronic headache, abdominal, or musculoskeletal pain not associated with chronic disease, and their parents. Families were participating in a randomized controlled trial investigating the efficacy of an internet-delivered cognitive-behavioral pain intervention program, and were recruited from multidisciplinary chronic pain treatment centers across the United States and Canada. The sample was predominantly female (74%), non-Hispanic White (91%). At baseline, prior to randomization, participants completed measures to assess pain intensity (0-10 Numerical Rating Scale), activity limitations (Child Activity Limitations scale; CALI), parental protective behaviors in response to adolescents' pain (Adult Responses to Children's Symptoms scale; ARCS), health service use (Client Services Receipt Inventory; CSRI), and demographic information (including household income).
Results
Multiple regression and logistic regression analyses were used to examine the impact of pain, activity limitations, parental protectiveness, adolescent sex, and household income on total number of outpatient medical, mental health, and physical therapy appointments (measured on a continuous scale), the number of emergency department visits (measured on a dichotomous scale of no visits versus one or more visits), and the number of hospital admissions (no admissions versus one or more admissions) over the preceding twelve months). Findings indicated that greater pain intensity (β=.20, p=.024) and higher levels of activity limitations (β =.22, p=.031) were associated with more outpatient health care visits. There were no significant predictors of emergency department visits or hospital admissions.
Discussion & Conclusion
Results indicate that clinical factors, such as pain intensity and disability, had the strongest influence on health care appointments in this multinational clinical cohort of adolescents with chronic non-disease pain. Future analyses will associate these health service variables with cost indicators to investigate the financial burden to individual families associated with pediatric chronic pain treatment.

Program no. 1-33
Severe Neuropathic Pain after Sympathectomy for Prevention of Sudden Cardiac Death
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Introduction: Left cardiac sympathetic denervation (LCSD) exerts a significant anti-fibrillatory effect and reduces the frequency of cardiac events in patients with potentially lethal cardiac channelopathies. Via thorcacoscopic approach, a surgeon resects the left sympathetic chain from the lower half of the stellate ganglion (T1) through T4. Recovery for most patients is uneventful. Of 110 patients, we present two who experienced

severe neuropathic pain after LCSD refractory to aggressive medical pain management.
Methods: A retrospective review of two patients who experienced severe neuropathic pain was conducted.
Results: A 10-year-old male and 37-year-old female were identified. Both pain patterns were identical, with constant pain in the posterior scapula (allodynia), left chest wall incorporating T3-T5 dermatomes, and shooting pain into the left arm. Both patients denied provocative maneuvers. Sleep disturbance was profound. Physical examination yielded severe allodynia to light touch over the left posterior scapula. Surgical incisions were non-tender; Tinel's sign was negative. Motor function was intact, including the hand and shoulder without winging of the scapula. Skin was normal in appearance without change in skin color, turgor, or hair distribution.
Multiple medications were trialed including topical analgesics. Gabapentin was escalated in the young woman, while pregabalin was used in the child, with mild benefit. Both continued oxycodone use more than 2 months after surgery, noting mild benefit. The woman also tried amitriptyline, clonidine, trigger point injections to the surgical scars, physical therapy, chiropractic therapy, acupuncture, and massage with modest improvement in daily functioning. Selective long thoracic nerve block in the middle scalene muscle produced pain relief for the duration of the local anesthetic, and improved the chest wall pain for 6 weeks, but the allodynia of the scapula recurred. TENS unit was mildly helpful. A trial of spinal cord stimulation is planned for the woman. Six months after surgery, the pain in the child had improved significantly, and titration off pregabalin was initiated.
Discussion: This is the first report of severe neuropathic pain after LCSD for the treatment of cardiac channelopathies . The etiology of the pain was thought initially to be peripheral nerve injury; however, it may be sympathetically mediated despite lack of sympathetic signs on physical examination. Although LCSD is very effective, this complication of severe pain and significant life disturbance should be communicated to the patient. The benefits of denervation therapy should be juxtaposed against the risk of this < 2% complication.
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Program no. 1-34
OPIOID USE IN A PEDIATRIC POPULATION REFERRED TO A PEDIATRIC CHRONIC PAIN CLINIC
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Introduction and Aims: Chronic pain in the pediatric population is widespread and has been estimated to approach 30% although this can vary greatly depending on the location of pain (1). Many patients have visited numerous providers and had extensive evaluation and treatment in an attempt to minimize pain. Some patients may have been prescribed opioid medications for their chronic non-malignant pain. It has been estimated that prevalence of prescription opioid use in the adult population with chronic non-malignant pain is increasing (3). This prevalence has been reported in the limited pediatric populations in the past.
Methods: Records of 95patients referred to a multidisciplinary pediatric chronic pain clinic in the midwest were retrospectively reviewed. Questionnaires were sent to these patients to provide follow-up at least 6 months after their evaluation. The Mayo Clinic Institutional Review Board approved this study and the patients signed consent forms to have their medical records reviewed. We noted location of pain use of prescription opioid medications during evaluation, and prevalence of ongoing opioid use for treatment of their pain.
Result: 11 patients of 95 reported current regular use of narcotic prescription medications. Locations of pain included generalized pain (3), headache (3), abd pain (2), extremity pain (2), pelvic pain (1). Of the 11 patients reporting opioid use at the time of their evaluation, 8 patients failed to return their mailed questionnaires, therefore it was impossible to determine if they continued on opioid medications. Three other patients indicated they discontinued the use of their narcotic medications.

Discussion and Conclusion: Prescription opioid use in the adult chronic pain population is reaching epidemic proportions and continues to rise. We found a prevalence of 11.5 % in this pediatric population evaluated at a multidisciplinary pediatric chronic pain clinic using prescription opioids for chronic non-malignant pain. Despite ongoing opioid use, this did not translate into normal functioning with regard to school attendance. During our multidisciplinary evaluation, we strongly recommend discontinuation of opioid medications and instead introduce other methods for pain management as appropriate including tricyclic antidepressants, anticonvulsant medications for pain, as well as non-pharmacologic strategies.

Program no. 1-35
CRPS-1 in children and adolescents, a retrospective study 1984 to 2010
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Gunnar L. Olsson, Matilde Hellberg, Rikard Wicksell.
Department of Physiology and Pharmacology, The Karolinska institute, Stockholm, Sweden and Section for Behavioral Pain Treatment at Karolinska Hospital, Stockholm
Introduction and aims. At the pain Treatment Service at Astrid Lindgren Children´s hospital we have had a special interest in CRPS since the start of the unit 1984. The aim of this study was to describe treatment and outcome of all cases diagnosed with CRPS.
Methods. A retrospective case record study.

Results: During the period 1984 to 2012 327 children was referred to the unit receiving the diagnosis CRPS. 85 % were female and ages were 8-18 years.
Treatment: Reassurance and physiotherapy with the aim to increase physical activity in spite of the presence of pain was a mainstay in the therapy. Sympathetic block was performed in 254 cases. Drugs were not used except for amitriptyline in a few cases. In 13 severe cases spinal cord stimulation (SCS) was performed and in one 11 year old boy a pump was implanted for intrathecal baclofen administration.
Since 2001 the basis of our therapy is a modern model of cognitive behavioral therapy based on acceptance and exposure to previously avoided activities (Acceptance and Commitment Therapy).
Approximately 22 % of the cases reassurance and physical therapy led to restored function and disappearance of pain. In the 244 cases given a sympathetic block approximately 50 %became painfree. Reoccurremnce rate was 15 %. SCS was mostly effective. The effect of amitriptyline was doubtful.
Dicussion and conclusion: CRPS-1 is not very uncommon in children and has some different characteristics compared to what is seen in adults. Sympathetic block was effective in 50 %.

Program no. 1-36
Caregiver Sensitivity in the Pain Context and Infant Regulation
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Introduction and Aims:Caregiver sensitivity has been hypothesized to be an important mechanism for change in infant development of emotion regulation. Routine immunization procedures provide an opportunity to measure caregiver sensitivity when infants are experiencing acute pain. The present study aimed to identify caregiver sensitivity during routine immunizations over the first year of life as a predictor for later infant regulation.
Methods:A sub-sample of 130 infants (56% male) who had regulation data at 14 months was selected from the OUCH cohort, an ongoing longitudinal cohort that follows healthy caregiver-infant dyads during routine immunization over the first year of life. Caregiver sensitivity and infant pain regulation were assessed at 2-, 4-, 6-, and 12-months of age. Ethics approval was obtained from both participating institutions. Caregiver sensitivity was coded from video footage using the Infancy/Early Childhood Version of the Emotional Availability Scales Fourth Edition (EAS; Biringen, 2008). Infant pain regulation was coded 2 minutes 15 seconds post-needle using the Modified Behavioural Pain Scale (MBPS; Taddio et al., 1995). Infant regulation at 14 months of age was operationalized as the Falling Reactivity subscale of the Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003). Bivariate correlations were conducted to inform a regression model predicting infant regulation at 14 months from caregiver sensitivity to infants' acute pain over the first year of life.
Results: Caregiver sensitivity to acute pain at 12-months positively predicted subsequent infant regulation, whereby caregivers who were more sensitive at 12-months rated that their infants had quicker rates of recovery

from distress and arousal at 14-months ($r = .22$, $p < .05$). Caregiver sensitivity at 12-months predicted parent report of infant regulation at 14-months after controlling for infant gender, age, and the objective measure of infant pain regulation at 12-months ($B = .02$, $B^* = .21$, $p < .05$).
Discussion and Conclusion: Caregiver sensitivity at 12-months predicted higher ratings of optimal infant regulation at 14-months. Given evidence that early caregiver sensitivity predicts later caregiver sensitivity (Pillai Riddell et al., 2011), caregiver sensitivity at 2-, 4-, and 6-months may indirectly influence infant regulation at 14-months. Accordingly, caregiver sensitivity across the first year of life is important in the development of infant distress regulation as early as 14-months of age.
Acknowledgements: This research was supported by CIHR, the Ontario Ministry for Research and Innovation, the Lillian Wright Foundation, SSHRC, and the CIHR-PICH strategic training initiative. There is no conflict of interest to declare.

Program no. 1-37
How does a preterm infant suffer, or is she suffering at all?
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INTRODUCTION AND AIMS. The concept of suffering is discussed usually among those who are cognitively aware and verbally capable to express their suffering. Due to immaturity, preterm infants' abilities to express suffering are limited. Relieving suffering is an ethical and juridical demand of good nursing care. The aim of this study is to describe nurses' perceptions of the suffering of preterm infants.
METHODS. A descriptive qualitative approach was selected. Data were collected by essays written by nurses (n = 19) working in the neonatal intensive care unit (NICU). Inductive content analysis guided by the research question was performed. The formal ethical approval was given to the study.
RESULTS. The nurses described individually determined suffering of the preterm infants according to four categories: suffering ruled by maturation, existence of suffering, individual threshold of suffering, and interpreting the cues of suffering. Preterm infants' suffering was seen as greater and the manifestation of it weaker compared to their full-term counterparts due to the former's immature capabilities to cope with suffering. Suffering was seen to be connected always to care provision fluctuating in many ways from an extensive to minimal display of it, even with no signs. Some infants endured more treatments without expressing suffering, whereas some were seen as suffering for no apparent reason. The individual threshold was seen as demanding for nurses, as it might manifest itself so low that caring would be almost impossible without causing suffering. Nurses' interpretations were based on both inductive interpretations of the expressions on the infants' faces and on physiological and behavioural cues.
DISCUSSION AND CONCLUSION. Studying suffering amongst preterm infants increases the knowledge of nurses and other professionals about the phenomenon and emphasises the need to develop alleviating interventions for unspoken suffering. The results highlighted the question of whether the theoretical definitions of suffering are deficient in nursing care in the case of those who are unable to ask for alleviation of

their suffering.
The authors declare that there is no conflict of interest and the research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Program no. 1-38
Pain and stress in pediatric inpatients reported by children and mothers
Main author: Maria Beatriz Linhares, Associate Professor, University of São Paulo/ Ribeirão Preto, Brazil
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INTRODUCTION AND AIMS: The model of socio-communication of pain highlights the effects of psychological and contextual variables on pain experiences in pediatric population. The stress symptoms and also the pain perceptions of the family caregivers could moderate the children`s pain responses. The aim of the present study was to examine the associations between pain responses and stress in pediatric inpatients, regarding the pain perception and stress of the children and also their mothers. METHODS: The sample was composed of 15 school-age children (mean age=9 years old) and their respective mothers. The children were hospitalized in a Pediatric ward of a public teaching hospital, for clinical treatment or surgery purposes. The pain was assessed by the Face Pain Scale-Revised (FPS-R), which was reported by children and their mothers. The pain assessed referred to the last 24 hours. The Infant Stress Scale was performed to measure the children`s stress (physiological and psychological symptoms). The Stress Inventory Symptoms for Adults was completed to assess the mothers` stress (resistance, almost-exhaustion, and exhaustion levels). The descriptive statistical analysis and the associations between variables were calculated (Spearman correlation test; Mann Whitney test). RESULTS: The mean FPS-R scores reported by children and mothers were very similar, showing agreement to detect moderate pain (Children: FPS-R=4 ± 3; Mothers: FPS-R=4 ± 3). Otherwise, children and mothers presented different levels of stress. Only 20% of children exhibited stress with physiological and psychological symptoms. On the other hand, 73% of the mothers presented high stress level with symptoms of resistance or almost-exhaustion. There was a statistical significant association between pain score and physiological symptoms of children`s stress; the higher score of stress, the higher pain score reported by the children ($r=0.50$; $p\leq0.035$). There was no statistical difference between mothers with stress symptoms and mothers without stress, regarding the pain score reported by the mothers (Mothers with stress symptoms= 4.25; Mothers without stress symptoms=2.57; $p\leq0.89$). CONCLUSIONS: There were association between physiological stress symptoms and pain reported by the pediatric inpatients. The most part of mothers presented high level of stress, but they perceived moderate pain in children independently of the presence of stress.
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CONFLICT OF INTEREST: None to declare.

Program no. 1-39

A Developmental Psychology of Paediatric Pain: A topical Review

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Introduction and aims

Childhood chronic illness has an adverse effect on psychosocial development. Through factors such as missed education and increased carer dependence the child may become fixed or revert to a developmentally inappropriate stage. In chronic pain this may be exacerbated by pain specific considerations. Pain has interruptive effects on cognition, potentially leading to additional academic delay, and the diagnostic challenges of pain may lead to uncertainty and a focus on health knowledge at the expense of other skills and knowledge.

Methods

This review is designed to outline and expand on these and other factors in an attempt to generate a developmental model of paediatric pain in childhood and adolescence. These were primarily considered within six facets of development; those of parental factors, contextual-environmental factors, cognitive factors, educational factors, cognitive factors and socio-emotional factors.

Results

The findings of this review suggest substantial changes in how children with pain complaints develop through childhood and adolescence. Children with pain demonstrate greater reliance on parental decisions compared to peers, altered emotional and cognitive development.

Discussion and conclusion

The present study suggests that a promising model can be generated based around a developmental framework for understanding paediatric pain patients. This model is based around the idea that through isolation both from education and normal social development that paediatric pain patients may also show a delayed or atypical developmental trajectory. Evidence is needed that can show that data supports this model within individual populations.

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Conflicts of interest

None to declare

Program no. 1-40

The hierarchy of online information seeking about pain

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Introduction and aims

Health care provision is increasingly using internet based platforms for the delivery of information to patients. Yet, little research exists into how adolescents use these resources for the mining of information they require in order to cope with painful conditions. We know from previous research that the quality of online information for adolescents in pain is lacking (Henderson, Rosser, Keogh, & Eccleston, 2012) and that their use of this information is sparse (Henderson, Keogh, Rosser, & Eccleston, in press). Yet a review of how adolescents see the internet and the resources provided on it in their wider pattern of coping has not been undertaken. We hypothesise a hierarchy of online information seeking to address this gap in the literature.

Methods

Results from two qualitative studies with adolescents were collated. The first study contained adolescents who report frequent use of the internet for pain information and second adolescents who report infrequent use. We reflected on the results of these studies and a third study containing self-reported opinions on internet use over the course of a large survey (Henderson et al., in press). What results is a qualitative interpretation of how adolescents use the internet to seek out pain information and where this use falls in terms of their wider coping with pain.

Results

Adolescents reported on what appeared to be a hierarchy of pain coping. They reported reliance on their parents first for information surrounding how to cope when in pain. If the information at this stage was found lacking they would then proceed to consult with a health care professional, friend or teacher. If these sources were not able to address their pain question they would then undertake some independent research. As adolescents progressed down the hierarchy they often became more anxious about their pain complaint. This anxiety tended to hinder their ability to interact with online help for pain as they were often too anxious to make measured judgements about the seriousness of their illness and what their coping approach should be.

Discussion and conclusion

The hierarchy of information seeking we present here is a qualitative interpretation of how adolescents in pain use the internet to cope with pain. This model can be used to explain why some adolescents are reluctant to use what is now standard care for pain – online information from their health care provider.

Program no. 1-41
Insomnia in pediatric chronic pain
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Introduction and Aims:
Insomnia is common in pediatric chronic pain, and associated with depression and functional disability. The Insomnia Severity Index is a well-known measure of insomnia, but it has not been validated in a pediatric setting.
This study aims at a psychometric evaluation of ISI adapted for youths (ISI-Y), as well as an investigation of the prevalence of insomnia and impact of sleep problems on depression and functional disability in a sample of patients presenting with pediatric chronic pain. Furthermore, analyses were conducted to explore the functional importance (i.e. mediation) of insomnia in the relationship between pain and depression.
Methods:
A cross-sectional assessment (n=154) of insomnia, pain, depression and functional disability was conducted prior to treatment at a clinic for pediatric chronic pain. In addition to analyzing the statistical properties of ISI-Y, hierarchical regression analyses were performed to evaluate the relation between e.g. insomnia, pain, and functional ability. In addition, the mediating function of insomnia on the relation between pain and depression was analyzed using a cross-product of coefficients approach.
Results:
The results from the psychometric evaluation of ISI-Y were satisfactory. Insomnia was highly prevalent in this sample, and plays an important role in depression and parent reported functional disability. Furthermore, insomnia was found to mediate the relation between pain and depression.
Discussion and Conclusion:
Insomnia in pediatric pain may be adequately assessed using the ISI for youths. Results from the present study suggest that insomnia may be a critical factor in the development of depression and pain related disability.

Program no. 1-42
Pain in Pediatric Sickle Cell Disease: Daily Behavioral Prevention Strategies
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Introduction & Aims: Pain is a hallmark of pediatric sickle cell disease (SCD). Although pain may lead to hospitalization, the majority of pain episodes are managed at home. Little is known about daily home behaviors that may help prevent or manage pain, such as limiting physical activity and rehydration. The aim of this study is to examine and clarify the temporal relationship between these behavioral pain prevention strategies and daily pain reports. We hypothesized that lower physical activity level and higher

fluid intake (glasses of water, juice, tea, soda, and other) are associated with lower same-day and next-day pain intensity.
Methods: In this ongoing study, we have recruited 18 children thus far (target sample size is 35) from a tertiary medical center. All children are African American, ages 8 to 18 (M age = 13.9, SD = 2.5; 67% female). Children completed 14 days of continuous actigraphy monitoring to objectively assess physical activity levels and daily-diary ratings of pain intensity (6 cm visual analogue scale). Three actigraphy variables were used: daily activity total (summary count), mean activity (average count/min) and peak (highest daily level) activity. Bivariate correlations tested the hypothesis that physical activity and fluid intake are associated with daily pain. Multilevel models (MLM) assessed daily temporal associations between physical activity, fluid intake and pain. Age, gender, and SCD subtype were included as predictors.
Results: In bivariate correlations, as expected, pain intensity was inversely correlated with total, mean, and peak physical activity (p,¬„¢s .05). MLM analyses partially supported hypothesized temporal relationships. Contrary to hypotheses lower peak physical activity was associated with higher same-day pain intensity (z = -3.67, p
Discussion & Conclusion: Preliminary results lend partial support for activity restriction as a behavior associated with pain prevention or management in children with SCD. While lower physical activity was related to greater pain during the same day, lower physical activity was related to lower pain the next day. It is possible that activity has more of a lagged influence on pain over time, or that an equally plausible temporal association exists between pain and subsequent reductions in activity. Further analyses with the complete sample will explore bi-directional influences between pain and physical activity.

Program no. 1-43
Cultural context of pediatric pain: Hot Spaniards and cold Danes?
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Introduction & Aims:
Differences in pain and health complaints have been found in pediatric populations in cross-cultural studies comparing Northern and Southern Europe. Little is known about the mechanism that causes these differences.
The aim of this theoretically based explorative study was to assess whether pain catastrophizing can mediate the difference in pain and pain-related outcomes between two countries located in Northern and Southern Europe, Denmark and Spain, respectively.
Methods:
Participants were schoolchildren aged between 9-15 years from Denmark (n=96) and Spain (n=100). Cultural differences in current pain intensity, functional disability and health-related quality of life were analyzed with pain catastrophizing as a hypothesized mediator.

Results:
The Spanish schoolchildren reported significant higher use of pain catastrophizing, higher level of functional disability, and lower health-related quality of life compared to the Danish schoolchildren.
Although culture did not have any total or direct effect on current pain intensity, pain catastrophizing was found to mediate the differences after controlling for gender and age in all the outcomes (i.e., current pain intensity, functional disability and health-related quality of life) between Danish and Spanish schoolchildren.
Discussion & Conclusion:
In this study pain catastrophizing was demonstrated to play a role in differences in pain and pain-related outcomes between Spanish and Danish children.
Schoolchildren in the Spanish sample reported higher level of functional disability and more frequent use of pain catastrophizing even though pain intensity was reported at an equal level as that of the Danish schoolchildren. According to these results, the risk of being trapped in a fear-avoidance circle causing reduced function would be higher in Spanish schoolchildren compared with Danish schoolchildren.
This study emphasizes the need of considering culture differences to understand and treat the experience of pain in children. In accordance with our findings, psychological interventions for pain management in a Spanish population may consider focusing more on pain catastrophizing than psychological interventions for a Danish population.
JJL is a trainee member and AH is graduate member of Pain in Child Health (PICH), a strategic research training initiative of the Canadian Institutes of Health Research (CIHR) and the Mayday Fund. The research was supported by the Danish Rheumatism Association and Agència de Gestió dAjuts Universitaris i de Recerca. PJMs research is supported by a Canada Research Chair. The authors have no conflicts of interest to disclose.

Program no. 1-44
Coping & Mood as Predictors of Quality of Life in Teens & Young Adults with Chronic Pain
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Introduction & Aims
Studies describing the psychological functioning of youth with chronic pain have been increasing. These studies highlight the presence of depression and anxiety in children and adolescents. Maladaptive coping with respect to emotion-focused strategies also have been associated with depression and disability. Few studies have, though, examined the role of demographic, medical or psychological factors in predicting functioning. The focus on more positive outcomes, such as health-related quality of life has been fairy absent in the literature compared to predicting disability. This study aimed to: 1) examine coping strategies, mood, and HRQoL in adolescents and young adults with diverse chronic pain symptoms, 2) explore the relationship among demographic variables, pain parameters, and psychological measures, and 3) investigate how coping and mood may impact HRQoL.

Methods
This study included 200 males and females between the ages of 13 and 21 years-old. Patients presenting with abdominal pain, back pain, headaches and body pain were fairly equally divided within the sample. The following measures were administered to patients during an initial Diagnostic Evaluation in a pediatric pain clinic at a mid-western pediatric hospital: the Pediatric Quality of Life Inventory (PedsQL), the Pain Coping Questionnaire, and the Short Mood and Feelings Questionnaire. Electronic medical chart reviews were conducted to obtain information about pain parameters and medical diagnoses.
Results
Descriptive statistics will be assessed for all measures for the participants according to gender and age, and then by pain symptom group (i.e., abdominal, back, headache, body). Independent sample t-tests will be used to compare the pain symptom groups on pain coping, mood, HRQoL, and pain parameters. Correlational analyses using Pearson product-moment coefficients will be calculated to examine the relationship between demographic variables, pain parameters, pain coping, mood, and HRQo. Separate multiple regression analyses will be performed with pain coping and emotional distress as dependent variables to examine the unique contribution to HRQoL. All analyses will be run for the total sample and then for the individual pain symptom groups.
Discussion & Conclusion
Results of this study may help identify targets of intervention in terms of attention to enhancing adaptive coping strategies or reducing effects of negative affectivity on HRQoL.
Acknowledgements
Appreciation is given to patients and their parents for completing questionnaires.
Conflict of Interest
None

Program no. 1-45
Negative life events as predictors of chronic pain among Dutch adolescents
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Introduction and aims Chronic pain is a common experience among adolescents and negatively influences their quality of life (Perquin et al., 2000). Psychosocial stress seems to serve as an important risk factor for the occurrence of pain (Walker et al., 2001). The present prospective study aims to examine if negative life events, e.g. victimization, abuse, and the divorce of parents predict chronic pain in adolescents at two year follow-up. Methods Yearly, the Municipal Health Services in Rotterdam preventively examine health conditions and developmental problems in 10.000 adolescents. They do this by means of the Rotterdam Youth Monitor (RYM), which is a longitudinal youth-health surveillance system. During the school years 2008-2009 and

2010-2011 the RYM included a chronic pain measure, i.e. the Pain Barometer. The Pain Barometer asks for several characteristics of pain, i.e. duration, localization, frequency, intensity, and consequences. Results In school year 2010-2011 9.6% of the adolescents reported chronic pain. Divorce of parents and being bullied via internet or text message in 2008-2009 were both significantly related to chronic pain two years later. No significant relations were found between being bullied at school, being a bully, and abuse in 2008-2009 and chronic pain in 2011-2012. Discussion and Conclusion The results of the present study suggest that some stressful life events, i.e. divorce of parents and being bullied via internet or text message might be predictive of chronic pain in adolescents. Since this is only a first step in examining the predictive factors of chronic pain, future research should also examine other factors, i.e. death of a family member.

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Program no. 1-46

Disabling pain in adolescents is associated with lower grades

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Introduction and aims Adolescents with disabling pain are frequently absent from school, which may result in school functioning problems. The purpose of this study was to determine if disabling pain is associated with specific measures of school functioning, i.e. grades, and factors critical to adolescents school functioning, i.e. attention and emotional problems. More specifically, we explored if the association between disabling pain and grades might be intermediated by attention and emotional problems. Methods In the large cross-sectional study LEERLIJN we collected data from 2215 pupils aged 12 to 13 years. Disabling pain, attention, and emotional problems were self-reported. Dutch, English, and math grades were taken as an index of school functioning. MANCOVA was used to test a model with disabling pain as the independent variable and grades as dependent variables. Results Of all pupils 32% reported to have disabling pain occasionally and 6% reported to have disabling pain frequently. The existence of disabling pain in adolescence was associated with lower grades (Dutch p=.019, English p=.37, and math p=.018), more emotional (p=<.01), and more attention problems (p=<.01). When emotional problems (p=>.05) or attention problems (p>.05) was added to the model, the association between disabling pain and lower grades was not longer significant. Discussion and Conclusion The results of the present study

suggest that the negative association between disabling pain and grades in adolescents might be explained by reduced attention and reduced emotional well-being. Future research should study the relation between pain and school functioning in a longitudinal design, which makes mediation analysis possible.

Program no. 1-47
Can we use the Illness Perception Questionnaire to assess adolescents' pain beliefs?
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Introduction and Aims

Research into adults' pain beliefs have utilised the Common Sense-Self-Regulatory Model (CS-SRM) as a framework to investigate the relationship between beliefs, coping and illness outcomes. Pain beliefs have been measured using the Revised Illness Perception Questionnaire (IPQ-R) in adults (1). The aims of this study were to examine whether the response options and domains included in the IPQ-R were appropriate for use by young people diagnosed with a long-term condition in which pain is a major symptom.
Methods

21 young people aged between 11-16 years old were recruited into a qualitative sub-study of a multisite prospective study of outcomes for children and adolescents with Juvenile Idiopathic Arthritis (the Childhood Arthritis Prospective Study, CAPS). Data were gathered using cognitive interviewing (2), a method for mapping the underlying reasoning people use to answer questionnaire items. This approach involves two main techniques: think aloud and verbal probing. The young people were asked to respond to each item of the existing IPQ-R whilst verbalising reasons for their responses or indicating any difficulties in providing responses. Interviews were audio-recorded and transcribed. Reasons for responses to each question and relevance of each of the IPQ-R domains were analysed.
Results
The young people understood most items and the IPQ-R domains were largely viewed as relevant to them with their accounts of pain experiences mapping onto IPQ-R domains. However, key issues arose indicating that the questionnaire needs adapting prior to use with adolescents. Two domains, 'consequences' and 'emotional representations' were not sufficiently emphasised. In addition young people had difficulties with anchor points for some response options.
Discussion and conclusions
The ways in which people perceive or represent their symptoms or illness are known to affect long-term outcomes. The IPQ and IPQ-R was validated on adults but will need to be adapted if we are to capture data that reflect the way younger people perceive their

pain. This study implies that new items and new response formats are necessary to assess pain representations in young people in relation to the impact of pain on their lives and how they emotionally represent their understanding of pain.
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Program no. 1-48
Making the invisible, visible: Group art therapy for children with complex chronic pain
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Introduction and Aims: Children with complex chronic pain typically report high levels of functional disability and emotional, psychological, physical, and social distress. They also often experience feelings of burden, powerlessness, and despair when grappling with their debilitating daily existence, which is seemingly invisible to those around them. To address these unique struggles, we designed and implemented an art therapy group curriculum in an interdisciplinary pain rehabilitation program. The group intervention consisted of four modules, delivered once per week for one hour (see Figure 1). Modules include: Pain Journey (patients create a visual timeline, past, present, and future, of their life and pain experiences), Social Atom (uses symbols to create a relational map of key social supports), Invisible Support (patients identify and write about an important value and then anonymously support each other in developing this value), and Letter to Future Self (patients write a supportive, validating letter to their future-self, post discharge). Art therapy was the chosen treatment modality because of its ability to aid in the expression of difficult feelings and support externalization and transformation of subjective experiences, giving patients some control over their experience. We evaluated perceived satisfaction, helpfulness, and perceived social support of the group intervention as well as patients level of participation in treatment.
Methods: Participants were 50 children, ages 9-20, enrolled in a day hospital interdisciplinary pain rehabilitation program. Participants completed a measure of satisfaction, helpfulness, and perceived social support after each group session. Participant engagement was measured using the Pittsburgh Rehabilitation Participation Scale.
Results: Across all four modules, patients enjoyed participating in the art therapy group, found it to be helpful, and reportedly felt more comfortable expressing difficult feelings through art rather than talking about them. They were engaged in the activities and agreed that they would try art therapy again as well as recommend group art therapy to other children managing chronic pain. Lastly, they indicated that making art is a coping strategy they could use at home for pain management.
Discussion and Conclusion: Patients connected and engaged well with this non-traditional approach to group therapy finding it a helpful, satisfying, and supportive

experience. Initial results are quite promising that group art therapy could be an amenable intervention to help meet the unique needs of this population. Further research is needed to explore the potential clinical benefits of group art therapy (e.g., impact on levels of psychological distress) for children with chronic pain.

Program no. 1-49
Mindfulness Meditation for Pediatric Chronic Pain: Effects and Precautions
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Introduction: Although there is substantial literature about the effectiveness of psychological therapies such as relaxation for pediatric chronic pain and for mindfulness meditation (MM) for health and mental health conditions, there has been little systematic attention the the use of MM for pediatric chronic pain. This presentation will address lessons learned from our ongoing clinical trial of MM in a pediatric chronic pain service at a university clinic
Methods: We present case material from our ongoing clinical trial of a manualized mindfulness meditation intervention, called Inner Resources for Coping with Chronic Pain (Waelde, 2011). Participants are 30 patients diagnosed with chronic pain, age 11-17, who are receiving a 6 week group based meditation intervention that includes daily home practice of the techniques. Case material from two participants will be presented to illustrate effects and precautions.
Results: Our case material indicates that patients are able to learn and practice the MM techniques, with good adherence to home practice. A male patient with multiple pain complains was able to learn and execute the meditation techniques and use them daily to cope with stressors and pain associated with his medical condition. A 16 year old female patient with longstanding pain, whose coping technique primarily involved distraction, found the concurrent use of mindfulness and distraction to be confusing and ineffective.
Conclusion: MM shows promise as an intervention for helping children and adolescents cope with chronic pain. The children and adolescents in our clinical trial have evidence the ability to engage with the material and adhere to regular home practice of the techniques and application of them to presenting problems. However, a note of caution is raised by the possible incompatibility of mindfulness with concurrent therapies emphasizing the use of distraction for coping with chronic pain.

Program no. 1-50
Symptom Attribution in Parents of Pediatric Chronic Pain Patients
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Introduction and Aims: Symptom attribution refers to beliefs about the cause of health symptoms, or “where do symptoms come from?” Three dimensions are empirically supported: environmental (typical), psychological (emotional), and physical (somatic). In the adult literature, psychological attribution style relates to psychological distress, physical attribution style to somatization, and environmental to positive functional outcomes. Parents’ attributions of children’s symptoms also may relate to important factors in pediatric care; however, this has not been studied in a pediatric population, in part due to the lack of an assessment tool. Children with chronic pain frequently report other symptoms; how parents attribute those symptoms may relate to parents’ and children’s pain-related distress and functional outcomes. The current study revised an adult measure of symptom attribution to investigate in parents of pediatric pain patients: (1) the factor structure of the parent report version, (2) the relation of symptom attribution to parents’ own psychological distress, and (3) the relation of parents’ attribution to children’s psychological distress and disability.
Methods: Pediatric chronic pain patients and their parents (N = 311) participated. Parents completed a revised 13-item Symptom Interpretation Questionnaire (SIQ). Parents rate the degree to which they believe children’s general health symptoms are caused by environmental, psychological, and physical factors. The measure is scored by determining attribution style as the most frequently endorsed category across symptoms. Parents and children also completed standardized measures of mood, somatization, pain catastrophizing, protective parenting (parents) and functional disability (children).
Results: (1) Confirmatory factor analysis identified three distinct symptom attribution dimensions corresponding to the original scale; environmental, psychological, and physical. (2) ANOVAs revealed that parent anxiety, pain catastrophizing, and protective parenting were greatest among parents with a psychological attribution style ($p<.05$). (3) Similarly, ANOVAs showed that children’s anxiety, depression, somatization and catastrophizing were greatest when parents had a psychological symptom attribution style, and high somatization was related to physical attributions ($p<.05$). There were no differences in children’s disability between parental symptom attribution styles.
Discussion and Conclusion: The SIQ parent report appears to be a psychometrically promising tool to assess parent attributions of child health symptoms. The factor structure was consistent with the original measure. Parental psychological symptom attributions were associated with greater parent and child pain-related psychological distress and child somatization compared to the other styles. This measure may serve as a screening tool to identify parents and children who would benefit from psychological intervention to improve pain-related distress.

Program no. 1-51
Acceptance and Commitment Group Therapy for Adolescents with Sickle Cell Disease
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Introduction and Aims: Sickle cell disease (SCD) is an inherited blood disorder causing pain, fatigue, and other symptoms, which are associated with declines in functioning and quality of life. Adolescents with SCD also struggle with adherence to the medical regimen. Recent studies suggest that Acceptance and Commitment Therapy (ACT) can improve functioning and quality of life in pediatric and adult populations. ACT interventions emphasize the acceptance of difficult experiences (e.g., distress) and behaving in-line with self-identified values (e.g., close family relationships). The purpose of this study was to examine an ACT based group intervention with adolescents with SCD. It was expected that the ACT groups would improve functioning, quality of life, and success in living a valued-life.
Methods: Participants were 10 12- to 17-year-olds and their parents, and were recruited from the Children's Healthcare of Atlanta sickle cell service. ACT participants completed measures at baseline and 1-month follow-up. Pain was assessed using the Pediatric Pain Questionnaire, which provides ratings of current, worst, and average pain. Functional Disability Inventory was used to assess the extent of restriction in performing daily activities. The PedsQL provided quality of life ratings with higher scores indicating better functioning. Self-care was assessed using through the SCI-SC, which quantifies adolescents' adherence to sickle cell treatment recommendations. Psychological Inflexibility was measured with the Avoidance and Fusion Questionnaire. The Chronic Pain Values Inventory detailed success in living consistently with identified areas of importance. Treatment satisfaction was assessed with an 8-item measure scored 1 (Strongly disagree) – 5 (Strongly agree).
Results: Patients' current pain but not worst or average pain improved and most indices of quality of life improved. Self-care did not change, but psychological flexibility improved. There was variability in success in engaging in values-based behavior, with improvements in school, health, learning, and spirituality, but a decrease in intimate relationships. Patients and parents indicated satisfaction with the group therapy.
Discussion and Conclusions: This study evaluated a group-based ACT therapy intervention for adolescents with SCD. Given difficulties with adherence to medical and psychosocial treatment, a one-time group workshop format was selected. Results indicated that the group format provided partial success in some domains, but there are areas for additional attention. Given general satisfaction with group-based therapy we plan to address the areas that require additional attention in order to improve the group intervention.
Funding: U.S. Health Resources and Services Administration, Graduate Psychology Education Grant (PI: Cohen)
Conflicts of Interest: None.

Program no. 1-52

Acceptance and Commitment Therapy individually or in group for youth with chronic pain

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Longstanding pain in children and adolescents may lead to severe reduction of daily functioning and disability. Acceptance and commitment therapy (ACT) is a psychological treatment approach developed within Cognitive Behavioral Therapy (CBT). ACT aims at improving functioning and disability by increasing psychological flexibility, i.e. the ability to act in accordance with personal values and goals, even in the presence of interfering pain or distress (Hayes, 2006). Research indicates the clinical utility of ACT to improve functioning and quality of life in children and youth suffering from longstanding pain (e.g. Wicksell, 2009).

Studies have shown that there is no difference in efficacy between individual therapy and group therapy. However, to our knowledge, there are a limited number of studies that have evaluated differences in efficacy between individual and group therapy for children and youth with longstanding pain. The present study aimed to evaluate possible differences in treatment outcome between individual and group treatment modalities for children and youths suffering from longstanding pain.

Thirty children and youths with longstanding debilitating pain referred to the Behavior Medicine Pain Treatment Services were randomized to ACT in group or individual format. The primary process measure was Psychological inflexibility. Primary outcome measures comprised pain disability and pain interference. Secondary outcome measures consisted of e.g. emotional functioning.

Preliminary results show that there were no differences between the two treatment modalities (individual format/group format) for the different measures. Furthermore, there were significant improvements in psychological inflexibility, pain disability, pain interference and emotional functioning for both modalities.

The results from the study are in line with previous research, and indicate that group treatment with ACT for children and youths with longstanding pain is as efficacious as individual treatment.

Program no. 1-53

Sex and Age Differences in Mood, Coping Style and Functioning in Youth with Chronic Pain

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Introduction and Aims: Sex differences exist in the experience of pain, with women reporting a higher incidence of suffering than men (Berkley and Holdcroft, 1999). Coping strategies are amongst the implicated psychosocial factors, in that women report using more social support networks as well as focusing more on their emotional responses than men (Tamres et al., 2002). Cognitive-behavioral therapy (CBT) has been shown to be effective in treating adolescents with chronic pain (Maynard et al., 2010). One of the main treatment components of CBT is training in cognitive restructuring, or altering maladaptive cognitions (i.e., catastrophizing) to improve functioning. Associations found between catastrophic thinking, functional disability, depression, and anxiety (Langer et al, 2009) suggest that cognitive interventions may improve treatment outcomes in pediatric pain population.
Methods: This cross-sectional study examines pre-adolescents (ages 8-12 years) and adolescents (ages 13-18 years) with chronic pain and compares differences in mood, coping style and functioning across age groups and sexes. It will present quantitative and qualitative data on patients (37 males; 37 females; total N= 74) referred for assessment and treatment recommendations to a multidisciplinary pediatric pain management clinic within a major urban pediatric hospital. Standardized measures assessing mood, level of pain-related functional disability, pain intensity, coping style, and pain catastrophizing were administered during patients initial clinic visit. Descriptive data concerning patient demographics, pain characteristics, mood, coping style and functional disability will be provided. Correlational data will be presented regarding the relationship between disability, pain, and mood with this sample. Analyses will be conducted to determine whether differences exist in coping style and pain catastrophizing between younger and older males when compared to younger and older females with chronic pain conditions.
Results: This study will highlight the importance of considering both sex and age when assessing pre-adolescent and adolescent youth and fostering their development of pain coping strategies.
Discussion and Conclusion: Evidence supporting or disputing the hypothesis that sex differences in pain perception and functioning of adolescents with chronic pain are mediated by differences in coping style, are partially independent of mood status, and change across development will be presented and discussed. Clinical recommendations for identification of adolescents in greatest need of pain coping interventions based on CBT approaches will be presented along with considerations for future directions in research on pediatric chronic pain coping.

Program no. 1-54
Children's selective attention to pain and avoidance behaviour
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Introduction & aims Cognitive-affective models of attention propose that pain imposes an overriding attentional priority that motivates avoidance behaviour, particularly in the context of excessive elaboration and rumination regarding pain, as is the case in high pain catastrophizing. The present study investigated selective attention to pain in children, its implications for child avoidance behaviour and the moderating role of child and parental catastrophizing about pain. We expected that (1) children would selectively

attend to pain, particularly when child and parental catastrophizing were high, and that (2) increased child attention to pain, particularly in the context of high child and parental catastrophizing, would contribute to increased avoidance behaviour (i.e., lower child pain tolerance). Additionally, we explored the differential predictive value of the comprising dimensions of child/parental catastrophizing (i.e., rumination, magnification and helplessness). Methods Participants consisted of 59 children (31 boys) aged 10-16 years (M= 12.64 years, SD = 1.58) and one of their parents (41 mothers). Child attention to pain was assessed by means of a dot-probe task using pictorial stimuli (i.e., facial display of pain). After performance of the dot-probe task, the child's pain tolerance was assessed during a cold pressor task (CPT). Child and parental catastrophizing was assessed using the PCS and PCS-C, respectively. Results Findings indicated that children's selective attention to pain is differentially sensitive to different dimensions of child catastrophizing and parent catastrophizing. Furthermore, results suggested that observed attentional patterns impact child avoidance behaviour. Yet, findings were counter to expectations. In particular, results revealed a greater tendency to shift attention away from pain faces (i.e., attentional avoidance) among children reporting greater pain magnification. A similar pattern was observed for parental rumination and helplessness. Furthermore, compared to selective attention toward pain, child attentional avoidance of pain was associated with increased avoidance behaviour (i.e., lower pain tolerance). Yet, this was only the case among children who reported high levels of pain magnification. A similar pattern was observed for parental rumination and parental helplessness. Positive correlations between child magnification and parental rumination and helplessness likely account for observed similiarities. Discussion & conclusion. The present findings are important as they are among the first of their kind. The current investigation attests to the importance of child attention to pain in understanding child avoidance behaviour and the moderating role of different dimensions of child and parental catastrophizing about pain. Future research is encouraged to explore alternative perspectives suggested by the current findings.

Program no. 1-55
Infant Pain-Regulation as an Early Predictor of Childhood Temperament
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Introduction and Aims: There is great variability in infant’s responses to painful stimuli, including facial and vocal expressions. This variability in pain-related distress responding may be a valuable indicator of the differential outcomes, such as self-regulation and temperament profiles later in childhood. The current study examined the relations between pain reactivity and regulation of infants across the first year of life and parent ratings of infant pain to determine predictability of later temperament profiles. Methods: A subset of parent-infant dyads (N=130) from an ongoing Canadian longitudinal cohort was studied (56% male). Infant pain behaviours were coded using the Modified Behavior Pain Scale (MBPS; Taddio, Nulman, Koren, & Stevens, 1995). Parental judgments of infant pain were made using the Numeric Rating Scale (Jensen,

Karoly, O'Riordan, Bland, & Burns, 1989). Infant temperament was measured using the Infant Behaviour Questionnaire–Revised (IBQ-R; Gartstein & Rothbart, 2003). The three broad temperament dimensions of Negative Affectivity, Orienting/ Regulation, and Extraversion were examined. Correlational analyses and multiple regressions were conducted.
Results: Multiple regressions revealed a 12-month regulatory pain score predicted parent report of Negative Affectivity temperament style at 14-months. In addition, parent ratings of infant pain at 12-months of age predicted Orienting/Affiliation temperament style, with gender differences observed in this substrate.
Discussion and Conclusion: Pain-related distress regulation at 1 year appears to be a novel predictor of later temperament ratings. Pain ratings (either immediately after the needle or during the regulatory phase) in the first 6 months did not relate to parent temperament ratings. The immunization context may provide an important opportunity for identifying infants who are at risk for developing regulatory difficulties and require intervention.
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Conflict of Interest: There is no conflict of interest to declare.

Program no. 1-56
Neg. pediatric pain-related affective constructs: A principal components analysis
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Introduction and Aims
Previous research has demonstrated the co-occurrence of pain and negative emotional states, both those that occur more generally (e.g. anxiety) and those which are specific to pain, such as fear of pain and pain catastrophizing (Mounce, Keogh and Eccleston, 2010). Although studies have shown a number of general negative affective and pain-specific constructs to be related to pediatric pain, the specific relationships between these constructs are unknown, in particular the degree to which these concepts are distinct from each other and aspects which they may share. Recent studies with adult populations have investigated common and unique elements of pain-related emotional constructs within samples of healthy participants and have identified significant overlap between the concepts examined (Mounce et al., 2010; Vancleef et al., 2009). The current research explores the relationship between pain-related negative emotional constructs in children. Investigation of the relationship between these constructs utilizing a healthy participant sample provides a first step towards understanding these relationships and developing concise effective measurement scales for use in applied pain settings.
Method
This study includes 300 healthy children between 9-12 years recruited from Irish schools. Ethical approval was obtained from the NUI Galway Regional Ethics Committee. Participants completed a series of measures within a classroom setting.

Measures include the State-Trait Anxiety Inventory for Children (STAI-C), Pain Catastrophizing Scale for Children (PCS-C), Childhood Anxiety Sensitivity Index (CASI), Pain Anxiety Symptoms Scale (PASS-20) and the Social Anxiety Scale for Children-Revised (SASC-R) - Fear of Negative Evaluation Subscale. Data were explored using Principal Components Analysis.
Results
Results will be discussed in the context of the degree to which negative affective pain-constructs are distinct from each other and commonalities amongst some of the constructs examined. A hierarchy of pain-related negative emotional constructs will also be discussed, in particular the relationship between lower order components and higher order constructs.
Discussion and Conclusion
Study findings highlight that whilst pediatric pain-related negative affective measurements retain unique components, considerable overlap can be identified between constructs. These findings indicate the need for those working within clinical and research paediatric pain settings to carefully consider the use of negative affective pain-related measurement scales amongst children.

Program no. 1-57
Psychological therapies for the management of chronic pain in children and adolescents
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Introduction and Aims: We undertook an update of a previous Cochrane review that investigated the effectiveness of psychological therapies to reduce pain and disability and improve the mood of children with chronic pain (Eccleston et al, in press).
Methods: EMBASE, MEDLINE, and PsychINFO were searched for studies from 2009 to March 2012. To be included, studies had to be randomized controlled trials (RCT), and use a psychological therapy to treat children (<18 years) with a chronic pain condition. 'Pain', 'Disability', and 'Mood' outcomes were extracted at post-treatment and follow-up. The pain conditions were split into headache and non-headache pain. Headache studies measured pain dichotomously, therefore numbers-needed-to-treat-to-benefit (NNT) was calculated. Continuous data were used for disability and mood outcomes.
Results: The updated search added a further eight studies to the previously identified 29 studies included in the 2009 version of this Cochrane Review. From the 37 studies, 21 investigated psychological therapies for headache (including migraine), seven addressed abdominal pain, four used a mixed pain sample (including headache pain), two used fibromyalgia patients, two delivered treatment associated with sickle cell

disease, and one for juvenile idiopathic arthritis. Results revealed five significant effects. Pain was found to significantly improve for both headache (NNT = 2.72; CI 2.32 to 3.29) and non-headache groups at post-treatment, and for headache groups at follow-up (NNT =2.01; CI 1.62 to 2.64). Disability significantly improved for non-headache groups at post-treatment, and mood significantly improved for headache groups at follow-up. Discussion: Psychological therapies are an effective treatment for the management of headache. 49% of children who received therapy improved on pain outcomes compared to 17% in the control group. There is, however, limited evidence for disability and mood outcomes for headache groups at post-treatment and follow-up. For children and adolescents with non-headache pain, therapies significantly improve their pain symptoms and disability at post-treatment, but these effects are not maintained at follow-up. Further to this, therapies do not improve of their mood when receiving such treatments. Future studies should concentrate on increasing sample sizes and tailoring treatments for conditions and individuals.
Eccleston C, Palermo TM, Williams ACDC, Lewandowski A, Morley S, Fisher E, Law E. Psychological therapies for the management of chronic and recurrent pain in children and adolescents. Cochrane Database of Systematic Reviews (in press).

Program no. 1-58
Psychological Interventions for Parents of Children with Chronic Illness
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Introduction and Aims: Chronic illnesses affect a growing proportion of children around the world every year. Parents play an important role in their child's illness and have been found to influence the child's pain levels and disability. However, parents are also report a negative social, financial, relational, and emotional impact of caring for a child with a chronic illness.
Psychological interventions that target parents to improve their mental health and behaviour have a positive effect on the child symptoms and family functioning. Individually, these therapies have had success with particular populations of chronically ill children including diabetes, recurrent abdominal pain and cancer and can be delivered through various methods. However, the overall effectiveness of such interventions has not yet been analysed.
The aim of this systematic review was to investigate the effectiveness of psychological interventions aimed at parents of children with chronic illness.
Method: The inclusion criteria included fourteen chronic illnesses including headache, recurrent abdominal pain, back pain, idiopathic pain conditions, complex regional pain syndrome, rheumatological conditions, cancer, diabetes mellitus, asthma, traumatic brain injury, inflammatory bowel diseases, sickle cell disease, skin diseases and gynaecological disorders. MEDLINE, EMBASE, PsychINFO and the Cochrane Central Register of Controlled Trials (CENTRAL) were searched for studies that investigated the

effectiveness of psychological therapies that included parents of children who endured a chronic illness.
Results: 34 studies met the inclusion criteria. These included 12 pain studies, nine diabetes studies, six cancer studies, three asthma studies, three traumatic brain injury studies and one eczema study. The psychological therapies used within these studies were categorised into the following groups; cognitive behavioural therapy (CBT, 18 studies), problem-solving therapy (PST, seven studies), family therapy (five studies) and multisystemic therapy (two studies). When all treatment types were combined, children symptoms for those with chronic pain conditions significantly improved when parents were included in therapy. Conditions were then combined and analysed by the different therapy groups. CBT significantly improved child symptoms and PST significantly improved parent behaviour and parent mental health immediately post-treatment.
Discussion & Conclusion: There is no evidence for the effectiveness of psychological therapies that include parents in most domains of functioning. More work is needed to develop and provide psychological interventions that directly target parents of children with chronic illness. Interventions should target long-term change in parents.

Program no. 1-59
National guidelines for neonatal pain management - occurance and content
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Introduction & Aims
International evidence-based guidelines for preventing or treating neonatal pain were published in 2001(1). They describe sources of acute pain and recommend approaches for pain assessment, and pharmacological and non-pharmacological management. We investigated the occurance and content of national guidelines for neonatal pain management and their compliance with international recommendations. A secondary aim was to study how intubation premedication recommendations were followed in clinical practice.
Methods
A questionnaire was distributed to neonatal societies worldwide and to members of the e-mail-lists International Pediatric pain-list, NICU-net and Council of International Neonatal Nurses-network. Additionally a search in Pubmed was done, using pain, neonatal, newborn, guideline, government publication and pain management as search-words.
A web-based survey about premedication prior to intubation of newborn infants was sent to members of the same e-mail-lists.

Results
National guidelines from 14 countries were obtained, mostly issued by professional societies from 1995 to 2011. Guidelines from 13 countries contained suggestions concerning procedural pain. Other issues were pain assessment (14 countries), post-operative pain (12) and ongoing/prolonged pain (9). Pharmacological and non-

pharmacological treatment recommendations were found in 13 national guidelines. Six countries had recommendations for premedication prior to intubation.
Seventy-six individuals from 27 different countries responded to the web-based survey. Seventy-one percent used premedications routinely prior to intubation. The most commonly used drug was fentanyl followed by morphine and midazolam. Thirty-four percent reported using muscle relaxant routinely, with suxamethonium as the most commonly used drug. Thirty-six percent used atropine prior to intubation.
Discussion & Conclusions
Many countries have still not developed national guidelines for management of neonatal pain. The guidelines obtained in this study comply with the international guidelines concerning their recommendations for pain assessment, actions at procedural pain, and pharmacological and non-pharmacological pain treatment. Many national guidelines do not have specific suggestions concerning dosages of drugs, management of ongoing/prolonged pain, and premedications for intubation. The web-based survey indicates that the use of premedication is still not widely adopted and there is wide variability in the drugs and doses used. The lack of evidence-based recommendations for intubation premedication in many countries also implies that the international guidelines should be revised and updated.
Reference
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The authors have no conflict of interest to declare.

Program no. 1-60
Skin-to-skin contact for pain relief - a bibliometric analysis
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Introduction & Aims
Skin-to-skin contact originated as a life-saving alternative to conventional neonatal care in low-resource settings. Later research has focused on its advantages for e.g. breast-feeding, mother-infant attachment and also for pain-relief. This study is a part of a larger bibliometric project, analyzing neonatal pain research from 2000 to 2012, as a follow up of a previous investigation (1).
Methods
PubMed, PsychInfo, Cochrane, and EBSCO databases were searched using terms relating to pain, neonatal care, infancy, skin-to-skin contact and kangaroo mother care. In addition literature was searched from personal knowledge, reference lists in retrieved articles and from the International Network of Kangaroo Care Bibliography (2). The

articles in the final inclusion were analyzed according to publication data and type of research and also type of pain.
Results
A final number of 87 articles were included in the analysis. Publication rate increased from an average of 2.5 articles per year the first 5-year period; 2000-2004, to 8.2 2005-2009 and 12.0 2010-2012. Eighty-eight per-cents were published in English language and the main publishing countries were USA with 34 % and Canada with 24 % of the articles. Randomized controlled trials constituted 33 % of the included articles, followed by 14 % other original research. Twenty per-cents were systematic reviews and 34 % guidelines, position papers or commentaries. The most common topic for the studies were procedural pain (61 %) followed by general pain issues (32 %). Of the first authors, 62 % were nurses and 28 % physicians.
Discussion & Conclusions
Research about skin-to-skin contact as pain relieving measure shows an increasing trend over the last decade, both randomized trials and other original research, which is also seen in the increasing number of reviews and guidelines built on the results of this scientific work. The large proportion of nurses performing skin-to-skin contact research shows that skin-to-skin contact is a multi-professional team-based intervention. A next step would be to study compliance with the guidelines and the implementation process of skin-to-skin contact for pain-relief.
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The authors have no conflict of interest to declare.

Program no. 1-61
Kids in Control: Implementing Sustainable Paediatric Sedation Practice Change
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Introduction and Aims:
In 2011, Pain Management Services from Randwick and Westmead campuses of Sydney Children's Hospital Network (SCHN) collaborated in the revision of procedural sedation clinical guidelines. Under the revised guidelines, deep sedation techniques were no longer recommended for use by non-anaesthetists.
The revised guidelines carried major implications for practice change for many departments within SCHN Randwick, particularly the Nuclear Medicine Department (NMD) and the Day Stay Unit (DSU), who relied heavily upon a triple-agent deep sedation technique The aim of this project was to reduce the use of deep sedation for children having nuclear medicine investigations at SCHN Randwick Campus by 100% within 12 months.

A facilitated, solution-focussed approach was utilised to enable the NMD and DSU to identify barriers to implementation and develop strategies to implement the guidelines effectively. A mixed methods evaluation of the new model of care was undertaken six months post implementation.
Methods:
Four methods of data collection were employed to evaluate the new model of care over a three month period. This included: a Clinical Practice Audit Tool (CPAT) (n=19); staff survey (n=10); staff focus group (n=10), and parental survey (n=13).
Results:
The CPAT demonstrated no additional sedation required to complete procedures or failures to complete investigations with the new single agent sedation regime. One hundred percent of staff surveyed felt that implementation of the new guidelines was working well or extremely well. Seventy-seven percent of parents felt their child coped well or very well with their procedure. Negative feedback on the lack of preparation parents and their children had for their child's procedure (38%) was a recurrent theme in parental surveys. Length of stay was reduced by approximately two hours and there were no inpatient admissions due to adverse effects. Selected results will be graphically displayed.
Discussion and Conclusion:
Evaluation of the new model of care, has shown the new sedation regime to provide adequate sedation for nuclear medicine investigations, and to be more efficient than the previous model of care,
As a result of this evaluation, strategies for continued improvement have developed between the two departments, including creation of a dedicated paediatric sedation room and an information leaflet for parents.
This quality improvement project enabled the DSU and NMD to collaborate in the development of innovative and sustainable ways of working to align practice with clinical guidelines, enhance patient safety, provide quality service, and enhance parent and staff satisfaction.

Program no. 1-62
Pain in children and interprofessional teamwork in Habilitation services.
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Introduktion
During the last decade pain has been presented as a common and repeated problem in children and adolescents with various neurological impairments. The cause and consequence of pain differs but often affects wellbeing and life quality for the individual and his/her caregiver and family. Despite increased professional knowledge there is a gap between theory and clinical practice. This fact has brought about a demand for adequate pain management strategies. Efforts have been made to enlighten all categories of personal working in Habiliation & Health services in Stockholm county council to recognize the impact of pain and requests for pain treatment. The fundaments of the habilitation organization provide excellent opportunities for different professionals

to meet in the management of diverse pain problems from an overall health and life perspective.
Aims
The objective of this project was to explore professional thinking and encourage increased interprofessional pain management. To increase evidence based care with clinical expertise and child/family resources truly shared.
Method
A case-method was used in roll play to introduce two fictive scenarios as starting points for discussion in habilitation service teams. The professional's arguments and thoughts were documented and reflected upon within and between three participating habilitation teams and by the project group. Frequent themes and areas of interest were recognized and strategies for interventions identified.
Results & Conclusion
The project enabled the exploration of available competence to all participants. It enlightens the professional individual approach with combined options and approaches of interventions. Guiding principle for interprofessional team working will be presented. Advances in pain management postulate professional attention with multiprofessional knowledge and team shared strategies.

Program no. 1-63
Improving Pain Intensity in Hospitalized Children Using Knowledge Translation
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Co-author(s): Janet Yamada, Hospital for Sick Children, Co-author(s): Jennifer Stinson, Co-author(s): Fiona Campbell, University of Toronto, Canada, CIHR Team in Children's Pain
Introduction and Aims: Despite extensive research, children continue to experience moderate to severe pain during hospitalization. To address this evidence to practice gap, the CIHR Team in Children's Pain implemented a novel Knowledge Translation (KT) intervention, Evidence-based Practice for Improving Quality (EPIQ), in pediatric hospitals across Canada. EPIQ incorporates evidence-based research and continuous quality improvement (CQI) methods to improve clinical pain outcomes (pain intensity). The aim of this study was to examine the effect of EPIQ on pain intensity and determine the influence of child and unit factors.
Methods: Thirty two patient care hospital units in 8 pediatric hospitals participated in this prospective cohort comparative study with repeated measures. The EPIQ intervention was implemented over an 18 month period in 16 units, while 16 units continued with standard care (SC). The EPIQ intervention includes establishing a group of pain champions on the units to facilitate improved pain outcomes (preparation phase), and implementing tailored, evidence-based KT strategies, as part of a CQI process to facilitate change, and monitoring improvement (implementation phase). Following EPIQ implementation, pain intensity was evaluated by trained pain experts, using validated pain assessment tools during routinely scheduled painful procedures on all 32 units (n=640; SC n=320; EPIQ n=320). Pain intensity was reported on a common metric (0 to 10 point scale).

Results: Overall, mean pain intensity was 4.0 (SD 2.8). In an adjusted analysis (marginal linear regression to account for clustering of outcomes within units), EPIQ units had, on average, adjusted pain scores that were 0.37 points lower than SC units (p=0.04). All age groups had pain scores that were significantly higher compared to the reference group of adolescents (aged 13 to 18) (p=<0.001). Both surgical and medical units had pain scores at least 1.16 points higher, on average, compared to the reference PICU units (p=0.01 and p=<0.0001, respectively). Units with higher numbers of occupied beds and longer average patient stay had higher pain scores (p=0.025).
Discussion and Conclusions: EPIQ was effective in reducing pain intensity scores in EPIQ intervention units compared to SC units. There is a particular need to focus on improving pain management strategies for school-aged and younger children. Further analysis of the unit context is required to explain results related to unit type, patient occupancy, and length of stay.
Supported by the Canadian Institutes for Health Research (CIHR) (CTP-79854 and MOP-86605)

Program no. 1-64
Sustainability of Improved Sucrose Practices in Hospitalized Infants
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Introduction and Aims
The Evidence-based Practice Identification and Change (EPIC) strategy (Lee et al., 2009) is a multifaceted tailored knowledge translation (KT) intervention that was used to promote improved pain practices (i.e., ordering and administration of sucrose) for managing procedural pain in infants hospitalized in the Neonatal Intensive Care Unit (NICU). EPIC was implemented over a 12 month period. KT strategies, including reminders, educational outreach, educational materials, and audit and feedback were implemented by health professional facilitators in the NICU to promote pain practice changes. The EPIC intervention was effective in improving the ordering and administration of sucrose over time. However, the sustainability of these improved practices in the NICU is unknown. The aim of this study was to determine whether the improvements achieved during the EPIC intervention could be sustained at 6 and 12 months post-intervention.
Methods
In this descriptive case study, retrospective patient chart reviews were undertaken at 6 months and 12 months post EPIC implementation to determine the sustainability of improved sucrose ordering and administration practices for procedural pain management in hospitalized infants in the NICU. A total of 30 patient charts were reviewed at each time point. Logistic regression was used to model the probability of the selected practice change based on time.
Results
At 6 and 12 months post EPIC, implementation of sucrose ordering remained elevated

relative to baseline, although this association was only statistically significant at 12 months post EPIC (OR: 3.43 95% CI: 1.12 to 10.47). The administration of sucrose was significantly increased in the post EPIC intervention period, with a 4.5 and 9.0 fold increase in the odds of administering sucrose at 6 and 12 months post EPIC compared to baseline (p=0.037 and p=0.002 respectively).
Discussion and Conclusions
Improved sucrose administration practices achieved during the EPIC intervention were sustained over time. Further theory-based research on the sustainability of EPIC beyond 12 months post implementation is required.
Reference
Lee SK, Aziz K, Singhal N, Cronin CM, James A, Lee DS, et al. Improving the quality of care for infants: a cluster randomized controlled trial. CMAJ. 2009 Oct 13;181(8):469-76.
Supported by the Canadian Institutes of Health Research (CIHR) (CTP-79854 and MOP-86605) and a CIHR Fellowship

Program no. 1-65
A systematic review of cost-of-illness studies of chronic pain in children
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Introduction & Aims: Cost-of-illness studies quantify the economic impact of diseases and inform decision makers about the burden of disease beyond epidemiological data. They are essential for developing good health policies, allocating funds to deliver programs, and guiding decisions about jurisdictional research funding. We undertook a review of the literature to determine the extent of cost-of-illness studies for chronic pain in children, and specific conditions with a significant pain component (arthritis, fibromyalgia, sickle cell disease, headache, abdominal, back, limb, musculoskeletal and cancer pain).
Methods: MEDLINE, OVID HealthStar and EMBASE were searched from inception to December 2012 using pain and illness terms mentioned above with terms for cost-of-illness or health care costs. Review articles were also examined. Only studies that reported costs for pediatric patients separate from adults were included.
Results: The search yielded 1078 unique studies from three databases. Nineteen relevant studies were identified including data from 976 children, and administrative database records of 112,500 children and 44,000 hospital discharges. Two studies determined costs associated with managing chronic pain (UK, USA). Cost-of-illness studies for other painful conditions included abdominal pain (n=2, Uruguay, USA), headache (n=2, Italy, USA) arthritis (n=6,Canada, Finland, Netherlands, Turkey, UK, USA), sickle cell disease (n=6, USA) and back disorders (n=1, Germany), but none of these reported pain management costs separate from disease costs. The two chronic pain studies reported costs for managing pain alone, not costs for other care, and included 127 children. The UK investigators collected data by mailed questionnaires to families of children treated in rheumatology and multidisciplinary pain clinics (MPC).

USA researchers interviewed families at MPCs and accessed charts and clinic financial records to determine costs. The UK study determined the annual cost of managing pain was £8000 for direct and indirect costs, including lost time from work by parents. Direct medical costs were estimated at £4431. The US study calculated direct outpatient medical costs to be $1761 for three months prior to the initial MPC visit ($7044 annual). Neither study captured costs to manage conditions that can occur due to pain, such as depression and anxiety.
Discussion & Conclusion: We found only two studies that determined the cost of managing chronic pain in children and depended on family recall to calculate costs. Given this paucity of data, additional robust studies that reflect costs relevant to specific health systems are needed to inform decision makers and policy developers at the jurisdictional level.

Program no. 1-66
A systematic review of non-pharmacological interventions for pediatric cancer pain
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Introduction & Aim: Pain in children with cancer is common and distressing. Despite advancements in pain assessment and management research, pain due to cancer and/or its treatment continues to be poorly managed. Pharmacological strategies have been the cornerstone of cancer pain management to date. However, patient and clinician interest in improving pain outcomes through other prevention and management methods is increasing. This study aimed to evaluate the current evidence addressing the use of physical and psychological therapies to manage pediatric cancer pain.
Methods: Electronic searches were conducted in Medline, EMBASE, CINAHL, PsychINFO and ISI Web of Knowledge (from database inception to June 2012) for clinical trials (including randomized controlled trials) and multicenter studies. Article inclusion criteria were: (1) patient population of children and adolescents (0-19 years) receiving care in the hematology/oncology programs of pediatric care centers, (2) pain examined as a primary or secondary outcome and (3) pain intervention that was not solely pharmacological in nature. Search results returned 7064 articles, which were assessed for relevance independently by two reviewers. Of 267 published articles identified that were potentially eligible for inclusion; 25 met inclusion criteria and were independently assessed for methodological quality by the two reviewers and included in analysis. Results: The included studies featured psychological pain interventions for children and adolescents (n=1003) aged 1 to 19 years with a variety of cancer diagnoses (leukemia or lymphoma, brain tumor and solid tumor). Invasive medical procedures were the pain source examined in 22 of the studies. Physical and psychological interventions used included distraction, hypnosis, relaxation, massage, hand-holding, arts therapy, positive re-enforcement and physical positioning. Five studies used a combination of these techniques and three used a pharmacological adjuvant. A statistically significant decrease ($p<0.05$) in pain intensity (self- or proxy-report) was observed in 16 studies. The methodological quality of studies was generally poor. Discussion & Conclusion: Current non-pharmacological pediatric cancer pain interventions are diverse in strategy and the cancer diagnoses they target. Significant

decreases in pain intensity when physical and psychological interventions are utilized suggest these strategies may be effective methods of pain treatment, especially in the case of painful medical procedures. These findings represent the beginnings of an evidence-base supporting physical and psychological interventions to improve pain and other selected health outcomes in children and adolescents with cancer. Future well-designed multi-center randomized controlled trials are needed to further discern treatment effects on pain and other health outcomes in this population.

Program no. 1-67
Chinese research on pain and neonates
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Introduction and Aims
Preterm and newborn infants suffer from pain in the same way as adults. They are even more sensitive to pain due to immaturity of endogenous modulation. Thus, they should have the same human right to be alleviated from pain. Today, infant care differs throughout the world and there is a need to calibrate knowledge and know-how in our Neonatal Intensive Care Units. The vision of the project is to increase global understanding and encourage knowledge transfer about pain in newborns. Knowledge transfer is the basis for improving treatment and care for newborns in a global perspective. A cross cultural collaboration will improve the safety, efficacy and quality of the care for the patients and families. Improving care will be cost efficient by a better care chain. Also, an aim is to connect the pediatric communities of Sweden and China by conducting seminars and workshops including
facilitation of student projects. A first step is to understand the present situation regarding neonates and pain and to understand what improvements should be prioritized.
Method
China's four most important medical data bases were scrutinized. All scientific articles regarding pain and neonates were included. Parameters as type of procedures, pain evaluation method such as pain scale, physiological and behavioural variables. Also, type of intervention was included.
Results
A total of 591 articles were found. Our preliminary results show that heel stick is a common procedure to study. NIPS are the most used pain assessment scale in published Chinese research. The articles are mainly about
pharmacological and non-pharmacological interventions, and that only 14 articles have content that covers knowledge, education and attitudes regarding pain of the clinical personnel in the NICUs. One of the most common
non-pharmacological interventions in China is tactile stimulation.
Discussion and Conclusion
The first review and comparison of scientifically publication show a medical culture difference. There is a need to further understand the knowledge and attitudes of

Chinese NICU personnel regarding pain. Our collateral collaboration is progressing to spread worldwide.

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Acknowledgement
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Conflict of interest
No conflict of interest exists.

Program no. 1-68

The Power of Stories of Children's Pain

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Introduction and Aim
We navigate our lives through stories. Some stories are powerful, resonant and heard; others are overlooked, told only to an internal audience or smothered by more powerful stories (Carter, 2002). Pain stories have the capacity to express, expose and frame many different elements of a person's experience of pain. We aim to demonstrate the power of stories in conveying individual insights, otherwise unavailable to us, in relation to experiencing and dealing with pain.

Methods
Drawing on stories we have collected from children, families and health care professionals from all over the world we will explore what stories can tell us about individual perspectives on pain.

There is a tradition of using stories in nursing research (Kelly and Howie 2007), as they provide a means of understanding patients and the context of nursing practice. Andrews et al (2008) suggest that narratives enable us to identify different and sometimes contradictory layers of meaning, and to ultimately understand more about each other.

Results
Stories can provide the means by which children, families and health care professionals can start to articulate their own experiences of pain. The stories we have collected provide a rich picture of the impact of pain on professionals and children and families. We have stories conveying the vulnerability of critically ill babies and children in pain alongside stories of parents' and professionals' frustration and despair in the face of poor pain management. These are countered by stories of children's resilience and the sensitivity and skill in meeting the challenge of relieving complicated pain.

Discussion and Conclusion
Although story telling is something we are familiar with from childhood, telling pain stories can be challenging. Parents, professionals and children can lack the narrative resources to 'tell' their stories. Valuing stories, helping children and families to locate resources, may help us understand their pain. Stories can help us to be 'in the moment'

with children and allow us access to a forum through which the individual impact of experiencing or dealing with pain can be articulated.

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Program no. 1-69

Acute Pain in Pediatrics. Primary Care Pediatricians' Perspective.

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Introduction&Aims: Several factors cause pediatric pain to be under-valued and poorly identified; this includes myths, poor information, beliefs and actual difficulties of children reporting painful conditions. So far, no data are available in Brazil to quantify and qualify the interpretation of painful conditions in children by the doctors. The understanding of this reality may be a valuable tool to demystify pediatric pain and for the development of educational strategies for a proper identification/stratification of painful conditions in this population. The aim of this investigation is to assess the approach of the patient in pain from the medical standpoint, taking into account the emotional impact on the parents and caregivers and the first conduct used.

Methods: A qualitative investigation was performed with 14 primary care pediatricians, who take care of patients from 6 months to11 years of age (ICr) and 12 to 18 years of age (AD). The average professional practice time was 26 years.

Results: A change in the standard of approach to pain has been observed with a reduced concern in introducing specific therapies with the use of instruments that will quantify the pain, such as: analog visual scale, numerical and faces pain scale. In the interviews conducted, a trend to minimize the importance of pain is detected. In all the age groups, abdominal pain was most reported, followed by muscular pains in AD. Headache was the least mentioned. According to the pediatricians who were interviewed, they offer parents guidelines to initiate a drug therapy, yet, in many cases, mothers, regardless of the directions, tend not to medicate their children to avoid masking the underlying condition. All the respondents use NSAIDs for the relief of mild to moderate pain.

Conclusion: As a conclusion, we may say that there is still today a lack of understanding about pain among pediatric primary care physicians; it is thus important that specific education programs on the subject matter be developed.

Reference: Bozimowski G. Patient Perceptions of Pain Management Therapy: A comparison of Real-Time Assessment of Patient Education and Satisfaction and Registered Nurse Perceptions. Pain Management Nursing, Vol 13, No 4 (December), 2012: pp 186-193

Program no. 1-70

Education: Patient Controlled Analgesia for children with life-limiting conditions.

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Introduction and aims

This paper examines the process and outcomes of education delivered as part of a novel therapeutic intervention to extend the pain management strategies available to children with life-limiting conditions in community settings.

There is considerable evidence that Patient Controlled Analgesia (PCA) is a safe and effective method of pain relief for children in the hospital setting, however despite the utilisation of PCA in palliative care populations being reported; there is a lack of published evidence on PCA in the paediatric palliative care population in particular in community settings.

Education is a core element of successful change implementation in clinical practice; it can address knowledge and skills acquisition in addition to patient safety. Improvements in quality of care are dependent upon the willingness of practitioners to engage with and deliver new clinical care initiatives. This transformation is imperative for children with life €“limiting conditions where there has long been recognition that their pain management is sub-optimal.

Methods

1. A pre education survey of community children€™s nursing teams (CCNT) working collaboratively with a tertiary palliative care service.
2. Development and implementation of an education plan.
3. Post education session evaluation questionnaires.
4. Semi structured interviews with CCNT, staff from children€™s hospices, local hospitals and the tertiary palliative care service post patient utilisation of PCA.

Results

1. Pre -education (60% response rate), no community services were using PCA for children with life-limiting conditions. Teams were delivering pain medication via a continuous subcutaneous (or intravenous) syringe driver, although service levels varied considerably.
2. 95 community staff attended training sessions, with 78% of staff completing evaluation forms seeing sessions as relevant to their clinical practice.
3. A multidimensional approach to education evolved in this project including general and patient specific training sessions, reinforcing at the source of care delivery for the individual patient and collating feedback from participants in a debrief format.
4. Interviews revealed that although knowledge and skills acquisition learning needs could be met by educational strategies, confidence in delivering PCA was more variable.

Discussion and conclusion

Delivery of PCA in the community setting is feasible and acceptable although resource intensive. Increased responsiveness to learning needs was required to meet a wide range of knowledge and skill foundation, including utilising pod casts to supplement face

to face training. Education strategies should reflect the time sensitivity of learning needs and requirements for effective on-going support to build and maintain confidence.

Program no. 1-71
Video education about pain treatment reduces anxiety in the emergency department
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Introduction: A visit to the emergency department (ED) is, by nature, a result of unpleasant and unexpected circumstances. Currently, little is published about anxiety experienced by parents during an ED visit. Further, no studies in the ED have investigated ways to reduce the anxiety experienced. Video education has been shown to decrease parent anxiety before pediatric day surgery and in the postoperative period.
Aim: To evaluate the anxiolytic effect of a 6-minute instructional video for parents that targets common misconceptions about at-home pediatric pain management.
Methods: We conducted a randomized, double blinded clinical trial of parents of children ages 1-18 years who presented with a painful condition to a large tertiary care pediatric ED in June and July of 2011. Parents were randomized to a video education about pain treatment (intervention) or a video education about preventing falls (attention control). Primary outcome was the parents reported anxiety using a 0-5 likert scale immediately before and after watching the video. Descriptive statistics and a chi square test were used to describe and compare the proportion of parents with reduced anxiety experience.
Results: 100 parents were enrolled: 59 parents watched the intervention video and 41 the control video. Mostly mothers were enrolled (n=85). Initial anxiety experienced was a median score of 3 (range 1,5). High initial anxiety (score of 4 or 5) was associated with young parents age (p=0.008), nonwhite race (p=0.050), no more than a high school education (p=0.009) as well as age less than 5 years (0.003) and female sex of their child (p=0.008). Post-video anxiety experienced was a median score of 2 (range 1,5). A significantly higher proportion of parents experienced reduced anxiety after viewing the video education compared to the control video: 40% vs. 12.5% (p=0.026).
Conclusion: A moderate level of anxiety is experienced by parents of children with pain in the ED setting. A number of characteristics identify parents with high anxiety. Viewing a video educational about home pain treatment was associated with reduced anxiety for parents in the ED. Further study is needed to determine the impact of parent anxiety on education and pain treatment outcomes in the ED.

Program no. 1-72
An admixture of naloxone for the prevention of opioid-induced pruritus in children
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Introduction & Aims

Morphine, administered by Continuous Opioid Infusion (COI) or Patient Controlled Analgesia (PCA), is an effective modality for postoperative analgesia, but is associated with side effects, including opioid-induced pruritus (OIP) [1]. Naloxone administered intravenously at 0.25-1.65 μg/kg/hr has been shown to reduce OIP, without affecting quality of analgesia or increasing opioid requirements [2]. To achieve this dose and avoid mixing solutions, the naloxone must be administered separately to the morphine infusion. This study's aim was to determine whether an admixture containing 12 μg naloxone per 1 mg morphine in normal saline is pharmacologically stable and, when administered via COI/PCA at a range of infusion rates, is effective in preventing OIP without attenuation of analgesia or increased opioid utilisation.

Methods

Stability of the morphine/naloxone admixture was analysed using high-performance liquid chromatography. Institutional review board approval was obtained for a clinical trial, which is ongoing. Eighty-five children, aged 8-18, ASA I-III, with normal developmental profile and prescribed postoperative analgesia utilising parenteral morphine, will be recruited. Following informed consent/assent, subjects are randomised to receive a COI/PCA infusion containing 1 mg/mL morphine with or without 12 μg/mL naloxone. Incidence and severity of pruritus is assessed every 4 hours using a validated Colour Analogue Scale (CAS). Opioid utilisation, occurrence of nausea/emesis, administration of diphenhydramine, ondansetron and dimenhydrinate, pain and arousal scores are recorded for 48 hours or until the COI/PCA is discontinued.

Results

Compatibility analysis demonstrated that the morphine/naloxone admixture is stable for 72 hours at room temperature and 30 days with refrigeration. Clinical data has been collected for 66/85 children of median (range) age 14.5 years (8-18), weight 56.6 kg (24.3-125.5), following general (n=11), spine (n=13), other orthopaedic (n=36) or urological (n=6) surgery. Median (range) pruritus CAS score was 0.5/10 (0-5) over the study period, which lasted median (range) 43 hours (9-48). Diphenhydramine was administered on one (n=13) or more than one occasion (n=13) or was not required (n=38). Median (range) opioid utilisation was 31.9 μg/kg/hr (13.1-81.6), corresponding to a potential naloxone dose of 0.38 μg/kg/hr (0.16-0.98). Subjects' group allocation remains blinded until recruitment completes in March/2013.

Discussion & Conclusion

A significant decrease in OIP, without reduced analgesia, would favour incorporating low-dose naloxone in standard COI/PCA morphine solutions to improve quality of pain relief, minimise use of anti-pruritic medications and obviate the need for a separate naloxone infusion.

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Acknowledgement

CAS Award

Program no. 2-01

Reducing the pain of IM benzathine penicillin injections in rheumatic fever

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Introduction & Aim: Monthly intramuscular (IM) benzathine penicillin injections are recommended for secondary prophylaxis of acute Rheumatic Fever (RF) for at least 10 years after diagnosis (1). The localized pain associated with these injections can cause difficulty in administration to children, which could potentially lead to poor compliance (2). The aim of this study was to evaluate the effectiveness of Lignocaine and Buzzy® device for pain management of these injections in the RF population of Counties Manukau District Health Board (CMDHB).

Methods: 405 RF patients receiving injections every 28 days in CMDHB region were offered 0.25 mL of lignocaine 2% and a Buzzy® vibrating cold pack device for pain management of their injections. The lignocaine was mixed with the benzathine penicillin prior to administration. A pre and post survey assessed pain scores at four time points (during administration, 2 minutes post, 1 hour post, next day). Questions assessing fear of the injection were also included.

Results: In total 49% of patients responded to the survey. Patients who chose no intervention had significantly lower pain scores than those who subsequently chose an intervention. Of those who chose an intervention paired data pre and post intervention was available (n=119). The results were consistent across gender and ethnicity however pain and fear scores were higher for patients ≤16 yrs. Mean pain score at delivery changed from 5.36/10 pre intervention to 2.44/10 post intervention ($p \leq .001$). Overall pain scores were significantly reduced over all four time points. There was also a significant reduction in fear of the injections. Lignocaine and Buzzy® resulted in a bigger improvement in pain score than lignocaine alone during injection delivery. A separate file audit 5 months post intervention found 66% of all RF patients at CMDHB were choosing to use lignocaine and 43% were choosing to use Buzzy®. In total 73% were choosing some intervention.

Discussion & Conclusion: Offering analgesia for benzathine penicillin injections has been popular in the RF community with 73% uptake and significant reductions in pain and fear. Further psychological and health improvements of adding analgesia may become apparent over time.

Acknowledgements: Linda Legge (CNS), Esther Leauanae (Play therapist), Annette Olsen (Nurse Educator), Rheumatic Fever District Nurses Resource Group and CMDHB District Nurses.

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Funding: From within clinical budget

Program no. 2-02

Contextual factors associated with pain responses of preterm infants to heel-sticks

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Introduction: Evidence indicates that medical and demographic contextual factors (cFs) impact pain responses in preterm neonates, but the existing evidence is very heterogeneous.
Aim: To explore the effect of cFs on pain responses to heel-stick procedures of preterm infants.
Methods: This study was a secondary analysis of data collected during a randomized controlled trial examining pain response to non-pharmacological interventions across repeated heel-sticks. Five heel-sticks across the first 14 days of life were videotaped. Pain response was rated with the Bernese Pain Scale for Neonates (BPSN) by four raters blinded to the heel-stick phases (baseline, heel-stick, recovery). Demographic and medical cFs were extracted from medical charts. Mixed single and multiple regression analyses were performed controlling for the intervention group, site and heel-stick phase.
Results: Apgar scores at 1 minute were negatively associated with behavioral (p=0.002) BPSN scores, while Apgar scores at 5 minutes after birth were positively associated with behavioral (p=0.006) scores. Accumulated number of painful procedures (p=0.002) and gender (p = 0.02) were positively associated with physiological scores while CPAP (p=0.009) and mechanical ventilation (p=0.005) were negatively associated.
Discussion: Higher exposure to painful procedures, male infants and having CPAP or mechanical ventilation were cFs associated with physiological response. The only variables significantly associated with behavioral BPSN scores were Apgar scores but these relationships were inconsistent.
Conclusions: While our findings support the importance of considering CFs as influencing pain responses in preterm infants, the results remain unclear. Our findings raise important methodological issues that need to be considered as future studies are designed to examine the impact of CFs on the pain responses of preterm infants.

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Program no. 2-03

Midazolam and ketamine as pain management of Botulinum toxin injections in children

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Introduction and aims

Children with cerebral palsy (CP) are often impaired by spasticity in their limbs. Botulinum toxin A temporary reduces the muscle tone and must often be repeated. Multiple intramuscular injections that are administered repeatedly necessitates the use of pain management to prevent suffering and pain memory. There is, however, no consensus on doses, treatment regimes, and the best integration with other clinical modalities. Midazolam and ketamine have in other contexts been pain relieving when children undergo procedures. There are few studies on pain management of Botulinum toxin A injections. The aim of this study was to investigate the effects and side effects when children with CP were administrated midazolam and ketamine in combination.

Method

Children who visited a regional rehabilitation centre were included in this study. All children had spastic CP. The children were administrated Botulinum toxin A in one or several limbs. All children got local anesthesia (EMLA) on the intended injection sites. Midazolam mean 0.26 (range 0.17-0.3) mg/kg and ketamin mean 3.7 (range 2.5-4) mg/kg were rectally administrated approximately 10-15 minutes before the procedure. The staff and the caregivers filled in a protocol that evaluated pain intensity (FLACC (Face, Legs, Activity, Cry, Consolability), NRS (Numeric Rating Scale) by proxy), well-being (NRS by proxy), and feasibility to do the procedure (NRS). The caregivers also filled in a protocol on side effects after the children went home.

Results

Forty-four children, median age five years, underwent in median 6 (range 2-12) injections of Botulinum toxin A. The median pain score on the observations (FLACC) was 2 (range 0-6) and the median pain score of NRS by proxy was 3 (range 0-10). The median score of wellbeing, measured with NRS by proxy, was 9 (range 7-10). The staff assessed the feasibility to do the procedure as median score 9 (range 6-10). Few side effects were reported, the most common side effect was tiredness, reported 15 times.

Discussion

Midazolam and ketamine in combination seem to be effective pain relief when children with CP undergo injections of Botulinum toxin A. Each child with CP has individual needs; in some children this treatment will be successful in reducing their suffering and pain memory.

Conclusion

Midazolam and ketamine are probably effective and safe when children with CP

undergo injections with Botulinum toxin A. More studies are necessary to confirm this result.

Program no. 2-04
Facial expressions of infants post-immunization: A comparison by pre-needle distress
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Introduction and Aims: Infant facial expressions serve crucial functions in the context of pain, as preverbal infants depend on their caregivers for relief (Pillai Riddell & Racine, 2009). Objective coding of pain-elicited facial expressions allows empirical study of developmental changes in responses to pain (Ahola Kohut et al., 2012). The aim of this research is to determine whether presence or absence of distress prior to an immunization predicts facial expressions shown following an immunization injection.
Methods: Following institutional ethics approval, facial expressions of 100 infants were videotaped before and after their 2-, 6-, and 12-month immunizations. Facial expressions were coded using BabyFACS for one minute after a non-painful distressing stimulus (doctor's touch) and a painful distressing stimulus (immunization). Facial expressions were categorized by emotional valence (positive, neutral, negative) after both stimuli. Negatively valenced facial expressions after the immunization were then further subcategorized into the 7 most commonly occurring facial configurations, ranging from the most intense immediate pain to mild distress.
Results: Proportion of time spent over the first minute after the doctor's touch was calculated for each emotional valence. Infants demonstrating more than 5% (3 seconds) of negative expressions were categorized as showing pre-immunization distress. Proportion of time spent over the first minute after the immunization was calculated for each of 7 empirically identified negative facial configurations. A set of Independent Mann-Whitney U Tests compared post-immunization expressions shown by infants who were distressed (DPN) versus non-distressed (NDPN) pre-immunization needle. There were no significant differences in the proportion of time infants in the two pre-immunization groups spent in different post-immunization facial expressions at 2 and 6 months. At 12 months, infants distressed before immunization displayed significantly more facial expressions associated with attempts to regulate distress following immunization ($\chi 2(99)= 2.46$, p
Discussion and Conclusions: Pre-immunization distress is not associated with differences in initial facial response to immunization at 2 or 6 months. However, at 12 months, pre-immunization distress is associated with increased efforts to regulate distress from the pain of immunization. Clinical implications will be discussed.

Program no. 2-05

Effect of high-dose paracetamol for needle procedures in children with cancer -an RCT

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Introduction and Aim. Some children experience needle procedures such as insertion of a needle in a subcutaneously implanted intravenous port as painful, frightening, and distressing even when the skin is numbed with a topical anesthetic. The aim was to investigate whether children experience less pain, fear, and/or distress when they receive high-dose paracetamol vs. placebo in combination with topical anesthesia, using a needle insertion in a subcutaneously implanted intravenous port as a model.
Method. Fifty-one children 1-18 years of age treated in a pediatric oncology and hematology setting were included consecutively when undergoing routine needle insertion into a subcutaneously implanted intravenous port. All children were subjected to one needle insertion following topical anesthetic (EMLA) application in this randomized, triple-blind, placebo-controlled study comparing orally administered paracetamol (n=24) 40 mg/kg body weight with a max of 2000 mg with placebo (n=27). The patients' pain, fear, and distress were reported by parents, nurses, and children (≥ 7 years of age) on 0-100 mm Visual Analogue Scales (VAS). In addition, pain observation, procedure time, and cortisol reduction in the paracetamol vs. the placebo group were assessed. The study was approved by the Regional Ethics Committee and registered in the European Clinical Trials Database EudraCT.
Results. No differences between the paracetamol and the placebo group were found with respect to demographic characteristics. According to VAS reports paracetamol did not reduce pain, fear, and distress compared with placebo. Behavioral observation, cortisol reduction, and procedure time did not differ between paracetamol or placebo groups.
Discussion and Conclusion. Paracetamol provides no additive effect in reducing pain, fear, and distress when combined with topical anesthesia in pediatric patients undergoing port needle insertion, and would not be expected to be of any benefit for similar procedures such as venipuncture, venous cannulation, and vaccination when topical anesthesia is used.

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Conflict of interest statement. There are no affiliations with any organization that, to any of the authors' knowledge, has a direct interest in the subject matter discussed.

Program no. 2-06

Not Making the Cut: Excluded Studies from a Review of Interventions for Needle Pain

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Introduction and Aims: We updated our 2006 Cochrane review assessing the efficacy of cognitive-behavioral psychological interventions for needle-related procedural pain and distress in youth aged 2-19 years (Uman et al., 2006; 2012). Thirty-nine (N=3584) randomized controlled trials (RCTs) met our more rigorous inclusion criteria and provided the data necessary to be included in the updated review. However, the majority of studies (n=122; 76%) identified as relevant in database searches and obtained for full study review were excluded. The aim of this analysis was to examine reasons for exclusion and to provide recommendations for design of future RCTs in the area.

Methods: To be included in the review, studies needed to: 1) be RCTs comparing a psychological intervention group with a control or comparison group; 2) include youth 2-19 years of age; 3) use validated measures of pain and/or distress; and 4) include a minimum of 5 participants per study arm. Studies were excluded if they were not published in peer-reviewed journals (e.g., dissertations, conference proceedings), involved needle procedures occurring during surgery, included children with documented needle phobias, or omitted data necessary for meta-analytic pooling (i.e., means, standard deviations, cell sizes) that could not be obtained from authors.

Results: Reasons for exclusion were: not a randomized controlled trial/quasi-randomized assignment/cross-over design (n=47), missing data necessary for meta-analytic pooling (n=25), adult sample (n=11), inappropriate or no control/comparison group (n=9), dissertations/non published studies (n=6), multi-component intervention/not primarily psychological (n=6), surgical procedure (n=5), outcomes not related to pain or anxiety (n=3), no needle procedure (n=3), use of general anesthesia/conscious sedation (n=2), failed randomization (n=2), infant sample (n=1), fewer than five participants per condition (n=1), and secondary data analysis (n=1).

Discussion and Conclusion: Primary reasons for exclusion were non-randomization/quasi-randomization and omitting data necessary for data pooling. Use of true randomization and reporting descriptive statistics for all study outcomes in published reports are recommended for improving trial quality. Systematic reviews are only as sound as the studies they include and may provide biased conclusions if a large proportion of relevant studies are excluded from analyses.

Program no. 2-07

Interventions to improve pediatric nurses' management of procedural pain

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Introduction and aim: Unrelieved pain during painful procedures has been proven to have long term negative effects on children such as fear of hospital environment and post-traumatic stress. Nevertheless, there are still deficiencies identified in nurses' knowledge regarding interventions to alleviate this pain. The aim of this study was to evaluate the effect of a tailored educational intervention on the level of competency of pediatric surgical nurses regarding pain management during painful procedures.
Methods: 42 nurses from the surgical ward of a pediatric university teaching hospital in Montreal participated to the study. A three-hour training session was developed based on the learning needs and barriers identified by these nurses regarding procedural pain management. Nurses were asked to complete a questionnaire on their level of competencies developed by the principal author. Training session focused on two specific competencies: using a clinical judgment and caring for the patient and his family during their health experience. T-tests will be used for data analysis.
Results: The training session had a significant positive effect on nurses' level of competency for using a clinical judgment (P = 0,000) as well as for caring for the patient and his family during their health experience (P = 0,002).
Discussion and conclusion: Training sessions in small groups based on specific needs and allowing interactions with participants increased nurses€™ level of competency regarding procedural pain management. Training on pain for health professionals should be reconsidered to be based on a competency approach.

Program no. 2-08

Biobehavioral pain responses in preterm infants according to neonatal clinical risk

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INTRODUCTION & AIM: Pain in neonatal period could be influenced by neonatal variables of the clinical context, such as the neonatal health clinical status. The aim of the study was to compare the biobehavioral pain reactivity-recovery in preterm infants using sucrose for pain relief, according to the neonatal clinical risk status. METHODS: The sample was composed of 30 preterm infants allocated into groups according to the clinical risk. The Clinical Risk Index for Babies (CRIB) was performed to separate the groups, as the following: Low Neonatal Clinical Risk (LCr), 15 infants with CRIB score < 4 (mean gestational age = 30.5 weeks; mean birth weight = 1,166g) and High Neonatal Clinical Risk Group (HCr), 15 infants with CRIB score ≥ 4

(mean gestational age = 29 weeks; mean birth weigh = 1,002g). All infants received the sucrose (25%, 0.5 mL/Kg), which was performed 2 minutes before acute-painful procedures. Infants' biobehavioral responses were assessed during a blood collection procedure divided into the following phases: Baseline (BL), Antisepsis (A), Puncture (P), Recovery-Dressing (D), and Recovery-Resting (R). The pain responses was measured using the Neonatal Facial Coding System (NFCS; range score=0-70). The Sleep-Wake State Scale (SWS; range score=0-6) and the heart hate (HR) were assessed at bedside. The biobehavioral responses were analyzed into scores and magnitude of responses (change between phases). The between groups comparison was done (Mann-Whitney test). RESULTS: Both groups of infants using sucrose for acute pain relief presented similar biobehavioral reactivity-recovery pattern in the Puncture phase (LCr, NFCS score median=4; HCr, NFCS score median=2) and in the Recovery-Resting phase (LCr, NFCS score, median=0; HCr, NFCS score, median=0). Otherwise, there were significant differences between groups on the magnitude of mean heart rate from Baseline to Puncture (LCr, HR mean=14; HCr, HR mean=8.5; $p = 0.05$) and also on the magnitude of maximun heart rate from Puncture to Recovery-Resting (LCr, HRmax = -2.6; HCr, HRmax = 5.4; $p = 0.03$). Then, the high risk for illness severity infants showed less change of physiological response in the Puncture, in comparison to the Baseline, and in the Recovery-Resting, in comparison to the Puncture, than the low risk infants. DISCUSSION & CONCLUSION: The infants, independently of the neonatal clinical risk status, presented low pain scores under sucrose management for pain relief. However, the high risk infants are more vulnerable in the physiological self-regulation process than the low risk infants, exhibiting difficulty to recovery to the baseline pattern.
ACKNOWLEDGEMENTS/DISCLOSURES: Financial support from The State of São Paulo Research Foundation
(FAPESP), and The National Council for Scientific and Technological Development (CNPq). BOV acknowledge the scholars from Pain in Child Health: Strategic Training Initiative in Health Research (PICH, Canada) for the great support in attending the meeting institutes during her master and doctoral training. CONFLICT OF INTEREST: None to declare.

Program no. 2-09
Neonatal clinical risk and sucrose effects on pain responses in preterm infants
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INTRODUCTION & AIMS: The sucrose solution is recommended as pain relief management in Neonatal Intensive Care Unit. Pain relief increases homeostasis and stability of infants, and also can be associated with the biobehavioral reactivity-recovery responses. Little is known about the interaction between high clinical risk and sucrose. This study aimed to examine the main and interactive effects of the neonatal clinical risk

for illness severity and sucrose intervention for pain relief on biobehavioral pain responses in preterm infants.
METHODS: The sample was composed of 82 preterm infants, including Low Clinical Risk infants (LCr, n=45) and High Clinical Risk infants (HCr, n=37). The neonatal risk was measured by the Clinical Risk Index for Babies (CRIB < 4 = LCr; CRIB ≥ 4 = HCr). Out of 82 infants, 30 received the sucrose (25%, 0.5 ml/ Kg) performed 2 minutes before acute-painful procedures (Sucrose Group-SG) and 52 infants did not receive sucrose because they were assessed prior to the sucrose guidelines implementation in the NICU (Control Group-CG). Infants' pain reactivity was assessed during a blood collection procedure divided into the following phases: Baseline (BL), Antisepsis (A), Puncture (P), Recovery-Dressing (D), and Recovery-Resting (R). Behavioral pain reactivity was measured using the Neonatal Facial Coding System (NFCS; pain score range = 0 to 70); the infants' facial activity was video-recorded. The Sleep-Wake State Scale (SWS; score range = 1 to 6) was assessed at bedside. The ANOVA 2X2 test was done to analyze the main and interactive effects of clinical risk and sucrose.
RESULTS: The sucrose presented statistically significant main effects on NFCS score in the Puncture and in the Recovery-Resting; the SG presented less pain response than CG in both phases (P: SG mean=10 [SD±15], CG mean=25 [±22], p=0.004; R: SG mean=3 [±10], CG mean=10 [±18], p=0.04). According to the SWS scores, the SG exhibited significantly less activated state in the Recovery-Dressing than CG (SG: mean=3 [±1.5]; CG: mean=4 [±2], p=0.05). We observed a statistical trend of interactive effect in the Recovery-Resting (p=0.07); the LCr infants using sucrose presented lower NFCS scores than the LCr infants not using sucrose and the HCr infants (LCr-SG: mean=1 [±2.6]; LCr-CG: mean=15 [±19]; HCr-SG: mean=5 [±13]; HCr-CG: mean=6.5 [±15]).
DISCUSSION & CONCLUSIONS: The sucrose was effective for pain relief in preterm infants, independently of the neonatal clinical risk. Moreover, the low risk infants using sucrose exhibited more regulated behavioral responses in the recovery than the other groups.
ACKNOWLEDGEMENTS/DISCLOSURES: Financial support from The State of São Paulo Research Foundation (FAPESP), and The National Council for Scientific and Technological Development (CNPq).
CONFLICT OF INTEREST: None to declare.

Program no. 2-10
"Behave Yourself" Children and Adults Behaviour During Routine Procedures
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Background:
When a child experiences a procedure, the accompanying adults' behaviour and language can influence the child's level of distress (1). It is recommended that coping promoting behaviours are predominantly used by adults during procedures, and the use of distress promoting behaviours is discouraged.

Aim:
To observe, categorise and benchmark the behaviour and language of adults and children during routine procedures in a paediatric centre.
Methods:
An observational study was performed over three months with patients and families in the ward, ambulatory, and anaesthetic areas. Child's and adult's behaviour was observed and coded the using the Child Adult Medical Procedure Interaction Scale-Revised (2). This scale uses multiple objective and subjective measures to categorise behaviour into neutral, coping or distress promoting.
Results:
The study observed 178 children having 205 procedures. Of the 187 parents present, 27% had a non-active role. The most frequently observed clinicians were Nurses (30%), Doctors (34%) and Radiographers (21%).The adult's behaviour interaction changed between neutral, coping or distress promoting throughout the procedure. Graph 1 demonstrates the clinician's behaviours as primarily neutral (94%) and parents as primarily coping promoting (37%).
Discussion:
Coping promoting behaviours displayed by adults is known to contribute to the child utilising coping strategies (1). Neutral behaviours were predominately used by clinicians; these are classified as neither coping nor distress promoting (2). Parents were predominately coping promoting, however 27% had a non active role, e.g. did not interact with their child. Those who had a non-active role may be unaware of how they can help promote coping in their child. Understanding adults' behaviours during routine procedures can help contribute to the development of programs that educate adults on the use of coping promoting behaviour.

Conclusion:
This study has observed, categorised and benchmarked the behaviour and language of children and adults during routine procedures. It has demonstrated that clinicians are predominantly identified as neutral rather than coping promoting. This data is useful in addressing pain culture and practice, and can provide the foundation for educational activities.

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Program no. 2-11

The Relationships between Caregiver Proximal Soothing and Infant Pain

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Introduction and Aims:
There is a paucity of research taking infant age into account when examining the relationships between caregiver proximal soothing and infant pain. Moreover, no studies have differentially examined the relationships between proximal soothing and infant pain according to qualitatively different phases of an infant's pain experience (i.e., pain reactivity versus pain regulation). The aim of this study was to examine the relationships between proximal soothing and pain reactivity/regulation at four different infant age groups.
Methods:
Caregivers and infants were part of a longitudinal cohort (the OUCH cohort) and were followed and videotaped during their 2-, 4-, 6-, and 12-month routine immunizations (n=760). Videotapes were coded for caregiver proximal soothing (MAISD, Cohen, 2005) and infant pain behaviour (NFCS, Grunau & Craig, 1986). Four identical latent growth models (LGM) were replicated at each of the four ages.
Results:
Proximal soothing accounted for little to no variance in pain reactivity or regulation at all four ages (R^2 = 0-4%). Pre-needle distress and pain reactivity accounted for large amounts of variance in pain regulation (R^2 = 41-79%). Exploratory analyses revealed that proximal soothing did not predict infant pain at any subsequent appointments, however, infant pain post needles at 4 months predicted pre-needle distress at 6 months ($r = .17$, $p < .001$) and 12 months ($r = .14$, $p < .001$) as well as pain reactivity at 12 months ($r = .19$, $p < .001$). Infant pain post needles at 6 months predicted pre-needle distress at 12 months ($r = .17$, $p < .001$).
Discussion and Conclusion:
Across the first year of life, earlier infant pain behaviour is a stronger predictor of subsequent infant pain behaviour than caregiver proximal soothing. Given the longer-term benefits that have been demonstrated for maintaining proximity during distressing contexts, caregivers are still encouraged to use proximal soothing during infant immunizations. Given that pain scores post needle predicted pre-needle distress at all subsequent appointments, this suggests the foundations for anticipatory anxiety towards immunization needles may be set very early in development. Given needle phobias may cause these infants to avoid preventative care in the future, this demonstrates the need for immunization pain management early in life.
Acknowledgements:
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Conflict of Interest:
None of the authors have any conflict of interest with this work.

Program no. 2-12

Neonatal Pain is Associated with Poorer Gross Motor Outcomes in Premature Newborns

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Introduction and Aims: Neonatal procedural pain has been associated with reduced white and gray matter brain maturation in premature newborns,1 as well as motor outcomes at 8 and 18 months corrected age (CA);2 however, the association of pain and motor pathway development is largely unknown. The purpose of this study was to examine in premature newborns the association of neonatal pain with (i) corticospinal tract (CST) development and (ii) motor outcomes at 18 months CA.

Methods: 100 premature neonates born at 24-32 weeks gestation age (GA) (median:27.3 weeks; IQR:25.6-29.9) were serially scanned with MRI near birth and at term-equivalent age. Diffusion tensor tractography determined CST fractional anisotropy (FA), a measure of microstructural development. Peabody motor outcomes at 18 months CA were categorized into three impairment groups: none (≥90), mild-moderate (80-89.99), and severe (equations examined the relationship between neonatal pain (# of skin breaking procedures, adjusted for early illness severity and morphine exposure) with (i) CST FA and (ii) motor outcome, adjusting for GA and age at MRI; analyses were further adjusted for other confounders (postnatal infection, white matter injury, and ventilation days).

Results: Higher neonatal pain was associated with slower increase in FA from early in life to term-equivalent age (interaction: p=.002); after adjustment for confounders (p=.003). Infants with poor gross motor outcome had a slower rise in CST FA in the neonatal period (p=.003; Figure 1); this association was not seen for fine motor outcome (p=.72). Poorer gross motor outcome was also predicted by higher neonatal pain (interaction: p=.04) and ventilation days (p=.002).

Discussion and Conclusion: Greater neonatal procedural pain is associated with slower maturation of the CST from early in life to term-equivalent age. The association of neonatal pain with poor gross motor outcomes is mediated, at least in part, by abnormal early CST development.

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Funding: Canadian Institutes of Health Research, Canadian Child Health Clinician Scientist Program, Michael Smith Foundation for Health Research, NeuroDevNet, Child & Family Research Institute

Program no. 2-13
Morphine Exposure is Associated with Altered Cerebellar Growth in Premature Newborns
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Introduction and Aims: Premature infants are at risk for impaired development of the cerebellum and associated poor motor and cognitive outcomes.1 Morphine is a commonly used analgesic in neonatal intensive care,2 which has been shown in animal models to be associated with Purkinje cell death and impaired cerebellar development.3 The purpose of our study was to examine the relationship between morphine exposure and cerebellar development in a prospective cohort of premature newborns.

Methods: 76 premature neonates born at 24-32 weeks gestation (median: 27.3 weeks; IQR: 25.9-29.7) were serially scanned with MRI near birth and at term-equivalent age. Measured cerebellar volumes and microstructural diffusion parameters [fractional anisotropy (FA) and mean diffusivity (MD)] of the middle cerebellar peduncle (MCP) were used as markers of cerebellar development. Generalized estimating equations examined the relationship between morphine exposure, cerebellar volume and MD and FA of the MCP. Factors associated with poor cerebellar development [early illness severity, intraventricular hemorrhage (IVH), cerebellar hemorrhage, infection, intubation, hypotension, patent ductus arteriosus (PDA), dexamethasone, hydrocortisone]4 were adjusted for and retained if significant at $p<0.1$.

Results: 52/76 (68%) infants received morphine (median cumulative dose: 2.48mg/kg; IQR:0.25-10.31). Significant interaction between morphine dose and age at MRI was detected ($p<0.001$); higher morphine exposure was associated with reduced cerebellar growth [Figure 1]. This interaction remained significant after adjusting for IVH, infection, PDA, and glucocorticoids ($p<0.001$). Morphine exposure was not associated with FA of the MCP ($p=0.11$), but was associated with higher MD ($p=0.007$); significance was attenuated by adjusting for confounders ($p=0.06$).

Discussion and Conclusion: Higher morphine dose is associated with impaired growth of the cerebellum in premature infants. Further research is needed to determine if morphine exposure is associated with poorer long-term neurodevelopmental outcome.

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Funding: Canadian Institutes of Health Research, Canadian Child Health Clinician Scientist Program, Michael Smith Foundation for Health Research, NeuroDevNet, Child & Family Research Institute

Program no. 2-14
RCT of Pet Therapy:Procedure Related Anxiety & Pain
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Introduction: Children receiving repeated (approximately every 6 months) treatments with Botox Injections in the sedation unit as outpatients are observed by health care providers to experience anticipatory anxiety. In addition, the procedure can be painful. Multiple injections are delivered to the sedated child in different muscle groups depending on clinical efficacy. Animal-Assisted Therapy using animals such as dogs and cats is thought to help decrease procedural anxiety through distraction and relaxation.
Aims: To compare, using a randomized, controlled trial design (Time 1), the self-reported pain, anxiety and physiologic distress of children who receive a certified pet therapy dog throughout their outpatient treatment for Botox injection in the sedation unit with children who receive usual care during an outpatient visit. At Time 2, approximately 6 months after Time 1, children randomized to receive usual care will experience the intervention (a pet therapy dog) and children in the intervention group will again have a pet therapy dog during their care.
Methods: Randomized controlled trial of pet therapy with subjects age 6-18 years old receiving regular Botox injection treatment in sedation unit (Time 1). Self reported pain (the Oucher) & anxiety (Self Report of Anxiety Scale, 0-10 scale) obtained pre and post procedure, along with vital signs (HR & RR). Previous visit sedation medication use compared to study visit sedation provided. Patients randomized to the intervention group receive the dog at time of admission with the dog remaining for the entire visit (aprox. 4 hrs.).
Results: Thirty-Two patients with 14 (47.8%) in the Dog Condition and 18 (56.3%) in the No Dog condition completed Time 1. Age of children who received pet therapy is 10.8 yrs. (SD 1.8), 50% Male; and in No dog control group m=11.5yrs (SD 3.7), 61% male. The majority of patients have a diagnosis of Cerebral Palsy with some form of muscle spasticity. Preliminary analysis of self reported anxiety scores before and after Botox treatments indicate a significant effect of the dog to decrease anxiety (m=5.0 pre and m=1.6 post, p= .01). In the control (no dog) group anxiety scores were pre, m= 5.2 and

post Botox Treatment m= 2.5, p =.018). Each child and parent reported positive effect of having the dog present on a 0-10 scale M=9.0).Analysis of additional outcome variables and Time 2 data measures will also be presented.
Discussion/conclusion: Preliminary and observational data indicate the positive effect of pet therapy in decreasing procedural anxiety in children.

Program no. 2-15
Maternal guilt is apparent: A Q-methodological study of infant immunisation
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Introduction and aims: The protective benefits of immunisation for the individual and wider community are recognised worldwide. In the UK, all infants are offered a course of primary injections at two, three and four-months to protect them from harmful diseases. Previous research has been dominated by the identification of barriers to immunisation uptake (Mills, Jadad, Ross, & Wilson, 2005; Wroe, Turner, & Salkovskis, 2004), meaning that the viewpoints of parents who have opted for immunisation are under-represented in the literature. This study used Q-methodology, a novel method within the field of acute procedural pain, to explore the diversity of parental understandings of immunisation and responses to infant pain expression after two-month-old infant inoculation.
Method: Parental views were assessed using a Q-sort; 31 statements regarding infant immunisation, generated from relevant academic literature and informal interviews, were organised into a quasi-normal fixed-response grid in terms of the degree of parental agreement or disagreement. Twenty three parents completed the Q-sort. Factor analysis was used to determine the configuration of each response to group parents in terms of their shared viewpoints regarding infant pain and vaccination.
Results: Q-factor analysis produced three statistically independent viewpoints concerning infant immunisation: 1) guilt as a consequence of parental duty, 2) parental confidence driven by immunisation awareness, and 3) the acceptance of the necessity of infant pain. An examination of the demographic characteristics of each factor showed that the majority of parents who felt guilty and accepted the necessity of infant pain were first-time parents whereas those who were confident about immunisation had experienced vaccination with other children.
Discussion and Conclusion: Findings were discussed in terms of the contribution of parity to the shared and district viewpoints of parents regarding immunisation. The findings have implications for the role of medical professionals when giving advice regarding immunisation before and after vaccination.
Funding source: This research was funded by an Economic and Social Research Council (ESRC) 1+3 studentship awarded to the primary author.
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Program no. 2-16

Neonatal pain in relation to brain microstructure and IQ at age 7.5 in preterm children

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Introduction and Aims: Procedural pain-related stress in infants born very preterm (≤32 weeks gestational age) has been associated with abnormal brain development during the period of neonatal intensive care. However, it is unknown whether neonatal pain is associated with long-term alterations in brain microstructure and adverse cognitive outcomes at school age in children born very preterm. Therefore, the present study examined whether neonatal pain was associated with white matter microstructure at 7.5 years of age, and whether neonatal pain and brain microstructure interact to predict cognitive outcome at 7.5 years of age in children born very preterm.
Methods: Fifty infants born very preterm were followed prospectively from birth. Neonatal pain was defined as the number of skin-breaking procedures from birth to term-equivalent age. Magnetic resonance (MR) images were obtained at 7.5 years of age. T1 and T2-weighted images were assessed for the severity of brain injury. MR diffusion tensor sequences were used to record fractional anisotropy (FA [range: 0-1]) values from 7 anatomically defined white matter regions. White matter maturation is characterized by higher FA. Child cognition was assessed using the Wechsler Intelligence Scale for Children IV. Generalized estimating equations were used to examine the relationships between pain, brain and outcome, adjusting for gestational age, size at birth, illness severity on day 1, days of mechanical ventilation, morphine exposure, infection, age at scan, gender and brain injury.
Results: In children born very preterm, greater neonatal pain was associated with lower FA values of the white matter at 7.5 years of age (p= 0.011). The interaction between neonatal pain and FA of the superior white matter was associated with IQ (p= 0.005), such that greater neonatal pain and lower fractional anisotropy of the superior white matter was associated with lower IQ at 7.5 years of age in children born very preterm.
Discussion and Conclusion: Greater neonatal pain (adjusted for confounding factors associated with prematurity) contributes to long-term abnormalities in cognition and white matter microstructure. Reducing unnecessary pain exposure during neonatal care may help to optimize white matter development, thereby reducing cognitive impairment at school age.
Funding: National Institutes of Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development to REG.
Conflict of Interest: The authors have no conflicts of interest to declare

Program no. 2-17

The support nurses' give children during needle procedures

Main author: Katarina Karlsson, University College of Borås, School of Health Sciences, Sweden

Introduction

There is a dearth of research describing the support nurses give children during needle procedures. A procedure is by definition an investigation or an action that children have to undergo to receive a diagnosis, administer treatment and to follow the development. This is the first study in a larger project aimed at describing various aspects of children´s lived experiences when they undergo procedures. This larger project includes three perspectives, the child, the parents and the nurse´s.

Aim

The aim of this poster presentation is to describe the support nurses´give children during needle procedures, from the nurse´s perspective.

Method

A reflective life-world perspective was used and a phenomenological analysis applied, as described by Dahlberg et al. The term procedure was used without defining in advance whether the procedure would lead to pain, distress or any other discomfort. The three dominant terms of openness, sensitivity and bridling were used. Ethical authorization and consent to carry out this study were obtained from the Regional Ethics Review Board at the University of Gothenburg (Dnr 724-10)

Result

Results of the study illustrate the importance of supportive measures that are based on meeting the child in the child´s world. These include supportive measures from a time perspective, using metaphors to speak the child´s language, understanding the importance of the child´s perceived health and life situation, the ability to talk through others to reach the child, giving encouragement and rewards. Nurses´supportive actions must find a balance between the child´s uncertainty and the need for the procedures to be carried out.

Discussion

Nurses play an important role in helping children though procedures and potential negative consequences. A child´s anxiety and worry can intensify feelings of pain. The nurse is responsible for making children´s suffering manageable.

Conclusion

It is essential to determine if the nurse´s perceptions and supporting role coincide with children´s with the aim of improve children´s experiences of care.

Financial support from the University of Borås. No conflict of interest while conducting this study

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Program no. 2-18

Nurses use of non-pharmacological interventions during painful procedures

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Introduction and aims

Non-pharmacological interventions can be effective to control procedural pain in children. They are mostly nurse-driven but their actual use by nurses has rarely been studied. The aim of this study was to describe nurses' use of non-pharmacological interventions during painful procedures as well as to identify nurses', parents' and children's preferences and perceived barriers in their utilization.

Methods

A cross-sectional descriptive study was conducted in 4 pediatric wards of a Portuguese University Hospital. Data were collected through direct observation of 100 painful procedures, the most frequent being wound care (47%), venous catheterization (27%) and venipuncture (11%); followed by semi-structured interviews to nurses, parents and children ≥ 6 years-old.

Results

Nurses encouraged parental presence in 93% of procedures. The frequency of use of other non-pharmacological interventions was: distraction (76%); engaging the child (54%); informing children and/or parents during the procedure (51%); preparing and informing children and/or parents previously (44%); positive reinforcement (37%); engaging parent (10%); relaxation (4%). Sucrose was used in 7 (63%) children below 12 months and 4 times in older children.

When asked about the interventions used, distraction was reported by 72% of nurses, 65% of parents and 56% of children; informing about procedure was reported by 33% of nurses, 2% of parents and 20% of children; parental presence was reported by 15% of nurses, 3% of parents and not reported by children; engaging the child was reported by 23% of nurses and engaging parent by 4% of nurses while none of these were reported by parents or children. Sucrose and pacifiers were used more often than reported by nurses and parents.

In forty-eight percent of procedures, nurses would have wished to use other non-pharmacological interventions namely music (26%), games, toys and story-telling (8%), television or video (6%), distraction (4%) and appropriate environment (4%). Only 5 times would parents have liked the nurse to use other interventions.

Barriers reported more frequently by nurses were lack of resources, lack of time and not remembering.

Discussion

Non-pharmacological interventions are used less than recommended but more frequently than reported by nurses, parents and children. This suggests that nurses' use of these interventions is unsystematic and not evidence-based. Parents and children are not aware of these interventions.

Conclusion

Parental role in pain management must be enhanced. Nurses' education is needed to increase knowledge about non-pharmacological interventions to manage procedural pain and promote compliance with national and international guidelines.

Program no. 2-19

Neonatal predictors of internalizing in very preterm school-aged children

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Introduction: Little is known about the etiology of internalizing (anxiety/depressive) behaviors that are prevalent in children born very preterm. Greater neonatal pain-related stress has been shown to be associated with greater internalizing at 18 months, but it is unknown whether this relationship persists to school age. Moreover, neonatal exposure to morphine may exacerbate or ameliorate the potential influence of neonatal pain/stress on internalizing.

Aim: To examine whether neonatal pain-related stress and morphine exposure are associated with internalizing behaviors at age 7 years in children born very preterm.

Methods: N=97 children born very preterm (≤32 weeks gestational age [GA]) were seen at mean age 7.7 years. Excluded: Intraventricular hemorrhage grade 3/4, periventricular leukomalacia, major motor, sensory, intellectual impairment or autism. Mothers completed the Parenting Stress Index-III (PSI) and Child Behavior Checklist (CBCL). Medical/nursing chart review was carried out from birth to term equivalent age. Neonatal pain-related stress was defined as the number of skin-breaking procedures. We examined skin-breaking procedures in relation to internalizing at age 7 years, separately in very preterm infants who were mechanically ventilated and exposed to both pain and morphine (N=56) or non-ventilated exposed to pain but not morphine (N=42) in the NICU. The association between the number of neonatal skin-breaking procedures, morphine dose adjusted for daily weight, and internalizing was examined with generalized linear modeling (GENLIN), adjusting for confounders (neonatal clinical factors, i.e. GA, SNAP-II at day 1, infection, number of surgeries and concurrent maternal parenting stress).

Results: In the ventilated group, higher morphine exposure (p=.002) was associated with greater child internalizing. In the non-ventilated group not exposed to morphine, higher skin-breaking procedures (p=.03) and maternal stress (p=.002) were related to greater internalizing.

Discussion/Conclusion: In very preterm children who undergo mechanical ventilation, judicious use of morphine is important, since higher exposure appears to be adversely associated with internalizing behaviors at school-age. Management of procedural pain-related stress needs to be addressed in very preterm infants in the NICU, to prevent long-term effects on child behavior. Concurrent maternal stress levels also contribute to child internalizing.

Program no. 2-20

Pain affects cortical thickness in school-aged children born very preterm

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Introduction: Infants born very preterm are exposed to repeated procedural pain-related stress during a period of very rapid brain development. Neonatal pain/stress is associated with atypical brain development from birth to term-equivalent age. Moreover, reduced cortical thickness has been reported in school-age children and adolescents born preterm. The relationship between neonatal pain-related stress and altered long-term brain development in children born very preterm is unknown.
Aim: To evaluate whether neonatal pain-related stress is associated with altered cortical thickness in school-age children born very preterm.
Methods: From a larger longitudinal cohort of infants admitted to a single tertiary NICU, 42 right-handed children born very preterm (24-32 weeks gestational age [GA]) underwent 3-D T1 MRI neuroimaging at mean age 7.9 years. Excluded: Intraventricular hemorrhage grade 3/4, periventricular leukomalacia and major motor/sensory/cognitive impairment or diagnosis of autism. Regional cortical thickness was computed using custom in-house developed software utilizing FreeSurfer output data. Medical/nursing chart review was carried out from birth to term equivalent. Neonatal pain-related stress was defined as the number of skin-breaking procedures (e.g., heel lance). The association between the number of skin-breaking procedures and cortical thickness was examined with generalized linear modeling (GENLIN), adjusting for neonatal clinical factors (GA, SNAP-II at day 1, infection, number of days on mechanical ventilation, number of surgeries, morphine exposure adjusted for daily weight).
Results: After correcting for multiple comparisons and adjusting for neonatal clinical factors, greater neonatal pain-related stress was associated with significantly thinner cortex in 14/66 cerebral regions (each p 0.002 to 0.000). This association was most significant in bilateral postcentral, superior frontal, rostral middle frontal, left hemisphere precentral and pars orbitalis, as well as right hemisphere supramarginal region.
Discussion/Conclusions: In very preterm children without major sensory, motor or neurodevelopmental impairments, we showed that neonatal pain-related stress was associated with thinner cortex in multiple regions at school-age, independent of other neonatal risk factors. Crucial to further advancing our understanding of the relationship between alterations in cortical development and neonatal clinical factors, will be the examination of corticospinal tracts, white matter and sub-cortical grey matter structures in relation to pain-related stress in school-aged children born very preterm. Finally, it remains for future studies to demonstrate to what extent these pain-related stress brain alterations predict cognitive and motor outcome in these children.

Program no. 2-21
Epidemiology and Management of Procedural Pain in Neonatal Units in Kenya
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Introduction and Aims
Hospitalized infants undergo many painful procedures daily. Although the development

and implementation of pain management guidelines has contributed to a significant reduction in the number of painful procedures and improved pain management in developed countries, little is known about the frequency and management practices of neonatal pain in resource-limited countries particularly in sub-Saharan Africa. The aim of this survey was to determine the epidemiology of pain and painful procedures in special care nurseries in Kenya; to describe existing pain assessment and management practices; and to explore the factors that influence the frequency of painful procedures and assessment and management practices.
Methods
Following ethics approval, medical records of neonates who had been admitted for at least 24 hours in seven academic and regional hospitals in Kenya were reviewed between July and August 2012. Data on the nature and frequency of all painful procedures performed and the pain management strategies implemented in the 24-hour period preceding data collection were extracted. Descriptive, comparative and general linear modeling analyses were conducted. $P < 0.05$ was considered statistically significant.
Results
All 95 babies included in the study had experienced at least one painful procedure over a 24-hour period; for a total of 404 painful procedures (mean 4.25, SD 2.005, median 4.0, range 1-12). Of these 105/404 (27%) were peripheral cannula insertion, 86/404 (22%) were intramuscular injections, and 68/404 (17%) were nasal cannula insertion. Unventilated babies had two times less painful procedures compared to ventilated babies ($\chi 2 = 21.871$, 95% CI [-2.737, -1.12]; $P < .001$) while babies in special care nurseries had 1.5 times more painful procedures than babies in NBUs ($\chi 2 = 4.908$, 95% CI [175, 2.858]; $P = .027$) after controlling for other predictors. Birthweight, gestational age at birth, and whether they were born at a study hospital did not influence the frequency of painful procedures. Of the total painful procedures recorded only one had pain intensity assessed and narratively described. There was not any form of pain management intervention documented before or during any painful procedure.
Discussion and Conclusion
A major gap exists between clinical practice and recommendations of pain management guidelines in sub-Saharan Africa compared to other regions of the world. The study results underscore the urgent need for tailored knowledge translation strategies to bridge the gap between practice and the recommendations of pain management guidelines in resource-limited regions particularly in sub-Saharan Africa.

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Conflict of interest: Authors have no conflict of interest to declare.

Program no. 2-22

Expectations of using music in NICU from the viewpoints of caregivers

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Introduction and Aims. Infants are exposed to several painful procedures, but also to ambient noise in a neonatal intensive care unit. Based on earlier studies, music as an intervention appears to have many positive effects especially on the infants. We have lack of studies on how the caregivers participating in the infant's care think about the preferred music and its use in NICU, and if there is any significant disagreement between their viewpoints. The aim of our study was to describe and explain the expectations concerning the use of music in NICU from the viewpoints of parents, nurses and physicians.

Methods. The sample of this cross-sectional survey design consisted of 508 participants (parents 197, nurses 210, physicians 101) who were recruited from the Finland's five university hospitals. The data were collected using a valid questionnaire that included three sections. An average response rate was 61%. The data were analyzed statistically using Chi-square test and logistic regression analysis.

Results. Slightly over half of the participants (64%) preferred recorded music versus live music (36%) for infants in the NICU. The most frequent choices were classical music and children's songs. The participants strongly expected that their preferred music could be beneficial both for the infants, parents, and staff. The parents agreed live music to be more suitable choice for infants, compared with the nurses' and physicians' musical preferences ($p<0.001$). In addition, the parents agreed most that the music could especially benefit the infant ($p < 0.001$) and parents ($p< 0.001$). Instead, it was the nurses who agreed most that the music could have positive effects on the staff ($p<0.001$). Some background details such as age, average length of time listening to music, musical training and experiences of using music provided significant explanations for the participants' expectations.

Discussion and conclusion. There were significant differences between the groups of the respondents concerning the type of the preferred music and its expected effects. This highlights the importance of discussion with the caregivers when taking music as one of the possible pain relieving methods in NICU. The personal experiences of music seemed to possess the expectations more than the demographic details of the participants.

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Conflict of interest

The authors declare that there is no conflict of interest.

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Program no. 2-24
The profile of prolonged pain in neonates: What have we learned?
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Introduction and Aims: During their hospital stay, neonates are subject to numerous painful stimuli that can result in recurrent pain. Recurrent pain occurs unpredictably over a long period of time and fluctuates in intensity and frequency; its recovery phase is extended. The aim of this study was to describe the characteristics of neonates experiencing prolonged pain.
Methods: Following ethics approval, a single case study design was used to describe the profile of neonates with recurrent pain. The socio-communication model of pain was used as a framework for the study (1). Multiple data sources were used. Medical and nursing charts and nursing notes of seven neonates identified with recurrent pain in a previous study(2) were reviewed. Their clinical characteristics were retrieved from the electronic data management system and their recurrent pain data from the research database. Guidelines documents related to pain management were also reviewed. Deductive data analyses were used to analyze data from each neonate (unit of analysis), prior to providing a synthesis of the case.
Results: The majority of the neonates (n=6, 87.7%) were males. The mean gestational age was 32.14 (±2.79) weeks and the average hospital length of stay at the time of recurrent pain was 7.85 (±2.03) days. During that time, they experienced a mean of 21.4(±9.9) painful procedures per day, of which 93.7% were judged low and moderate in intensity. Mobilisation, nasal aspiration, heel prick, and endotracheal suction comprised 86.9% (n=960) of all low and moderate painful procedures. Venous catheterization was the most performed severe painful procedure (n=55, 74.3%). Acute pain was inconsistently documented with recordings of pain scores varying between 1 and 8 per day. Documentation of pain management following pain assessment was inconsistent.
Discussion and Conclusion: Detailed examination of the characteristics and pain profile of the case as defined by the seven neonates with recurrent pain permitted to demonstrate similar trends in the experience of repeated painful stimuli with inconsistent documentation about pain assessment and analgesia. Despite its limitation due to the retrospective nature of the design, the results of this study showed that prolonged pain needs to be assessed in a regular basis and that there is room for improvement in the documentation of pain management in neonates.

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Program no. 2-25

Neonates' exposure to painful procedures in a developing country

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Introduction & Aim: Current evidence strongly supports acute pain treatment to neonates undergoing painful procedures; however studies in developed countries show these neonates are still exposed to many procedures with no pain treatment. To determine the frequency and type of painful procedures neonates are exposed during the first week of hospitalization in neonatal units in a developing country. Methods: In this descriptive exploratory study we recorded all the potentially painful procedures neonates underwent during the first week of hospitalization in two 6-beds neonatal units (level II and III) in Brazil. Data was collected from September-December/2011 with a questionnaire filled by the health professionals on the neonate's bedside. This questionnaire was based on other epidemiological study[1]. Results: Participated in the study 32 neonates with 34.5 ±3.7 weeks of gestation and 2271.6 ±838.6 g. During the study period neonates were submitted to 1.316 painful procedures during the first week of hospitalization; with a mean of 41.1 ±21.8 painful procedures. Each neonate received 5.9 ± 4.7 procedures per day, varying from 9.4 ± 6.2 in the first day to 3.8 ± 3.2 procedures in the seventh day of hospitalization. The more frequent painful procedure were heel lance (26.5%) and venipuncture (19.1%). Discussion & Conclusion: Other recent studies conducted in France[1] and Canada[2] reported neonates were exposed to 12 and 6.3 procedures per day, respectively. Heel lance was the most frequent painful procedure, yet it is known as more painful than venipuncture[3]. Neonates are still submitted to a countless potentially painful procedures during their hospitalization.
Keywords: Acute pain; Newborn; Procedural Pain; Neonatal Unit.
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Program no. 2-26

Lumbar punctures in children: a survey of current practice in London, UK

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Introduction and Aims: Lumbar puncture (LP) is a common procedure in children used to diagnose infection and various neurologic processes. It is suggested by anecdotal evidence that especially patients younger than 1 year of age, are often positioned in a manner which is potentially harmful and not beneficial for the procedure itself. It is also well known, that despite good evidence-based recommendations analgesia for painful procedures in children is still inadequate. We want to survey current clinical practices, specifically in terms of positioning and use of analgesia, in paediatric LPs.
Methods: A survey questionnaire was designed for distribution to healthcare staff working in paediatric emergency departments and on the wards of 10 paediatric departments in London. The survey contained questions about demographics, choice of position during LPs, reasons for that choice, use and frequency of analgesia, LP training background and demand for training. Questions about positions and pain relief were divided into different age groups.
Results: A total of 118 questionnaires were completed, which demonstrated that the most common position being used in children under the age of 1 was the lateral recumbent position with neck flexion (83% in newborns to 3 months and 59% in 3 months to 1 year). 61% of participants said this position was used to increase the interspinous distance, whilst 27% said is was used to best hold the child still. Sucrose was the most commonly used method of pain relief in children under 1 year, however 39% of participants never, rarely or only sometimes used pain relief in this age group. The use of topical analgesia was low, 3% in preterms, 5% in newborns, 26% in 5 weeks to 1 year olds, 46% in 1 to 10 year olds and 33% in children older than 10 years. 80% of participants would appreciate more training in this area.

Discussion and Conclusion:
We demonstrated that a painful, uncomfortable and potentially dangerous position to hold children during LPs was the first choice in the majority of cases. We also demonstrated that the use of analgesia in general was either absent or poor. Further education of health care staff involved in this procedure is needed.

Program no. 2-27

Human milk vs. sucrose for pain relief in neonatal screening for retinopothy

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Introduction & Aims: Eye exam to screen for Retinopathy of Prematurity (ROP) is one of the most severe painful procedure routinely performed in the neonatal unit; sucrose analgesia has been reported with mixed results(1) but the effectiveness of human milk has not been tested. We compared the effect of human milk (HM) vs. sucrose (SC) in reducing behavioral pain responses of preterm infants during routine eye examination for ROP. Methods: 48 stable preterm infants were randomly allocated to receive either 2ml of HM (n=23) or 0.5ml/kg of 25% SC(n=25) via syringe 2-minutes before eye exam. Immediately before eye exam, all infants were swaddled and received two drops of anesthetic in each eye. Measures of cry duration and changes in NFCS facial responses (brown bulge and nasolabial furrow) were collected continuously during baseline (5 minutes), exam of right and then left eye and post-eye exam (5 and 10 minutes). Infant measures were analyzed using a RM-ANOVA. Results: In both groups, median NFCS scores were equal during right and left eye exam (HM=2.0 vs. SC=2.0); decreased immediately 5-min after eye exam (HM=1.0 vs. SC=1.5) and, either maintained or decreased, 10-minutes after eye exam (HM=1.0 vs. SC=1.0), but no difference was found between groups (p=0.481). There was no group difference in duration of the NFCS facial actions [brow bulge (p=0.241); nasolabial furrow (p=0.241)] or in crying (p=0.656) throughout the ROP procedure. Discussion & Conclusion: Both sucrose(2) and human milk(3) reduce neonatal procedural pain although it is the first time the effectiveness of sucrose vs human milk during eye exam was examined. Our results may be because the dose of human milk may have been small. Reduction of NFCS scores 5-minutes after the exam in both groups suggests that treatments were equally effective in reducing behavioral responses in the short term. We conclude that human milk does not have greater effect than sucrose on behavioral pain responses in preterm infants undergoing eye examination. Future studies should use higher doses of human milk, adding physiological measures and extended timepoints to better assess pain recovery.
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Program no. 2-28
Current use of pain relief for routine childhood immunisations in primary care: a UK-wide survey.
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Introduction and Aims: Immunisations play an important and life-saving role in disease prevention. They are also one of the most common painful procedures in children in primary care settings. Pain caused by intramuscular injection is often only poorly managed, despite plenty of evidence-based recommendations for various methods of analgesia. Our aims are to survey current management of immunisation injection pain in children in primary care and to assess analgesia management of intramuscular injection in paediatric tertiary care centres.
Methods: We designed a questionnaire and surveyed a cluster sample of primary care offices located around 22 children hospitals. The survey contained questions about the existence of analgesia guidelines, previous training on the topic, methods of analgesia for different age groups and demand/interest for more training and education.
Results: A total of 132 questionnaires were completed. 0% offered 2 to 13 months old babies
sucrose or topical analgesia, 0% offered 2 to 6 year old children topical analgesia or vapocoolant spray, about 1-2% offered 10 to 18 year old teenagers topical analgesia or vapocoolant spray. Distraction and rubbing/ pressure at injection site was ticked in all age groups in up to 75%, but on further questioning, the method of applying pressure at injection site was in almost all cases ineffective. 87% of GP surgeries either did not have or were not sure if guidelines existed for immunisations. 86% have never or were not sure if they received training on methods of pain relief. 64% felt further information from the PCT was not required, 11% felt strongly or very strongly that more information was needed. A guideline for the management of intramuscular injections was found in 18% of the surveyed children hospitals.
Discussion and Conclusion: We demonstrated that the management of painful immunisation injections in primary care settings is still extremely poor. The most recommended evidence-based methods of pain relief were almost never found to be used. Although most children hospitals have general analgesia guidelines for painful procedures, the management of intramuscular injections in particular is not much better than in primary care. There clearly is room for improvement and need for further training and education for healthcare staff in primary care, as well as in paediatric secondary and tertiary care.

Program no. 2-29
Effects of paracetamol during first days of life
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Introduction and Aims
Paracetamol (acetaminophen) is the most commonly used analgesic during childhood (1), although its mechanism of action is not completely understood. Neonates have a less developed pain system, which results in increased pain sensitivity and even greater need for analgesia compared with adults (2). Also, there is a need to evaluate and

adapt off-patent medicines to the paediatric population.
Pain increases sympathetic tone and stress responses. Heart rate (HR) and HR variability (HRV) are frequently used physiological indicators of pain in infants. Subgaleal hematoma after vacuum extractions and clavicle fractures are described complications after deliveries. Physical handling of these infants might result in breakthrough pain and a specific need for analgesics. Our aim was to increase understanding of the action and effects of paracetamol in the newborn infant.
Methods
Full-term newborn infants were studied during the first three days of life; 26 infants born with normal vaginal delivery and 17 infants with complications were included. Infants were studied with or without 60 mg paracetamol in a cross-over trial. Recordings of heart rate were registered during sleep, followed by standardized handling of the infants arm and head.
Results
All infants decreased their basal heart rates after a 60 mg paracetamol (118 to 113 bpm, CI 0.0-9.8, $p=0.05$) and in response to the standardized handling of the head heart rate reduced (127 to 113 bpm, $p=0.02$ and $p<0.01$).
Discussion and Conclusion
Paracetamol reduce breakthrough pain and decrease heart rate in full-term newborn infants. Do neonates have muscle ache following birth? Does the analgesic effect work via the sympathetic system, via a direct effect on the heart or on the heart rate only? Is there a dose/response effect?
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Conflict of interest
No conflict of interest exists.

Program no. 2-30
Does My Baby Feel Pain After Cardiac Surgery?
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Introduction: Pediatric Cardiac Intensive Care Unit (PCICU) in Schneider Children's Medical Center is one of the leading centers in Israel for pediatric cardiac surgery,

conducting two-thirds of all surgeries in the country (about 500 operations annually). Two-thirds of the patients are infants under one year of age. Most parents of infants receiving medical treatment in PCICU worry that their child may experience pain
Methods: The purpose of the study was to elicit parent's views towards their infant's pain and pain management after cardiac surgery. The study was designed to examine the differences in attitude and response to pain by parents of a different ethnic background. The study population was parents of infants under one year of age who underwent cardiac surgery. Parents of infants with re-do surgery were excluded from the study. We used 21-item survey to measure parent's satisfaction with their infant's assessment of pain, pain treatment and the guidance they receive by the medical staff. The survey was conducted on the 3-5th day after the surgery. Medical information was collected from medical records by the research team. In July 2011, during the accreditation process of the hospital, official "parental guidance about pain management" guidelines were computerized. The study received expedited approval from the hospital institutional review board.
Results: In 2011, 488 children underwent cardiac surgery. 292 were infants under one year of age. 234 matched the research criteria. 140 parents filled the questionnaire, (comprising 60% of the parents who meet the inclusion criteria), 44% of the sample was Jews, 37% Arabs and 17% of other origin. 67% of parents thought that their babies felt pain during their stay in the ICU. 55% of those who indicated that their child felt "high pain intensity" were parents of Jewish origin. The most significant factors for high scoring were: the number of invasive catheters (OR=4.67) and mechanical ventilation (OR=2.56). Following the changes in computerized component, the percentage of parents which reported that they had received training on pain increased from 24% to 87% ($p < 0.001$).
Conclusions: There is a difference in the attitudes towards child pain among parents from different ethnic background: Jewish parents were more likely to report that their babies felt intense pain during the hospitalization. Introduction of the computerized "pain management" guidelines significantly increased the reports of parents receiving training on pain (3.5 fold). There is a need for further improvement in parent training process, both verbally and written.

Program no. 2-31
A Comparison of Maternal versus Paternal Non-Verbal Behaviour during Child Pain
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Introduction and Aims: Parental behaviour is known to play a significant role in children's response to pain. However, the majority of research to date has focused solely on maternal behaviour during child pain. A recent study conducted by Moon, et al. (2011) found generally no differences between mothers' and fathers' verbal behavior during child pressor pain. The present study aimed to build on this work through comparing mothers' and fathers' non-verbal behaviour during child pain. Methods: The

non-verbal behaviour of mothers (N = 20) and fathers (N = 20) of 20 children (10 boys, 10 girls) who participated in the cold pressor task as part of the study by Moon et al. (2011) were coded from video-tape. Children had completed the CPT once with their mothers present and once with their fathers present in a counterbalanced order. Parental non-verbal behaviour was coded across 13 categories of behaviour, including distraction, humor, physical comfort and reassurance, facial and behavioural sympathy, procedure related attending behaviour and fidgeting. Coding was completed by two research assistants. Percent agreement ranged from 88% to 100% across the behaviour codes. Results: A series 2 (child sex) x 2 (parent sex) mixed analyses of variance (ANOVAs) revealed generally no significant differences in mother vs. father non-verbal behaviour, with the exception of fidgeting (i.e. any form of fidgeting or behaviours expressing agitation such as feet tapping, tapping fingers, bouncing knee), $F(1,18) = 6.57$, $p < .05$, with fathers engaging in significantly more fidgeting than mothers (fathers: M = 0.39, SE = .08; mothers: M = .23, SE = .06). There were no significant effects of child sex or parent by child sex interactions. Discussion and Conclusion: Concurrent with findings on parental verbal behaviour, mothers and fathers non-verbal behaviour generally did not differ during their child's pain experience. However, fathers appeared to fidget more often than mothers during child pain, perhaps indicating a greater amount of restlessness or discomfort in response to watching their child in pain or uncertainty about how to respond.

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I have no conflicts of interest to declare.

Program no. 2-32

Birth Order, Emotional Availability and Pain Behaviours during Routine Immunizations

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Introduction and Aims

Caregiver emotional availability has been linked with infant birth order (Harel et al., 2002). The present study examined the relationship between birth order and caregiver emotional availability during infants' 12-month routine immunization. Given evidence that caregivers' emotional availability predicts lower pain behaviours in infants at 12-months of age (Pillai Riddell et al., 2011), the relationship between birth order and infant pain behaviours was also examined.

Methods

A sub-sample of 545 infants (50.5% female) with immunization data at 12 months was selected from the OUCH Cohort, a longitudinal cohort following infants' routine immunizations over the first year of life. Ethics approval was received from both participating institutions.

Caregivers' emotional availability (sensitivity, structuring, nonintrusiveness, and nonhostility) was coded using the Emotional Availability Scales Fourth Edition (EAS; Biringen, 2008). Infant pain was operationalized as the intensity of facial actions, cry, and distressed body movements using the Modified Behavioural Pain Scale (MBPS; Taddio et al., 1995). Infant pain behaviours were coded 15 seconds pre-needle (baseline), 15 seconds post-needle (pain reactivity), and 1 minute 15 seconds post-needle (pain regulation).

Results

Compared to parents with older children, first time parents exhibited greater parental sensitivity, $F(1, 543) = 3.88$, $p = .05$, partial $\eta^2 = .007$, structuring, $F(1, 543) = 4.19$, $p = .04$, partial $\eta^2 = .008$, and non-intrusiveness, $F(1, 543) = 5.67$, $p = .02$, partial $\eta^2 = .01$. Compared to infants with older siblings, first born infants showed greater pain intensity at baseline, $F(1, 531) = 4.29$, $p = .04$, partial $\eta^2 = .008$, and 1 minute 15 seconds post-needle, $F(1, 532) = 6.72$, $p = .01$, partial $\eta^2 = .01$. Parents did not significantly differ on nonhostility and infants did not significantly differ on pain reactivity.

Discussion and Conclusion

First time parents showed greater sensitivity, structuring, and nonintrusiveness during their infants' immunization compared to non-first time parents. However, first born infants showed more intense pain behaviors at baseline and slower pain regulation, than infants with other siblings. Perhaps first time parents were utilizing soothing techniques associated with increases in infant pain behaviours or were more anxious in the immunization setting. Future studies should examine parental soothing behaviours among first time versus non-first time parents.

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Conflict of Interest

There is no conflict of interest to declare.

Program no. 2-33

Back to school? Long-term school functioning after pediatric pain rehabilitation

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Introduction and Aims: Improving school functioning is a central goal of pediatric pain treatment, including intensive interdisciplinary pain rehabilitation. This study describes school functioning over time among children treated in an intensive pain rehabilitation program, including exploration of potential risk factors for long-term school impairment.

Methods: Seventy children/adolescents (ages 9-18, M=14.5 years; 85% female) treated in the Boston Children's Hospital Mayo Family Pediatric Pain Rehabilitation Center (PPRC) provided 12-month post-discharge follow-up data. All had chronic musculoskeletal or neuropathic pain with failed response to conventional outpatient treatments. School function was assessed through reports of school attendance in the month preceding each assessment point and via the School Functioning scale of the

Peds-QL.1 Psychological functioning (anxiety, depression, social functioning), pain intensity, and functional disability also were assessed at admission, discharge, and follow-up.
Results: Mean school days missed in the month preceding admission was 4.8 (SD=2.8); 79.5% of patients scored 70 indicate positive functioning). At 12-month follow-up, patients reported a mean of 2.8 (SD=1.4) school days missed in the preceding month; 37.9% scored
Long-term school functioning outcomes correlated closely with concurrent ratings of overall functional disability (r=0.76, P
Linear regression models were tested to identify factors at program admission or discharge that predicted long-term school function outcomes, controlling for baseline school functioning. In a multivariate model, different predictors accounted for child vs. parent reports of improved school functioning at follow-up, with parent-report of child's pre-treatment social functioning (β=0.51, t=3.15, PDiscussion: Short-term intensive interdisciplinary pain treatment is associated with long-term improvement in school functioning whereas school impairment at treatment outset is not a significant risk long-term. However, some participants with emotional and social risk factors may require further treatment planning and monitoring after discharge to foster school success.

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Program no. 2-34
The ethics of online research for adolescents in pain: lessons learned
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Introduction and aims
The internet is an emerging platform for the study of pain and pain related disability in young people. However, little guidance exists as to the ethical implications of online research and provision of support to these groups through the internet. Particularly lacking is a discussion of how to safeguard both the participant and the researcher during online exchanges involving sensitive topics. In this poster we outline our approach to these ethical dilemmas in the development of a message board for qualitative research with adolescents in pain.
Methods
In designing the message board we sought guidance as to how to approach the project in order to protect participants and researchers during the research process and found guidance from professional bodies lacking. In the absence of this guidance, in consultation with the ethics committee of the University of Bath and the leader of the local pain service we developed a series of safeguards to allow us to conduct the study with participant safety online as paramount.
Results

Let’s Chat pain was designed using the FluxBB v 1.4.7 tool and was hosted on the University of Bath server to ensure full security of participant data. Participants were given a secure log in and were asked to provide an email address for a parent who could consent on their behalf. They were also asked to agree to a set of board rules. The discussion was checked daily by a moderator who had the power to delete any pejorative comments and to remove participants who were in violation of board rules from the study. In the event of a participant disclosing that they were the victim of abuse or that they intended to harm themselves or others as part of their discussion on the board, a panel including the lead clinical psychologist from the pain clinic, the research team and the head of the ethics committee would be convened to discuss this disclosure and to decide on appropriate action including alerting the relevant child protection services.
Discussion and conclusion
Adolescents in pain are often described as a vulnerable group with higher than average depression, anxiety and suicide ideation scores. Our approach during this study while not perfect, presents one way to protect these adolescents over the course of their participation in online pain research and safety procedures can be lent to those wishing to provide online support to their adolescent pain patients.

Program no. 2-35
A Measure of Parent Responses to Everyday Pains in the Toddler and Preschool Years
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Introduction/Aims: Parents exert a powerful influence on children's pain experiences and the most common painful incidents are everyday pains (i.e., minor bumps/ scrapes incurred during everyday activities). Parent responses to child pain have been shown to influence children's pain behaviors; however, the toddler and preschool years have been largely overlooked. Understanding of pain response in this age group requires measurement of everyday pain. As well, parents' influence on children's pain behaviors may be most salient and formative in this age group. The purpose of the present study was to develop and examine a measure of Parent Responses to Everyday Pains (the PREP) in toddlers and preschoolers.
Methods: Participants included 194 parents (93% mothers) of children (54% girls) aged 18 months to 5 years (M = 35.47 mos, SD = 11.86 mos). Parents completed an online questionnaire about typical responses to their children's everyday pains (e.g., "encourage him/her to do something else"). The questionnaire originally contained 46 items derived from an observational study. Child and parent distress in response to everyday pains were completed using 5-point numerical rating scales.

Results: Principal Components Analyses with oblique rotations were conducted to assess the underlying factor structure of the PREP. Eigenvalues (>1.0) and scree plot suggested a 4-factor structure with responses characterized as Sympathy, Distract, Scold, and Minimize. Items that cross-loaded highly on more than one factor were removed until a clean solution without any cross-loading items was obtained, resulting in a final 33-item measure. Sympathy and Distract responses tended to co-occur and although both were related to child distress, only Sympathy was related to parent distress. Parent distress predicted use of Sympathy, indicating that it may be a self-oriented response that serves to reduce parental distress upon witnessing a child in pain. Minimize and Scold tended to co-occur; only Minimize was related to child distress.
Conclusions: This research describes the development and preliminary validation of a tool to assess parent responses to children's everyday pains in the toddler and preschool years. This may be a critical developmental period during which children's pain behaviors are socialized. Findings suggest that parent responses have differential relationships with child and parent distress and may characterize self- versus other-oriented responses that become shaped over time. Future research will assess the factorial validity of the 4-factor PREP and other model variants using confirmatory factor analyses in a separate sample.

Program no. 2-36
Mothers' Memories of their Children's Pain following Major Surgery
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Introduction/Aims: Memories for pain are a powerful mechanism underlying pain experiences (Noel et al., 2012a), and anxiety influences how these memories are framed (Noel et al., 2012b). A recently proposed model of acute pain memory development in childhood (Noel et al., 2012c) posits that both child and parent anxiety exerts an influence on pain memories; however, research has not examined the role of parent anxiety in the development of parents' memories of child pain. Parents' memories of child pain may influence parent-child communication about pain, pain-related cognitions/affect, decisions to seek health care, and children's pain experiences over time (Noel et al., 2012c). The present study examined the influence of parental catastrophizing about child pain in the development of mothers' memories of their children's pain following surgery.
Methods: To date, participants include 19 children (aged 12-18 years) undergoing major general and orthopedic surgery and their mothers. During the week before surgery, mothers completed a measure of parental catastrophizing about child pain (PCS-P); children completed a measure of child pain catastrophizing (PCS-C). Children rated their pain intensity using a 0-10 Numerical Rating Scale while in hospital, and again 2 weeks following surgery while at home. Approximately 2 months following surgery, parents were asked to recall their children's pain intensity experienced 2 weeks following surgery based on their memories.
Results: Hierarchical regression analyses were conducted to examine predictors of mothers' pain memories (i.e., memories of their child's pain intensity). In the initial steps

of the model, the following background variables were controlled for: child-reported in-hospital pain, child catastrophizing about pain, and child and parent proxy report of pain 2 weeks following surgery. In the final step of the model, the additional contribution of parental catastrophizing about child pain was examined and emerged as a unique predictor of mothers' memories of child pain ($\Delta R2 = 16.5$, $p < .01$). That is, higher levels of parental catastrophizing about child pain before surgery was associated with higher levels of recalled post-surgical pain. Collectively, this model accounted for 94% of the variance in parents' memories of their children's post-surgical pain.
Discussion & Conclusions: Preliminary findings suggest that parental catastrophizing about child pain prior to major surgery is a powerful predictor of the development of their memories of their children's pain following surgery. Future research should examine whether these pain memories
influence the quality of parent-child discussions about pain, children's pain expectancies, and their subsequent pain experiences.

Program no. 2-37
Factors Influencing Parent's Decision to Donate Healthy Infant DNA for Pain Research
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Introduction/Aims: Donation of DNA from healthy infants is more problematic than the donation of DNA from infants who are at-risk or potential carriers of genetic conditions due to parental attitudes and concerns about the risks for their healthy infant. The purpose of this study was to explore the process parents utilized to arrive at a decision to donate their healthy infant's DNA for a minimal risk genetic research in pediatric pain.
Methods: To determine what factors influenced a parent's decision to donate their healthy infant's DNA for minimal risk genetic research we conducted 30 semi-structured interviews with mothers or mother-father dyads 24-48 hours after the birth of their healthy, full-term infant (IRB# 813678). Parents were interviewed in their private rooms. Audio recording and field notes were collected. Data driven content analysis using selected principles of grounded theory was performed.
Results: Parental willingness to donate their healthy infant's DNA for minimal risk genetic research in pediatric pain emerged as a process involving four interacting components: (1) parental knowledge of the study purpose, study duration, travel and expense, (2) parental trust in the scientist, (3) physical risks to the child, and (4) parent's belief in the value of the research embedded within the context of personal benefit to the child. Seventy percent of parents (n=21) stated the study purpose, duration, travel and expense would influence their decision to participate. Fifty-seven percent of parents (n=17) stated they would not participate because they did not believe scientist would be truthful about the study goals or would be able to protect the confidentiality of the data or the privacy of their child. Thirty-seven percent (n=11) stated they would not participate if their child was exposed to

study risk or exposed to pain during DNA collection. Thirteen percent of parents (n=4) felt there maybe an association between genetics and pediatric pain and believed research to advance that understanding was worthwhile. Parents originally refusing to participate in genetic research in pediatric pain stated they might change their minds if there were direct benefits to their child (n=7).
Discussion/Conclusion: This study identified significant gaps in parental knowledge and comprehension of genetics and research. Identifying parental misunderstandings that influence their decision to donate their healthy infant's DNA has the potential to contribute to the design of evidence-based informed consents for minimal risk genetic research in pediatric pain.
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Program no. 2-38
Parental Behaviour in Paediatric Chronic Pain: A Qualitative Observational Study
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Introduction and Aims:
Parental behaviour appears to influence the adjustment of children with chronic pain. However research in this area has failed to produce consistent evidence. Studies have tended to rely on self-report measures derived from adult pain populations. This qualitative, observational research provides descriptive data of parental behaviour in a clinical environment.
Methods
Qualitative observational study of parents and adolescents in a physically stressful setting. Modified grounded theory analysis of verbal and non-verbal behaviours. Methods: Eight parent-adolescent dyads seeking treatment for chronic pain were videoed during physical exercise sessions. Verbal and non-verbal behaviours were recorded and transcribed.
Results
Four overarching categories emerged: 'monitoring', 'protecting', 'encouraging' and 'instructing'. These often had both verbal and non-verbal aspects. Within these categories, more precise behavioural groups were also identified.
Discussion and Conclusion
This research identifies categories of parental behaviour that were derived directly from observation, rather than imposed on the basis of results from different populations. Four categories of behaviour were derived, which clarify and extend dimensions used in existing self-report instruments. Careful description of parental behaviours showed features that past research has neglected, and highlighted potential drawbacks of apparently positive parental actions.

Program no. 2-39

Issues related to Parental Involvement in the Pain Care of Preterm Infants

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Introduction & Aims

Worldwide healthcare systems are challenged by preterm birth with a prevalence rate of 9,8%. Most preterm infants are hospitalized for long periods in a neonatal intensive care unit (NICU) having a high risk to suffer pain, primarily due to medical procedures. Repeated pain exposure at this stage of life has well known adverse effects on the development of these infants. Adequate pain management is therefore crucial. Increasingly the involvement of parents in their child's pain care is discussed. Non-pharmacological interventions provide an opportunity to involve parents who seek a more active role in pain care and want to assume their natural protective role. Franck, Oulton, & Bruce, 2012 showed that involvement in pain care potentially reduces parental stress. However, the implementation of parental involvement depends on organizational context, which is defined as the setting in which pain care is carried out. Several facilitators and barriers can enhance or hinder the performance of a successful family-centered pain practice in a NICU (Stevens et al., 2011).

There are no studies available aiming at describing facilitators and barriers for parental involvement from the perspective of healthcare professionals. The presented study describes the experiences and needs of healthcare professionals related to parental involvement in pain care and explores facilitators and barriers.

Methods

In this qualitative study, interdisciplinary focus group interviews were performed in December 2012 in two level III and one level II NICU in Switzerland (German speaking part). The total sample consisted of 23 NICU healthcare professionals (17 nurses/6 neonatologists). Data will be analyzed by thematic analysis and validated by an expert supervised research team from January to March 2013. Demographic data of the sample will be analyzed with descriptive statistics. The study has been approved by two local ethical boards.

Results

The findings and recommendations will be presented at the ISPP in Stockholm.

Discussion & Conclusion

The study has the potential to provide better understanding of factors enhancing or hindering the implementation of parental involvement in pain care of their infant.

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Program no. 2-40

Paediatric recurrent abdominal pain: twin family case-control study

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Introduction & Aims: The aim of this twin family case-control study was to seek evidence that life prevalence of non-specific paediatric recurrent abdominal pain (RAP) is genetically influenced, and to examine potential co-morbidities.
Methods: In Phase I of the study, twins, parents and siblings were asked if they had a history of RAP (including irritable bowel syndrome), whether it was diagnosed by a doctor, and about onset and duration. In Phase 2, twin and family members who reported RAP over 3 months at any time were sent Rome III questionnaires for further diagnostic classification (results pending). Standardised questionnaires, validated for zygosity, growing pains (GP), migraine, headache and restless legs syndrome (RLS) and screening questions for ADHD, iron deficiency, low back pain (LBP) and chronic pain were randomly distributed by the Australian Twin Registry to twins aged 3-18 years, their biological siblings and parents. The case-control design, analysed by $\chi 2$, odds ratio (OR; 95% CI) for dichotomous data and t-tests for continuous data, was applied to test associations between case and control twin individuals and families.
Results: Questionnaires were distributed to 3,909 twin families yielding 1,017 (26%) evaluable responses by time of analysis. Two hundred and eleven twin families had at least one twin identifying as having RAP. Thirty-three out of 107 (31%) monozygous (MZ) twin pairs were concordant for RAP compared with 17 out of 104 (16%) dizygous (DZ) twin pairs. The casewise concordance was 0.47 for MZ pairs and 0.28 for DZ ($\chi 2=6.13$, $P=0.021$). The prevalence of RAP in parents and siblings in case families was significantly higher than in control families [mothers: $\chi 2=33.21$, OR=2.6 (1.86-3.60), $P<0.001$; fathers: $\chi 2=16.30$, OR=2.5 (1.57-3.86), $P<0.001$; siblings: $\chi 2 = 18.53$, OR=2.5 (1.63-3.84), $P<0.001$]. RAP in twin individuals was significantly associated with GP [$\chi 2 =15.25$, OR=1.8 (1.34-2.43), $P<0.001$], RLS [$\chi 2 =23.92$, OR=2.4 (1.66-3.34), $P<0.001$], migraine [$\chi 2=44.35$, OR=3.5 (2.37-5.13), $P<0.001$], headache [$\chi 2=38.08$, OR=2.6 (1.91-3.57), $P<0.001$], chronic pain [$\chi 2=84.41$, OR=5.2 (3.53-7.60), $P<0.001$], LBP [$\chi 2=8.62$, OR 2.0 (1.25-3.13), $P=0.005$], iron deficiency [$\chi 2=19.98$, OR=2.5 (1.66-3.85), $P<0.001$], and high anxious depression scores ($P=0.037$).
Discussion & Conclusions: Under the assumptions of the classic twin model, the data are consistent with genetic influence on non-specific RAP. RAP has characteristics of a functional pain syndrome, as currently defined, with genetic

susceptibility, associations with other common paediatric pain syndromes, and with anxious depression.

Program no. 2-41
Relations between parent & child functioning in a chronic pain rehabilitation program
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Introduction and Aims: Parents of adolescents with chronic pain report increased distress (Sieberg et al., 2011) and responses to and worries about their children's pain is related to adolescent functioning (e.g., Caes et al., 2011). Psychologists work with parents to modify approaches to children's pain, but little is known about responses to such interventions. Preliminary data from our program suggests parents make significant change. However, the extent that changes in parent functioning relate to changes in adolescent functioning has not been examined and is the aim of this study.
Methods: Parents of 33 adolescents with chronic pain, ages 11-18, participated in parent and family groups focused on pain management, stress management, and parent response to their child's pain. Parents completed measures of depression, pain catastrophizing, worrisome and overinvolved parenting, and sense of parenting competency prior to and upon completion of the program. Adolescents completed measures of depression, anxiety, pain catastrophizing, and functional disability. <p>
Results: Change in parent depression predicted change in adolescent anxiety ($F = 31.34$, $p < .001$), pain catastrophizing ($F = 11.70$, $p < .001$), and functional disability ($F = 9.93$, $p < .01$). Change in parent pain catastrophizing predicted change in adolescent depression ($F = 4.35$, $p < .05$), anxiety ($F = 30.40$, $p < .001$), pain catastrophizing ($F = 11.30$, $p < .001$), and functional disability ($F = 12.06$, $p < .001$). Change in parent worrisome and overinvolved behaviors predicted change in adolescent anxiety ($F = 29.95$, $p < .001$), pain catastrophizing ($F = 11.80$, $p < .001$), and functional disability ($F = 10.15$, $p < .001$). Change in sense of parenting competency predicted change in adolescent anxiety ($F = 30.86$, $p < .001$), pain catastrophizing ($F = 12.10$, $p < .001$), and functional disability ($F = 10.12$, $p < .001$).
Discussion and Conclusion: In a program that includes parent and family programming aimed at helping parents change behaviors and responses to pain, parents' changes in functioning was significantly related to changes in adolescent functioning. Parent functioning is important to consider when conceptualizing and treating pediatric chronic pain.<p>
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Sieberg, C. B., Willams, S., & Simons, L. (2011). Do parent protective responses mediate relation between parent distress and child functional disability among children with pain?

Program no. 2-42

Parental beliefs and behaviours on the functioning of paediatric chronic pain patients

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Introduction and Aims

Parents are known to have a major impact on how a child responds to stressors such as chronic pain. The aim of this study was to explore, within a cognitive behavioural framework, relationships between parental beliefs (catastrophising, and perceptions of child's self-efficacy to cope), parental behaviours (minimising and protective behaviours), and the functioning of children with chronic pain (functional disability and school functioning).

Methods

In this cross-sectional, observational study, 75 families from the Paediatric Chronic Pain Clinic, Sydney Children's Hospital completed questionnaires prior to their initial clinical appointment. Parents completed measures of their perception of their child's self-efficacy, catastrophising about their child's pain, and protective and minimising behaviours. Children completed measures of functional disability and school functioning. Multiple regression analyses were performed to assess independent and cumulative impacts of parental beliefs and behaviours on children's functional outcomes. Correlational analyses were conducted to further elucidate the relationships.

Results

Parental confidence in child self-efficacy (β=.325, p=.005) and parental catastrophising (β=.347, p=.003) were significant predictors of variance in parental protective behaviour. Lower parental confidence in child self-efficacy (r=.501, pp=.048) and school functioning (β=–.405, p=.004) was predicted by parental protective behaviour, independent of parental confidence in child's self-efficacy and parental catastrophising. Higher child functional disability was associated with lower parental confidence in child's self-efficacy (r=.232, p<.05), higher parental catastrophising (r=.275, p<.05) and parental protective behaviours (r=.361, p<.001). Parental protective behaviour was associated with poorer school functioning (r=–.390, p<.001).

Discussion and Conclusion

Results suggest parental beliefs and behaviours, specifically low confidence in child's self-efficacy, high catastrophising and protective behaviours, potentially impact negatively on functional outcomes of children with chronic pain. Such parental beliefs and behaviours were closely related to each other. The impact of parent's perceived self-efficacy of the child presents a novel contributor to poor outcomes in paediatric chronic pain and hence a novel target for treatment. Interestingly, parental protective behaviours significantly impacted child outcomes, independent of beliefs, suggesting an important role of behaviour management strategies.

Program no. 2-43

Paediatric restless legs syndrome is associated with multiple pain syndromes

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Introduction and aims: Our previous twin results are consistent with paediatric restless legs syndrome (RLS) having a genetic relationship with growing pains (GP) and migraine. The aims of this study were to estimate the heritability of lifetime prevalence of RLS; to identify further associations between RLS and functional pain disorders in childhood (FPS); and to explore other potential co-morbidities.
Methods: A cross-sectional survey by questionnaires of 3200 twin families (twins aged 3-18 years, including parents and siblings) chosen randomly was distributed through the Australian Twin Registry. Questionnaires, validated where available, provided assessments and measures of RLS, growing pains (GP), migraine, headache, recurrent abdominal pain (RAP), back pain, anxious depression, and multiple sensory sensitivities. A twin family case-control design was employed, comparing families with at least one twin having RLS to families where neither twin had RLS. Concordance rates for monozygous (MZ) and dizygous (DZ) twins, prevalence rates, and associations with other FPS were analysed by $\chi 2$ with odds ratios and 95% CIs. Independent samples t-test were used to test associations with anxious depression and sensory sensitivity.
Results: There were 1017 (31.7%) twin family responses to the questionnaires (case families 159, control families 858). Thirty-three of 81 MZ twin pairs and 14 of 78 DZ twin pairs were concordant for RLS (casewise concordance 0.58 and 0.30 respectively, $\chi 2 = 9.91$, $P=0.003$). The parents and siblings in case families had a significantly higher prevalence of RLS than the parents and siblings of control families [mother: RLS=31.19%, $\chi 2=76.20$, OR=4.4 [3.12-6.30), $P<0.001$; father: RLS=25.78%, $\chi 2=11.43$, OR=2.1 (1.36-3.26), $P=0.001$; siblings: RLS= 41.23%, $\chi 2=61.71$, OR=5 (3.22-7.69) $P<0.001$]. Occurrence of RLS in twin individuals had significant associations with GP [$\chi 2= 158.18$, OR=5.9 (4.37-7.99), $P<0.001$], RAP [$\chi 2=23.92$, OR=2.4 (1.66-3.34), $P<0.001$], migraine [$\chi 2=21.93$, OR=2.7 (1.76-4.19), $P<0.001$], low back pain [$\chi 2=8.67$, OR=2.0 (1.26-3.30), $P=0.005$], chronic pain [$\chi 2=21.36$, OR=2.8 (1.77-4.32), $P<0.001$], and iron deficiency [$\chi 2=56.54$, OR=4.3 (2.86-6.51), $P<0.001$]. No associations were found between RLS and headache, ADHD, anxious depression or sensory sensitivity at the individual or familial level.
Discussion & Conclusions: Paediatric RLS was associated with those FPS which we have found probably to be heritable, but not non-migraine headache which has not been heritable in our twin family sample. The association data lead to an hypothesis that the common FPS of childhood and RLS might share genetically influenced neurobiological mechanisms.

Program no. 2-44

Parent and child predictors of protective parental responses to chronic pediatric pain

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Introduction & Aims:
Among parents of children with chronic pain, increased parent psychological distress is associated with poorer child outcomes. Protective parental responses to children's pain has emerged as an influential factor in understanding children's pain and functioning, however little is known about factors that contribute to protective parental responses to pain. Thus, this study examined the contribution of specific child and parent psychosocial factors to parental protective responses to pain. We hypothesized that parent psychological distress would predict increased parental protectiveness, above and beyond any contribution made by the child's own experience of pain, depression, anxiety or functional disability.

Methods:
Participants included 129 pediatric patients (8-17 years) with chronic pain and their parents who consulted a multidisciplinary pain clinic at a large urban children's hospital. Patients completed self-report measures of their current pain, functional disability (FDI), and symptoms of depression (CDI Total T-Score) and anxiety (MASC Total T-Score). Parents completed demographic data and self-report measures assessing protective responses to children's
pain (ARCS-Protect) and parental distress (BSI GSI T-Score). Parents in this sample were primarily mothers (92%) of moderate to high family SES (48.6; range 22-66). Patients (Mean age=14.5 years, SD=2.4) were 83% female, 86% white, and reported an average pain duration of 23.5 (SD=31.5) months.

Results:
Significant bivariate correlations were found between parental protectiveness and patients' pain duration $r=.20$, $p<.03$, anxiety symptoms $r=.30$, $p<.00$, depressive symptoms $r=.19$, $p<.03$, disability $r=.35$, $p<.00$ and parental psychological distress $r=.27$, $p<.00$. Based on these relations, we tested a regression model that included pain duration as a covariate in step 1; child anxiety, depression, and disability in step 2; and parental distress in step 3. This model explained 19% of the variance in parental protective responses to pain [$F(5, 94)=5.68$, $p<.00$]. Moreover, pain duration ($\beta=.24$), disability ($\beta=.34$), and parent distress ($\beta=.20$) contributed significant unique variance to the model, with parent distress contributing significant incremental variance [$R2$ Change$=0.031$, $F(1, 94)=3.84$, $p=.05$] beyond child distress and disability. Discussion & Conclusion:
Our results demonstrate that parental psychological distress and children's functional disability are important factors contributing to protective parental responses to children's pain. Moreover, findings support that parental distress contributes to parental protectiveness
above and beyond the contribution of children's anxiety, depression or functional disability. Findings suggest it may be important to assess parental distress and provide

support to parents living with a child with chronic pain in order to help modify maladaptive pain response behaviors that can maintain pediatric pain and disability.
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Conflict of Interest
We have no conflict of interests to declare.

Program no. 2-45
Twin study of one month current prevalence of regional pain in adolescents
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Introduction and aims: In adults, pain reported at different body sites might have an underlying, single genetic factor. The initial aim of this study was to investigate potential genetic influence on one month prevalence of self-reported regional pain in adolescents.
Methods: A cross-sectional survey of 1377 twin families (twins aged 11-18 years) was distributed through the Australian Twin Registry. The primary questionnaire was a body map with request to indicate regions of pain if present for most of the past month. Analyses with $\chi 2$, odds ratios and 95% CIs with concordance rates were used to assess potential heritability. Bivariate correlation analyses were used to determine the relation between number of reported pain sites and anxious depression and sensory sensitivity scores.
Results: From 481 (34.9%) twin family responses to the questionnaires, there were 211 twin pairs in which at least one twin reported pain in one or more region for most of the previous month. The rank order of body site pain reporting in the twins was: legs, back, neck, head, abdomen, arms, chest. From the monozygous (MZ) twin pairs, 46 out of 104 were concordant for reporting at least one region of pain and 28 out of 107 of the dizygous (DZ) twin pairs [casewise concordance 0.61 (SE 0.04) and 0.26 (SE 0.04) respectively, [$\chi 2=7.56$, OR = 2.24 (1.2-4.2), P=0.009]. For the individual reported pain sites, back pain was found to be more highly concordant in MZ twins than DZ twins [13 out of 44 MZ twins concordant, 2 out of 33 DZ twins, casewise concordance 0.46 (SE 0.05) and 0.11 (SE 0.04) respectively [$\chi 2=6.63$, OR = 6.5 (1.2-45.7), P=0.02]. Odds ratios for other individual pain sites were neck 3.27 (0.6-18.5), legs 2.17 (0.89-5.30), head 1.3 (0.14-13.5), while abdominal pain and chronic widespread pain showed MZ concordance but no DZ concordance (low numbers). The correlations between mean number of reported pain sites and anxious depression score and sensory sensitivity scores were small but were statistically significant: anxious depression r = 0.22, sensory sensitivity score r = 0.13.
Discussion & Conclusions: Under the assumptions of the classic twin model, the data

are consistent with genetic influence on reporting of regional pain occurring during most of the preceding month. The foremost genetic influence was seen with back pain, consistent with our results for 3 month life prevalence.

Program no. 2-46
Growing pains: genetic influence and associations including restless legs syndrome

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Introduction and Aims: Our primary aim was to obtain further evidence through a twin family study as to whether there is genetic influence in growing pains (GP) and genetic association with restless legs syndrome (RLS), as earlier studies suggest* Further, we aimed to investigate associations with functional pain syndromes (FPS) and with anxious depression and sensory sensitivity.

Methods: Phase 1 involved a cross-sectional random survey of 3200 twin families (twins aged 3-18 years, siblings and parents) which was distributed through the Australian Twin Registry. A twin family case-control design was employed, comparing families with at least one twin having 3 month life prevalence of GP to families where neither twin had GP. Analyses were conducted to determine heritability, prevalence rates and associations with GP. In Phase 2, responding families completed questionnaires regarding anxious depression (ASEBA Behavioural Checklist) and sensory sensitivity. Concordance for GP in monozygous (MZ) and dizygous (DZ) twin pairs was calculated to assess heritability. Descriptive statistics, X2 analyses and odds ratios were applied to investigate frequencies and associations between GP and the conditions of interest in twin individuals, parents and siblings.

Results: There were 772 twin family responses to Phase 1 (23%) and 455 responses to Phase 2 at the time of analysis. Fifty-one of 107 MZ twin pairs and 24 of 100 DZ twin pairs were concordant for lifetime GP (casewise concordance 0.65 and 0.39 respectively [$X2 = 8.9$, OR = 3.3 (1.4-5.0), $p<0.01$]. GP families had significantly ($P<0.001$) more mothers (43.4%), fathers (28.6%) and siblings (38.8%) fulfilling lifetime criteria for GP than control mothers (17.9%), fathers (11.1%) and siblings (14.5%). In the age group 3-10 years, GP in individuals was significantly associated with RLS ($X2 =63.6$, $P < 0.001$), migraine, non-migraine headache, and recurrent abdominal pain (RAP). In the age group 11-18 years, the same associations were confirmed except for RAP. Prevalence of associated disorders in family members was most significant for maternal RLS (38.0%, $p<0.01$). In Phase 2, there were no significant associations between GP and anxiety, depression or sensory sensitivity.

Discussion & Conclusions: Under the assumptions of the classic twin model, GP is probably genetically influenced and closely related to RLS. GP was associated in twin individuals with migraine, non-migraine headache and recurrent abdominal pain. There

was no indication of significant psychological association.
*Champion D et al. European Journal of Pain 2012; 16: 1224-31.

Program no. 2-47
Paediatric migraine: twin family car-control study of heritability and associations
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Introduction & Aims: Genetic studies in paediatric migraine and non-migraine headache (HA) are generally lacking and we have found no twin family case-control studies. We aimed to identify distinctions between migraine and HA regarding genetic influence and co-morbidities. This abstract is primarily focussed on migraine.
Methods: Phase 1 involved a cross-sectional random survey of 3909 twin families (twins aged 3-18 years, siblings and parents) hrough the Australian Twin Registry. A twin family case-control design was employed, comparing families with at least one twin having life prevalence of migraine to families where neither twin had migraine. Heritability, prevalence rates and associations with disorders of interest were investigated. Zygosity testing was conducted by validated questionnaire. In Phase 2, families completed questionnaires regarding anxious depression (ASEBA Behavioural Checklist) and multiple sensory sensitivity. Concordance for migraine in monozygous (MZ) and dizygous (DZ) twin pairs was calculated to assess heritability. Descriptive statistics, X2 analyses and odds ratios were applied to investigate frequencies and associations between migraine and the conditions of interest in twin individuals, parents and siblings.
Results: There were 1017 (26%) Phase 1 and 455 Phase 2 evaluable twin family responses at the time of this analysis. Of the 115 case twin pairs, 16 of 54 tmonozygous (MZ) twin pairs were concordant for migraine, and 8 of 61 dizygous (DZ) twin pairs. Casewise concordance for migraine was 0.42 for MZ twins and 0.20 for DZ twins [X2 = 4.7, OR = 2.78 (1.09-7.14), p=0.05]. In contrast, non-migraine headache did not show indications of genetic influence. Lifetime prevalence of migraine in case family members was significantly higher than in control families [mothers 35.7% compared with control mothers 13.7%, P<0.001; fathers 11.3% compared to control fathers 3.2%, P<0.001]. In migraine twin individuals, there were statistically significant associations between migraine and growing pains, restless legs syndrome, recurrent abdominal pain, low back pain, chronic pain, ADHD, and iron deficiency, compared to controls. Migraine twins had significantly higher anxious depression and sensory sensitivity scores, compared to controls.
Discussion and Conclusions: In this first paediatric migraine twin family case-control study, under the assumptions of the classic twin model, the data support a genetic influence. While this was anticipated, the multiple co-morbidities revealed was of

particular interest and suggests complex potentially genetic relationships meriting further research.

Program no. 2-48

Siblings´experiences of pain in children with Cerebral Palsy

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Introduction and Aims

Pain is common in children with Cerebral Palsy (CP). Their families have an important role in interpreting the children´s signals of pain (1). According to parents, the entire family is affected when a child in the family suffers from CP (1,2). A better understanding from a family perspective is important for families with children with CP in order to help families.

The aim was to illuminate, from siblings´ and parents´ perspective, the experience of being a sibling in a family with a child with severe CP.

Methods

The study was part of a qualitative research project in the four northernmost counties of Sweden. Thematic interviews were made with seven siblings and ten parents to children with severe CP. Siblings and parents were from different families. The interviews were analyzed with the Grounded Theory method (3).

Results

The analysis resulted in the core category Togetherness and multi-dimensional pain and seven categories. The siblings had a strong sense of the family as a unit, being eager to protect the family from insight from others, and active in working together with their parents in caring for the child. Siblings were perceptive of pain in the child with CP, detecting and understanding signs of pain and trying to divert the pain. Siblings perceived anxiety, helplessness, and frustration in relation to the childs pain. Siblings coped with the situation by sharing their feelings with family or friends, by keeping emotions to themselves or engaging in meaningful activities. They wished for better support from the development centre when needed. Parents interviews supported the siblings narratives. Parents felt worry about, but saw emotional growth in the siblings.

Discussion and Conclusion

Siblings need more support and information from development centers and health care, about physical and emotional pain, to cope with the family situation.

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Conflict of interest
The authors report no conflicts of interest and are responsible for content and writing of the abstract.

Program no. 2-49
Parental Attitudes Towards Children's Pain and Analgesic Drugs in the UK
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Introduction and aims
Many children continue to experience moderate to severe pain following surgery, including day surgery. With day surgery, it is often parents who assume primary responsibility for postoperative pain management. Parental attitudes towards and beliefs about pain and pain management in children have been explored in the USA and Finland, with studies in these contexts finding that parents may be reluctant to administer analgesic drugs (Kankkunen et al. 2003, Zisk-Rony et al. 2010). Some variation between the two countries was found in a comparative study, suggesting attitudes may vary according to cultural and national context (Kankkunen et al. 2008). Parental beliefs and attitudes in relation to pain and pain management in children remain unexplored in the UK. This study, therefore, explored parental attitudes and beliefs in relation to pain in children and analgesic drugs in the UK.
Methods
A convenience sample of parents (n=108) attending outpatient clinics or whose children were admitted to the paediatric wards at one hospital in South West London completed the Parental Pain Expression Perceptions and Medication Attitudes Questionnaires. Descriptive statistics were calculated to examine questionnaire scores and explore patterns in participant responses.
Results
Misconceptions and erroneous beliefs about the ways in which children express pain are evident amongst this sample of UK parents. For example, nearly half of all parents believed that children always tell their parents when they are in pain. Furthermore, parental understandings of analgesic drugs reflected misconceptions about their properties and efficacy. This included uncertainty regarding the addictive properties of analgesic drugs, beliefs that pain medication works best when given as little as possible, and that pain medications work best when taken as infrequently as possible.
Discussion and conclusions
Parental beliefs and attitudes towards pain in children and analgesic drugs in the UK reflect the results of other studies, in other countries suggesting misconceptions persist. These misconceptions may shape parental management of children's postoperative pain, and it is therefore important to explore parental understandings in this context in

order to improve the quality of care children receive. Strategies to optimise pain management must take these beliefs and attitudes into account.

Program no. 2-50
Effects of a support program for parents of children with chronic debilitating pain
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Repeatedly, research on child behaviours and cognitions show that parent behaviors and cognitions play an important role in shaping the behaviors and cognitions of children (e.g. Lundahl, Risser, & Lovejoy, 2006).
In ACT a central treatment target is psychological flexibility, defined as the ability to choose action in line with personally held values, in an accepting manner, even in the presence of interfering thoughts, emotions and sensations (e.g. pain) (Hayes et al. 2004).
A four session ACT-based parent support program in a sample of 30 children and their parents was administered within a randomized trial recently conducted at the Behavioral Medicine Pain Treatment Services, Karolinska University Hospital.
In addition to teaching parents traditional contingency management, the program aimed at increasing psychological flexibility in parents, in relation to their own distress regarding their childs pain. More specifically, interventions were aimed at improving the ability to deal with negative parental distress that might interfere with effective management of the child's situation. This was done in session, mainly through the use of ACT-related processes such as acceptance, defusion, values and committed action. Outcome measures include psychological flexibility, anxiety & depression as well as self-report measurements on health and healthcare consumption.
Results indicate decreases in the primary measures, parental psychological inflexibility and pain reactivity. Analyses will be performed on the other measures. Furthermore, analyses will be performed to investigate the relationship between changes in psychological inflexibility and child pain disability. Implications of these results will be discussed.

Program no. 2-51
Acute Pain: Perception of Children and Adolescents' Mothers, Value and Impact.
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Introduction& Aims: Several factors cause pediatric pain to be under-valued and poorly identified; this includes myths, poor information, beliefs and actual difficulties of children reporting painful conditions. So far, no data are available in Brazil to quantify and qualify the interpretation of painful conditions in children by their mothers. The aim of this investigation was to assess the relevance of acute pain with regard to parents and how the latter identify, value and interpret the signs in connection with the diagnostic of pain and its intensity, with the use of pharmacological and non-pharmacological therapies.

Methods: A retrospective study was conducted using a questionnaire to be answered by mothers of children aged 6 months to 11 years (ICr) and between 12 and 18 eighteen years of age (AD), which compose a representative sample of the social economical and demographic profile of the Brazilian population. The ways the pain is identified have been assessed together with the conducts and emotional impact of pain.
Results: Out of 1281 responding mothers, the predominant feelings were concern, anguish, nervousness and distress. With regard to the frequency of pain, 28% of the mothers reported that their children are frequently in pain and there are no differences between the different age groups. When the last 12 months were assessed, 50% of the mothers indicated 2 to 5 pain conditions in their children, regardless of the age group. The most frequently reported pains by mothers were headache in 69% AD and 50% in ICr, followed by sore throat (AD 48%), (ICr 53%) and abdominal pain AD (27%) and ICr (41%). The main form of detecting pain is through self reporting by AD and by children. Other forms taken into account were apathy and relentless crying. Approximately 67% of mothers give medicine to their children and 58% of mothers use one or more non-pharmacologic methods that include 43% massage, 36% rest, 28% home made drugs, 25% infusions, 24% compresses).
Conclusion: We conclude that there is a lack of knowledge in lay people for an appropriate assessment and treatment of pain. It is, therefore, important to develop family and general public education programs.
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Program no. 2-52
Development of the Parent Responses to School Functioning (PRSF) Measure
Main author: Barber Garcia Brittany, Boston Children's Hospital, Pain Treatment Service, United States
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Introduction/Aims: Parental pain catastrophizing and protective responses to child pain predict child school attendance rates and reports of school impairment (Logan, Simons, & Carpino, 2012), emphasizing the importance of assessing parental responses to child school functioning. Therefore, this study aims to develop a reliable and valid questionnaire to assess how parents of children with chronic pain feel, think, and act regarding their childs school attendance and other school behaviors.
Method: The PRSF was developed by a pediatric pain psychology fellow and faculty supervisor. It underwent review by 14 pediatric pain experts, with changes made based on review feedback. The resulting measure includes 35 theoretically-derived items representing five domains (i.e., parent internal thoughts, parent behaviors, trust in school, parent self-efficacy, perceived child self-efficacy). Respondents rated items on a scale from 0 (never true) to 5 (always true). The PRSF was completed by 210 parents of children with chronic pain in the Headache and Chronic Pain Clinics. A subset completed the PRSF at two-week follow-up to establish test-retest reliability. Internal consistency was examined via Cronbachs alpha coefficients. Exploratory Factor Analysis was conducted to compare the theorized domains to the observed factor

structure. Content validity of the PRSF measure was determined by comparing the PRSF to other measures of school functioning (e.g., attendance rates and Peds-QL school functioning scores).
Results: Preliminary item analysis reveals many items with mean scores in the middle of the range (>1 and <3) with moderate item-total correlations. The EFA model suggested a six-factor solution that accounted for 60% of the overall variance of the measure and had some correlation with theorized domains. Four factors could be logically linked to theorized domains including: trust in school, parent internal thoughts, parent behaviors, and parent/child self-efficacy. Regarding content validity, the PRSF was positively correlated amount of school missed at the $p < 0.01$ level and with parent protective responses to pain at the $p < .001$ level.
Conclusions: Having a reliable and valid measure of parents responses to their childs chronic pain and school functioning will help psychologists better guide parent-directed interventions. It will also be a useful research tool to understand parents processing regarding managing their childs pain and school functioning. Preliminary analyses suggest that, with minor modifications, PRSF will be a valid instrument for assessing parents beliefs and behaviors regarding school functioning in children with chronic pain.

Program no. 2-53
Chronic pain in the school setting: the teachers' point of view
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Introduction and Aims
Children with chronic pain (CP), as any other child, must attend school. Students with CP may experience difficulties in social, academic, and physical functioning1.Teachers could greatly contribute to children’s adjustment and help them to improve their quality of life.
The main aims of this study were to explore teachers’ responses to students with CP, the problems they encounter when dealing with CP students, and identify what might help them to support these students. As a secondary objective, we also analyzed the relationship between teachers’ responses to students in pain, their pain coping strategies and personality traits.
Methods
An email requesting collaboration was sent out to potential participants. Those interested had to answer an online survey which included the Inventory of Parent/Caregiver Responses to the Children's Pain Experience -teachers’ version-, the Zuckerman-Kuhlman-Aluja Personality Questionnaire and the Chronic Pain Coping Inventory.
Results
40 teachers participated. Most of them were women (83%), in their forties, taught at secondary school (65%) and had a long teaching experience (mean=14 .41 years, SD=9.40). 38% have had children with chronic pain in their classes.
Absenteeism (68%) was the main issue that teachers described, whereas having some guide to learn what to do with a student with CP (80%) and counting on the collaboration of families (78%) were identified as the most useful alternatives to help them support these students. Coping and solicitous responses were the ones used

most to deal with a child in pain. Teachers, who tended to response in a solicitous way to their CP students, were more anxious ($r=0.37$, $p<0.05$) and frequently used self-statements as a coping strategy ($r=0.37$, $p<0.05$). Those that responded by promoting pain coping and healthy behaviors also tended to use the same coping strategy ($r=0.54$, $p<0.01$), to relax ($r=0.42$, $p<0.01$) and seek social support ($r=0.37$, $p<0.05$).
Discussion and Conclusion:
This study reports on the difficulties perceived by teachers when dealing with students with CP, the alternative avenues for helping those students as well as on the teachers' usual responses to them. This data might be of help to develop guidelines to support teacher's actions when dealing with children with CP.
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Conflict of Interest: None
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Program no. 2-54
Satisfaction with parent participation in children's immunization pain reduction
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Introduction & Aims: Poorly managed immunization pain causes needle phobia, iatrophobia, and avoidance of preventive health care. Implementation of pain prevention is perceived as too labor-intensive for primary care settings. Parents usually are not included in pain management yet they would like to be if instructed how to do so. The aim of this pilot randomized trial was to evaluate parent participation in a multi-modal immunization pain reduction technique (Berberich et al. Pediatrics 2009;124:e203).
Methods: Healthy children aged 4-6 years, scheduled for pre-kindergarten immunizations: Dtap (diphtheria, tetanus, acellular pertussis), IPV (injectable polio vaccine), and MMR (measles, mumps, rubella) or Dtap/IPV without MMR were eligible. Participants were randomly assigned to: (a) an evidence-based multi-modal immunization pain reduction technique (PRT) delivered by 2 trained medical assistants (MA) or (b) a modified protocol in which 1 parent and 1 MA utilized the method (P-PRT). The PRT and P-PRT protocols were explained to parents and children immediately prior to the procedure using standard scripts. Children were videotaped during the procedure and for 2 minutes afterward. Parents and children completed self-report measures of procedural satisfaction using 5-point Likert-type scales. Results: All 71 eligible families consented to participate. One parent withdrew after randomization to P-PRT and 2 parents/children in the PRT group did not complete the protocol due to child distress during the procedure. In the final sample of 68 parent/child dyads (PRT=30; P-PRT=38), there were no significant differences in demographic characteristics between groups. The majority of parents (84%) and children (67%) in both groups were satisfied with the immunization experience, and found all components of their respective techniques helpful; there were no differences between the two groups (Child PRT satisfaction 3.43

(1.43) vs P-PRT 3.12 (1.25), p=.36; Parent PRT satisfaction 4.57 (0.86) vs P-PRT 4.49 (0.65), p=.67). Parents' free text comments were similar across both groups and revealed 3 main themes: 1) desire for procedures to be done as quickly as possible; 2) concern about increasing child anxiety with pre-procedure preparation; and 3) pleasant surprise at child engagement in the distraction technique. There were no adverse events. Discussion & Conclusion: Parent engagement in an immunization pain reduction method is feasible and well accepted. It is associated with as high a degree of satisfaction as with the 2 MA delivered technique. Greater engagement of parents may reduce provider burden and improve delivery of pain prevention interventions to children during routine immunizations. Funding: UCSF School of Nursing

Program no. 2-55

A pilot randomized trial of parent participation in child immunization pain reduction

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Introduction & Aims: Children undergoing vaccine injections experience significant distress and pain. At present, parents are not routinely educated about how to assist in reducing distress and pain during vaccine injections. The aim of this pilot randomized controlled trial was to estimate the effectiveness of parent participation in pain-prevention strategies compared with provider-delivered pain-prevention strategies lacking parent participation during routine immunizations.
Methods: Healthy children aged 4-6 years, scheduled to receive pre-kindergarten immunizations: Dtap (diphtheria, tetanus, acellular pertussis), IPV (injectable polio vaccine), and MMR (measles, mumps, rubella) or Dtap/IPV without MMR were eligible. Participants were randomly assigned to: (a) an evidence-based multi-modal immunization pain reduction technique (PRT) delivered by 2 trained medical assistants (MA) (Berberich et al. Pediatrics 2009;124:e203) or (b) a modified protocol in which 1 parent and 1 MA utilized the method (P-PRT). The PRT and P-PRT protocols were explained to parents and children immediately prior to the procedure using standard scripts. Children were videotaped during the procedure and pain was assessed from video recordings using the Faces Legs Activity Crying Consolability (FLACC) scale (0-10) (Merkel SI et al Pediatr Nurs 1997;23:293-297) at 3 time points: pre-procedure (FLACC-1), after injection(s) in arm 1 (FLACC-2) and after arm 2 (FLACC-3). Parents and children provided Faces Pain Scale ❤“ Revised (FPS-R) scores (0-10) (Hicks CL et al Pain 2000;93:173-183) immediately after all injections.
Results: 68 children were enrolled and completed the protocol (PRT=30; P-PRT=38). There were no statistically significant differences between groups in demographic characteristics. Pain scores did not differ between groups at any time point (FLACC-1: PRT 2.03 (3.01) vs P-PRT 0.54 (1.04); p=.18; FLACC-2: PRT 2.07 (1.85) vs P-PRT 1.31 (1.91); p=.27; FLACC-3: PRT 2.70 (3.20) vs P-PRT 1.91 (2.28); p=.27). Similarly, child and parent FPS-R scores did not differ (Child FPS-R PRT 2.07 (1.71) vs P-PRT 2.38 (1.72); p=.51; Parent FPS-R PRT 2.27 (1.70) vs P-PRT 2.50 (1.58); p=.57).
Discussion & Conclusion: These preliminary findings suggest that a multimodal

immunization pain-reduction intervention delivered exclusively by 2 MAs vs. an MA assisted by a parent do not differ in the level of pain and distress responses experienced by 4-6 year old children undergoing routine pre-kindergarten vaccinations. Greater engagement of parents in delivery of pain prevention interventions to children during routine immunizations may be recommended after confirmation in a larger trial.
Funding: UCSF School of Nursing

Program no. 2-56
Restoring School Functioning in Children with Chronic Pain: Multifaceted Intervention in a Pediatric Pain Rehabilitation Program
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Introduction and Aims
For children, school is the major hub of social, emotional, cognitive, and academic development. Chronic pain threatens a child's ability to function successfully in the school environment, and has far reaching effects on a child's well being (Logan & Simon, 2010). Pediatric pain rehabilitation programs are designed to restore function in children who are significantly disabled by their pain. Restoration of school functioning is a primary goal of therapeutic intervention. As this goal requires changes in physical, psychological, cognitive, and academic functioning, a multidisciplinary approach is necessary. In order to better address the needs of the patients, we explored how close coordination between disciplines is utilized to achieve maximum treatment outcomes.
Methods
A chart review was conducted on 35 patients. Our program offers daily OT, PT, psychotherapy, and a minimum of 1.5 hours/day in hospital school. All providers coordinate care in daily team rounds.
Results
The average age of our sample was 13.37 years (range 8-19). Average length of treatment: 6.5 weeks. School attendance in previous 3 months: 88.6% missed at least 5 days/month, 43% attended less than half the time, and only 4 attended >90% of the time. Upon admission, only eight patients (22.8%) had a formal school plan already in place that outlined pain-related accommodations. At discharge, 100% of patients had formalized school plans (504, IEPs, or private school plans) developed in coordination with our hospital education specialists who acted as liaisons between the treatment team and the patient's community school. Ten patients (29%) were referred for neuropsychological assessment while in the rehabilitation program, and all were identified as having previously unrecognized learning issues that required accommodation. Plans included 54% with a modified school day plan, and 34% had regular school plans with some accommodations. All patients returned to a higher level of school functioning following discharge from our program.
Discussion and Conclusion

Return to school functioning requires addressing practical issues (access to resources, physical accommodations, coordination with medical care), psychological barriers (motivation, anxiety, depression), skill building (management of social scene, self advocacy, coping skills) and empowerment of the patient/parent. Regular daily communication between providers allows for these aspects to be worked on and skills "practiced" within the hospital classroom environment. Detailed, formalized plans incorporating the input of all disciplines are an extremely important piece in increasing the chances of successful school functioning after discharge. Education specialists are a vital part of this multidisciplinary approach.

Program no. 2-57

Pain syndrome correlates with raised level of cortisol, cytokine, C-reactive protein.

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Background: One of the most difficult challenges still facing researchers and clinicians is assessing pain in the children. The mechanisms contributing to severe pain syndrome (SPS) in children are multifactorial. Recent evidence suggests a potential pathogenetic role for inflammation.
Objective: To examine the relationship between serum concentrations of inflammatory mediators, cortisol (hydrocortisone) and SPS after major abdominal surgery.
Methods: Prospective observational study involving children with SPS after major abdominal surgery and normal controls. All patients after operation received adequate analgesic therapy (continuous infusion opioid analgesics). Blood samples were taken at 12 h, 24 and 48 h for cytokines, cortisol and CRP after major surgical procedure. Data were analyses using analysis of variance and 2 analyses.
Results: 39 children with SPS and 22 controls were enrolled. 24/39 (61,5%) patients with SPS required mechanical ventilation, 1/39 (2,6%) died. Patients with SPS had more than threefold higher serum levels of interleukin 8 (IL8) than the controls ($p<0.05$). At 12 h, 24 h and 48 h, serum IL6 and CRP were 2.87- fold higher in children than the controls group ($p <0.002$). All patients with SPS had significantly ($p < 0.001$) higher plasma cortisol levels over control group (mean +/- SD, 703.8 +/- 80.8 vs. 185.22 +/- 58.90 micromol/l on 12 h; 860.2 +/- 98.4 vs. 240.2 +/- 62.4 micromol/l on 24 h; 664.1 +/- 80.4 vs. 200.8 +/- 54.4 micromol/l jn 48 h).
Conclusion: This study demonstrated that severe pain syndrome is associated with raised blood levels of proinflammatory mediators and cortisol, suggesting that inflammation contributes to the severe pain syndrome in children.

Program no. 2-58

Systematic review of sex differences in healthy children undergoing experimental pain

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Introduction and Aims: Recent systematic reviews have reported sex differences in studies of adult pain (Racine et al., 2012); however no recent reviews have been conducted in children. The purpose of the current study was to conduct a systematic review of published research examining sex differences in response to experimental pain in healthy children.

Methods: A search was conducted of key electronic databases (PsycINFO, EMBASE, CINAHL, PubMed). Eligibility criteria included: (1) Empirical investigations using any experimental pain task to examine pain-related outcomes; (2) Published in manuscript form in English; (3) Studies using community/healthy samples of children between 0 and 18 years of age, or studies that included a healthy control group; (4) Studies including both boys and girls. Eligible studies were coded for reported sex differences in pain-related outcomes.

Results: The search yielded 519 abstracts, with 76 separate studies eligible for inclusion (reporting findings from n=126 experimental pain tasks, e.g., cold pressor task, pressure pain, thermal pain). Of the pain tasks that examined sex differences in pain intensity (n=37 pain tasks), 89.2% reported no sex differences, and 10.8% indicated girls reported significantly higher levels of pain intensity than boys. Regarding pain threshold (n=15 pain tasks), 73.3% reported no sex differences, and 26.7% reported that girls demonstrated a significantly lower pain threshold than boys. Regarding pain tolerance (n=22 pain tasks), the majority of studies (81.8%) reported no sex differences, though 9.1% reported girls had greater tolerance than boys, and 9.1% reported the boys having greater tolerance than girls. Sex differences were not reported in the majority (90.9%) of pain tasks that measured pain affect (n=11 pain tasks), though 9.1% found that girls reported significantly greater pain affect than boys. Regarding facial activity in response to pain (n=8 pain tasks), 75.0% reported no sex differences, and 25.0% reported that boys had significantly greater facial activity in response to pain than girls. Finally, regarding physiological responses to pain (n=11 pain tasks), 90.9% reported no sex differences and 9.1% reported boys had significantly greater physiological responses to pain than girls.

Discussion and Conclusion: The results of this systematic review indicate that the majority of studies on children's responses to experimental pain report no significant sex differences on pain and pain-related outcomes. The few studies that did report sex differences found that girls had greater pain intensity and affect, lower pain thresholds and facial activity in response to pain, and less physiological reactivity to pain.

Program no. 2-59

Neonatal surgery: a role for p38 MAPK in enhanced pain sensitivity following re-injury

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Introduction and Aims: Long-term changes in sensory processing in preterm-born children requiring intensive care were more marked in those who also required surgery1. Similar changes are seen in a laboratory model of surgical injury, as hindpaw incision in the first postnatal week, but not at older ages, enhances sensitivity to future injury. Prior neonatal injury primes neuroimmune interactions in the spinal cord. Increased degree and duration of hyperalgesia following re-incision is matched by an increased expression of morphological markers of spinal microglial reactivity, and reduced by microglial inhibition with minocycline2. Adult plantar incision increases phosphorylation of p38 MAPK (p-p38) in microglia, and specific inhibitors of p38 phosphorylation attenuate mechanical allodynia3. We aimed to evaluate the impact of prior neonatal incision on this early functional marker of microglial reactivity.

Methods: Experiments were performed in accordance with the United Kingdom Animal (Scientific Procedures) Act 1986. Plantar hindpaw incisions were performed under anaesthesia in adult male Sprague Dawley rats with prior incision at postnatal day 3 (repeat incision) and in age-matched rats without prior injury (single incision). Intrathecal vehicle or p38 MAPK inhibitor (SB203580; 0.2mg/kg or 1mg/kg) was administered 30mins before incision, and hindlimb mechanical thresholds were assessed at regular intervals for 3weeks. In additional groups, spinal cords were removed following terminal anaesthesia 1, 3 or 24hrs after repeat or single adult incision and p-p38 immunoreactivity was compared.

Results: Prior neonatal injury altered baseline sensory thresholds in adulthood and enhanced the degree and duration of hyperalgesia following repeat incision. In animals with prior neonatal incision, pretreatment with 0.2mg/kg and 1mg/kg SB203580 attenuated the degree and/or duration of mechanical allodynia. SB203580 was less effective in single incision adults, as only 1mg/kg reduced mechanical allodynia. The degree of p-p38 immunoreactivity in L4-5 spinal dorsal horn microglia was also greater in animals with prior neonatal incision.

Discussion and Conclusion: These findings strengthen the hypothesis that priming of spinal microglia by neonatal surgical injury contributes to the enhanced pain response following repeat injury in adulthood. Inhibitors of p38 MAPK are currently in clinical trials4, and may have improved efficacy for peri-operative pain in patients with prior neonatal pain experience.

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Program no. 2-60

Long-term effects of neonatal pain after surgery for Tierfell Naevus

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Introduction and aims

A Tierfell naevus (giant congenital melanocytic naevus) is often removed within the first six weeks of life. Surgery involves removal of the epidermal tissue underlying the naevus. As this is considered very painful, the infants receive high dosages of opioids. We know that burn injuries during infancy induce long-term alterations in sensory and pain processing [1]. In the present study we evaluated if this holds true also for children who underwent surgery for Tierfell naevus, which also affects the skin. We compared detection- and pain thresholds and pain-related brain activation patterns induced by thermal pain stimuli between these children and controls.

Methods

Fourteen children with a medical history of surgery for Tierfell Naevus in the first eight weeks of life and 42 healthy age- and gender-matched controls were included, at mean age 12.3 (SD 2.1) and 11.6 (SD 2.4) years, respectively (p=0.35). Individual detection and pain thresholds were determined using the Thermal Sensory Analyzer-II (Medoc Ltd. Advanced Medical Systems, Ramat Yishai, Israel). Functional MRI (fMRI) imaging (BOLD) was performed on a 3T MR scanner (GE Signa). Ten cases and 29 controls successfully finished one or two runs during which they received four warm (41 °C) and four painfully hot (46 °C) stimuli. Children indicated the intensity and unpleasantness of the pain stimuli on a Numerical Rating Scale (NRS). Pre-processing, individual- and group analyses were performed with AFNI and FSL 5.0 software.

Results

Mean detection thresholds did not significantly differ between both groups (cold: cases 29.2 (SD 3.7), controls 30.2 (SD 3.0), p=0.32; warm: cases 35.2 (SD 3.4), controls 34.0 (SD 1.8), p=0.24). Mean pain thresholds were also not significantly different (cold: cases 6.6 (SD 7.2), controls 9.6 (SD 8.6), p=0.26; heat: cases 45.5 (SD 4.4), controls 46.1 (SD 4.0), p=0.62). The mean NRS scores for pain and unpleasantness were 2.6 (SD 2.9) and 1.7 (SD 2.1) for cases and 3.3 (SD 2.9) and 3.1 (SD 3.0) for controls (p=0.46 and p=0.18). The fMRI scans showed no differences in brain activation during pain between cases and controls (Figure 1).

Discussion and Conclusion

These results suggest that there are no long-term effects of severe neonatal pain on pain perception later in life while altered pain processing was expected. Region-of-interest fMRI analysis and structural MRI analysis will be helpful to confirm these results.

References
[1] Wollgarten-Hadamek et al. Pain 2009;141(1-2):165-172.
The authors declare that they have no conflicts of interest.

Program no. 2-61
Long-term effects of neonatal ECMO treatment on pain processing later in life
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Introduction and aims
We prospectively monitor psychomotor and mental development until 18 years in children who as neonates received extracorporeal membrane oxygenation (ECMO) treatment. An unpublished study from our research group suggests that children with a history of neonatal ECMO treatment are less sensitive during childhood than healthy controls in detecting cold and warm stimuli, suggesting altered pain processing. In the present study we established detection- and pain thresholds and pain-related brain activation patterns induced by thermal pain stimuli in these children at age 8-15 and compared these findings to those in controls.
Methods
Thirty-four children with a medical history of neonatal ECMO treatment and 52 healthy age- and gender-matched controls were included, with mean age 10.9 (SD 2.2) and 11.4 (SD 2.3) years, respectively (p=0.32). Individual detection and pain thresholds were determined using the Thermal Sensory Analyzer-II (Medoc Ltd. Advanced Medical Systems, Ramat Yishai, Israel). Functional MRI (fMRI) imaging (BOLD) was performed on a 3T MR scanner (GE Signa). Fourteen cases and 36 controls successfully completed one or two runs in which they received four warm (41 °C) and four painfully hot (46 °C) stimuli. Children indicated the intensity and unpleasantness of the pain stimuli on a Numerical Rating Scale (NRS). Pre-processing, individual- and group analyses were performed with AFNI and FSL 5.0 software.
Results
Mean detection thresholds did not significantly differ between the two groups (cold: cases 29.8 (SD 1.4), controls 30.2 (SD 2.7), p=0.40; warm: cases 34.4 (SD 1.4), controls 34.1 (SD 1.8), p=0.31). This also held true for mean pain thresholds (cold: cases 11.2 (SD 10.0), controls 9.8 (SD 9.3), p=0.49; heat: cases 44.8 (SD 4.6), controls 45.8 (SD 4.3), p=0.31). Cases assigned almost two points higher mean NRS scores for pain (5.0 SD 3.0; vs. controls 3.2 SD 3.1), though without significance (p=0.07). The unpleasantness score was 4.0 (SD 2.9) in cases and 2.7 (SD 3.0) in controls (p=0.16). Brain activation on fMRI scans during administration of painful stimuli did not significantly differ between cases and controls (Figure 1).
Discussion and Conclusion

We could not confirm that children who received ECMO treatment are less sensitive for thermal stimuli. Furthermore, fMRI scanning did not indicate different pain processing between cases and controls. Our future goal is to compare brain morphology of children who received ECMO versus controls using structural MRI.
The authors declare that they have no conflicts of interest.

Program no. 2-62
Persistent connectivity alterations in pediatric Complex Regional Pain Syndrome.
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Introduction and Aims
In children and adolescents, CRPS symptoms frequently fluctuate and often resolve within months to years, allowing studying the CRPS brain longitudinally during recovery. Here, we address how pain changes the functional connectivity in the CRPS brain during the symptomatic state, and whether such alterations persist also after symptom resolution.
Methods
Eight pediatric complex regional pain syndrome (CRPS) patients were studied with 3T fMRI in the symptomatic painful state and at follow up in the recovered state. We determined regions with increased cold-induced functional connectivity in the affected limb vs. unaffected limb in the CRPS state, but with normalized connectivity patterns in the recovered state; and regions with increased cold-induced functional connectivity in the affected limb as compared to the unaffected limb that persisted also in the recovered state.
Ethics approvals were obtained from the McLean Hospital Institutional Review Board and the Children's Hospital Boston Institutional Review Board.
Results
Cold stimulation of the affected CRPS limb in the symptomatic state led to a general pattern of increased functional connectivity between the seed regions and the brain, consistent with pain leading to an increased degree of BOLD synchronization within pain processing regions. The amygdala, the anterior cingulate, caudate, postcentral gyrus and the putamen displayed significant elevations in functional connectivity during stimulation of the affected limb as compared to stimulation of the unaffected limb during the symptomatic and/or recovered CRPS state.
Discussion and Conclusion
The data support the notion that even after symptomatic recovery, alterations in brain systems persist in amygdala, and basal ganglia systems. Connectivity analysis may provide a measure of temporal normalization of different circuits/regions when evaluating therapeutic interventions for this condition. The results add emphasis to the importance of early recognition and management in improving outcome of pediatric CRPS.

Acknowledgement
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Program no. 2-63

Brain activity following cutaneous needle puncture in human infants: preliminary data

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Aim: To determine whether a noxious EEG response can be detected following inoculation in infants.

Introduction: Previous EEG studies(1, 2) have shown a specific pattern of cortical activity following noxious heel lance in newborn human infants. It is unclear whether this activity is lance-specific, or more generally, nociceptive-specific. Therefore, in this pilot study we have explored the cortical response to a different noxious, skin-breaking, stimulus - inoculation.

Methods: Participants were healthy infants (39-48 weeks GA) studied at a postnatal age of 29-108 days (n=9).

Noxious stimulation was a clinically required inoculation to the thigh, given by a trained neonatal nurse. Brain activity was monitored with EEG recordings. EEG electrodes were placed according to the international 10:20 system. Time-locking of the inoculation with the EEG was achieved by means of a novel method(3): a high-speed camera (Optronis GmbH, Germany; frame rate = 200 fps) recording of the stimulation site, which was synchronised to the EEG. The frame number at which the skin was broken by the needle was identified post-acquisition by two independent observers. The corresponding EEG segments were then analysed.

Ethical approval for this study was given by the UK NRES and by the UCL/UCLH Joint Research Office.

Results: Needle puncture evoked a clear event-related potential consisting of a late NP complex followed by an ultra-late negative potential, maximal at the vertex. This waveform is consistent with the pattern of activity evoked by heel lance(1, 2).

Conclusion: It is possible to record an event-related EEG response to inoculation. Preliminary data indicate a similarity between this potential and that evoked by heel lance(1, 2) suggesting that there may be a common cutaneous mechanical nociceptive-evoked potential in infants, but further data and analysis are required to confirm this. As inoculation is performed in older infants, the technique we have piloted here offers the opportunity to study the long-term postnatal development of nociceptive EEG potentials.

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This work was supported by the Wellcome Trust and by the UCL/UCLH CRBC.
The authors have no conflict of interest to disclose.

Program no. 2-64
Neuroglia and delayed onset pain hypersensitivity following infant nerve damage
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Introduction and Aims
While nerve injury in adults results in neuropathic pain, this is not observed in either young rat pups or human infants when nerve injury occurs in the first few weeks of life. However peripheral nerve injury in infant rats does lead to a delayed onset mechanical hypersensitivity which only emerges in adolescence (Vega-Avelaira et al., 2012). Here we have investigated the role of spinal dorsal horn neuroglial interactions in this delayed hypersensitivity
Methods
Sprague-Dawley rats and CD1 mice aged postnatal day (P) 10 or adult (P33) underwent spared nerve injury (SNI) or sham surgery under anaesthesia. Behavioural thresholds to von Frey hair stimulation (g), latency to radiant heat (sec) and responses to acetone (cold) on the lateral plantar hindpaw were measured at 7, 14, 21, 28 and 35 days post surgery. The ipsi and contralateral spinal cord dorsal horn segments (L4-L5) of CD1 mice were dissected and a cytokine array (R&D systems) was performed on extracted protein and quantitative real time PCR (qPCR) on extracted RNA.
Results
Peripheral nerve injury (SNI) at P10 in both rats and mice results in delayed onset, long lasting cutaneous mechanical and cold, but not heat, sensitivity in the affected limb when the animal reaches adolescence. At 7 days following P10 nerve injury, when there is no evidence of pain behaviour, the anti-inflammatory cytokine IL-10 mRNA is significantly upregulated in the ipsilateral dorsal horn, compared to sham controls, while proinflammatory cytokine TNF-alpha mRNA and growth factor BDNF mRNA are not significantly altered. At 21 days post P10 nerve injury, when delayed hypersensitivity is observed, IL-10 mRNA is unaffected but BDNF and TNF-alpha are upregulated, compared to sham control, to the same levels as seen in adult neuropathic models. Markers of microglia (IBA-1) and T cells (CD2) were not significantly altered at 7 days post P10 injury but were upregulated at 21 days and following adult SNI, while astrocytes (GFAP) were only upregulated following adult nerve injury.
Discussion and Conclusion

Pain behaviour following peripheral nerve injury in young animals is not exhibited until adolescence. This pain is specifically evoked by mechanical and cold stimuli, but not heat stimuli. Age related alterations including the presence of glial cells and pro-inflammatory cytokines may provide clues to understanding the long term effects of early injury and the emergence of complex pain syndromes in adolescent patients. Vega-Avelaira D, et al., Mol Pain. 2012 Apr 24;8:30.

Program no. 2-65
Electrophysiological Responses in Children to Noxious Stimuli Under Anaesthesia
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/Introduction & Aims:
Each year, more than 235,000(1) children in the UK are admitted to hospital and receive an operation or investigation under general anaesthesia. The insertion of an intravenous cannula as part of normal clinical practice provides us with a useful nociceptive stimulus, creating an opportunity to measure electrophysiological responses using electroencephalography (EEG) and electromyography (EMG). It is unknown whether noxious stimuli evoke a change in the brain activity of children receiving a general anaesthetic; and in this study, we present a novel approach to investigating clinically noxious procedures, and have demonstrated that it is possible to record noxious stimulus-evoked brain activity in the anaesthetised child.
/Methods:
Thirty children aged between 0-12 years were studied under sevoflurane monoanaesthesia. Anaesthesia induction was performed using volatile agents as per routine anaesthetic practice, and once stable, patients were maintained under sevoflurane monoanaesthesia. EEG and EMG was recorded pre- and post- cannulation and experimental noxious (pin-prick) and non-noxious (touch) stimuli were performed at the site of cannula insertion on the dorsum of the hand, prior to cannulation. Changing patterns of neuronal activity evoked by noxious and non-noxious stimuli were ˜time-locked to electrophysiological recordings by means of a high-speed camera and an event-detection interface. Video recordings were captured at 220fps, a precision of 9ms and accuracy of 4.5ms, and touch events marked with a precision and accuracy of 624µs and 256µs respectively.
/Results:
Using frequency and principal component analysis, we have investigated the central and peripheral patterns of noxious and non-noxious stimulus-evoked electrophysiological activity. Preliminary data from children in our cohort, born healthy and at term, indicates that EEG activity post-stimulus is altered compared to the pre-stimulus baseline.
/Discussion & Conclusion:
The electrophysiological recordings we have obtained show that it is possible to measure evoked brain activity following a variety of noxious and non-noxious stimuli in

anaesthetised paediatric patients. By continuing to characterise these responses, our studies will allow for the comparison of children with prior painful experiences and investigate the effect of anaesthesia on pain sensitivity. With this novel experimental technique it is possible to investigate how the human brain processes noxious stimuli under anaesthesia.
/Acknowledgements: Stewart Boyd & Alan Worley
/(1) Cook T, Woodall N & Frerk C (2011) Major Complications of Airway Management in the United Kingdom. 4th National Audit Project of The RCoA and the Difficult Airway Society

Program no. 2-66
Pain tolerance and pain perception in adolescents born extremely preterm
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Introduction: Being born preterm is associated with repeated painful events and prolonged stress during months of hospitalisation in Neonatal Intensive Care Units. These early exposures may have consequences reaching beyond their immediate and unpleasant effects in the neonatal period.
Aims: To assess the tolerance and perception of experimental pain as well as self-reported health complaints in a population-based cohort of adolescents born extremely preterm and to compare with matched controls born at term.
Methods: Thirty-one (89%) of 35 eligible preterms (mean gestational age 26.8 weeks) and 28 (80%) term-born controls participated at this follow-up study at a mean age 17.8 years. Subjects performed a standardized Cold Pressor Task (CPT) and completed validated questionnaires regarding current health complaints (Health Behaviour in School-aged Children-Symptom Checklist (HBSC-SCL), and sociodemographic and personal characteristics (General Self-Efficacy (GSE) scores, range 1-4).
Results: Ten (32%) subjects born preterm vs. 17 (61%) born at term reached the ceiling time of 180 seconds immersion time in the ice water, a hazard ratio (HR) for early withdrawal of 2.05 (95% confidence interval (CI): 1.72 to 2.44, $P < 0.001$), with males explaining most of the difference. For subjects born preterm, the risk of early withdrawal decreased significantly with more days of mechanical ventilation, more pain events and more doses of morphine during the newborn period. The means of the overall pain ratings during the CPT at the Numeric Rating Scale were 6.7 vs. 6.5 for preterms and term-borns, respectively ($P = 0.22$). HBSC-SCL somatic, psychological and sum-scores were similar in the preterm and term-born groups ($P = 0.54$, 0.83, and 0.82, respectively). Crude HR for early withdrawal from the ice water was increased in subjects with mothers with low education (HR = 10.31; 95% CI: 7.09 to 14.97 for maternal education below college/university level) and was reduced with increasing GSE scores (HR = 0.73; 95% CI: 0.65 to 0.83). In an adjusted regression model these

variables reduced the difference between the preterm and term-born groups (HR = 1.34; 95% CI: 1.11 to1.63, P = 0.003).
Conclusion: Subjects born preterm and at term scored their pain experiences similarly, but the pain tolerance of those born preterm was reduced. Differences were explained mainly by males and by those exposed to least invasive neonatal treatments and thus least pain treatment. Neonatal pain treatment and management of pain during childhood is an important issue in this vulnerable population.
Acknowledgement: We thank the Western Norway Regional Health Authority for funding the study.
Conflict of interest: The authors declare no conflict of interest.

Program no. 2-67
Screening for neuropathies in children with diabetes – Misguided guidelines?
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Introduction and Aims
Diabetic peripheral neuropathies, even though they themselves may be painless, are an important risk factor for the development of severely painful and disabling complications (foot ulcerations and amputations) in children with diabetes. Objective tests for peripheral neuropathies (Nerve-Conduction Studies; NCS) show that between 25% and 59% of the children with diabetes have peripheral neuropathies. As NCS are unpleasant and not available in pediatric practice, guidelines suggest screening-tests for vibration detection and mechanical sensitivity. The aim of the present paper is to systematically review studies comparing these two tests to the gold-standard NCS.
Methods
A systematic literature-search was performed on medline and google scholar and within published guidelines. Inclusion criteria were: (1) Use of NCS as gold-standard; (2) Assessment of either vibration detection or mechanical sensitivity; (3) Assessment of children and adolescents.
Results
Overall the literature search identified four articles reporting results from a total of 227 children. The methodological quality was weak with little or no blinding.
Vibration-based screenings were evaluated in all four studies; two used an electric vibratron and yielded acceptable sensitivities/specificities (82%/75% and 62%/65%). Two used the traditional Rydell-Seiffer tuning-fork and yielded extremely low diagnostic utilities (17%/89% and 0%/0%). Mechanical sensitivity tests were evaluated in only two studies. The first used 14milliNewton as cutpoint for abnormal values and yielded unacceptable results (19% / 64%). The second used 1milliNewton as cutpoint and yielded acceptable results (75% / 89%).
Discussion and Conclusion
The review shows that the existing evidence does not support the procedures suggested by guidelines. Specifically the use of the tuning-fork is not supported as the comparably good results for the vibration detection were achieved with electric vibratrons that enable much more control over the stimulation.

Use of 10G-Semnes-Weinstein monofilaments is also not supported by the data. However, a recent study (Blankenburg et al., 2012) suggests that use of finer monofilaments are a practical way to improve screening in pediatric practice.
On a more general level these results call for a more systematic assessment when developing guidelines for diagnostic procedures. Of note the German S3 guideline cites the above-mentioned study that showed 0% sensitivity for the tuning-fork as evidence supporting it's use.
Furthermore, both the data-collection method as well as the interpretation standards should be evaluated separately.
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Program no. 2-68
Altered pain processing in adolescents & young adults with Sickle Cell Disease
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Introduction and Aims: Numerous previous functional neuroimaging studies have identified brain regions that show greater activation to painful versus non-painful stimuli. This experiment examined the response of brain regions within this "pain matrix" in patients with sickle cell disease (SCD) to describe possible alterations to neural reactivity that underlies pain sensitization.
Methods: The pain threshold for 12 African American adolescents and adults with SCD (ages 16-31 years) and 12 demographically-matched control participants were determined using a pressure algometer and a calibrated series of weights. Pressure pain sensitivity was evaluated by suprathreshold sensations using an 11 point (0 – 10) patient numerical rating scale following 18 seconds of stimulation. Participants then underwent an fMRI block design pain challenge task using three pre-determined experimental pain levels (none, mild, or moderate) and a standard equal pressure weight (125g) condition. FMRI time series data were realigned, spatially-normalized and smoothed (8mm FWHM) using SPM8 and examined using a finite-impulse-response model to capture any transient or sustained brain activity changes during each stimulation. Mixed-factor SPM8 ANOVA compared groups across pain levels.
Results: There was no statistical difference in the pressure required to produce the predetermined pain levels between SCD subjects and controls. Despite having equivalent pressure requirements at each of the three experimental pain levels, SCD subjects showed reduced hemodynamic response in SII and insular cortex regions-of-interest compared to controls across no pain, equal pain and equal pressure conditions.
Discussion and Conclusion: We have demonstrated evidence for centrally altered pain processing in patients with SCD. The results indicate that pain-related neural processing is abnormal in SCD patients, involving deficits in brain regions specialized

for sensory-discriminative (SII) and somatosensory integration (insula). However, no SCD abnormalities during pain challenge were detected in brain regions thought to represent basic sensation (SI) or cognitive/emotional aspects of nociceptive processing (e.g., anterior cingulate). Although these results stand in contrast to some studies that found pain matrix activation predicted self-reported pain intensity, they make sense within the context of evidence for reduced neural response when pain is delivered in a predictable, fixed context. Therefore, the blunted average SII and insular activation in SCD patients is taken as evidence for even greater-than-usual reduction in repeated pain-induced activation related to pain sensitization. The results also suggest SCD patients pain sensitization might involve abnormal signaling from these brain regions to other cortical areas more directly involved with interpreting and consciously representing the pain experience.

Program no. 2-69
Juvenile Joint Pain – short and long-term consequences of joint inflammation in early life
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Introduction/Aim - Juvenile joint pain is poorly understood and a cause of major suffering and disability in children with juvenile arthritis. We aimed to develop and characterise a rodent model of joint inflammation to study the neurobiological basis of joint pain in early life and to establish whether joint inflammation in childhood influences joint pain sensitivity as an adult.
Methods - Mono-arthritis was induced with complete Freund's adjuvant (CFA) (0.9ul/g) injected into the ankle joint of postnatal day 8 (P8) and 21 (P21) and 40 (P40) Sprague-Dawley rats. Mono-arthritis was also induced in P40 rats that had previously experienced joint inflammation earlier in life (P8). Naive and saline injected controls were performed at all ages. Pain responses were measured using flexor muscle electromyographic (EMG) recording, which provides a quantitative measure of the excitability of spinal nociceptive sensory circuits. EMG activity was recorded in anaesthetised rats (1.1% isofluorane) using a single bipolar needle electrode inserted into the biceps femoris muscle. In all experiments noxious pinch of the ankle and toe was used to evoke reflex activity. Experiment (1) Evoked EMG activity was measured 24hrs and 4 days post-CFA injection at three postnatal ages. Experiment (2) Animals inflamed at in early life were re-inflamed as adults and evoked reflex responses were measured and compared to animals that had only received a single injection and naïve animals of the same age.
Results - In contrast to the well-described enhancement of the flexion reflex produced by skin inflammation, joint inflammation at P21 and P40 resulted in a marked depression of flexor reflex EMG activity on the inflamed side, compared to controls. In the youngest, P8 animals, however, this depression was absent, indeed flexion reflex responses following joint inflammation were enhanced compared to controls. Furthermore, P8 joint inflammation had long term effect on adult joint pain responses: joint inflammation induced suppression of flexor reflex activity was significantly greater

in adult animals that had experienced previous joint inflammation as a juvenile compared to those that were only injured in adulthood.
Conclusions - Inflammatory arthritis suppresses flexion limb withdrawal in adolescent and adult animals, apparently through powerful spinal inhibitory mechanisms, but leads to enhanced reflexes in juveniles, who lack this inhibition and therefore may risk damaging their joints further. Furthermore, our results show that experience of arthritic pain in early life has a long-term priming effect on spinal nociceptive circuits and increases sensitivity to joint pain in adults.

Program no. 2-70
The development of RVM selectivity of spinal sensory input
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Introduction and Aims: Brainstem control of spinal sensory network excitability is crucial in maintaining adequate balance of excitation and inhibition (1). In the adult, descending inhibition of spinal dorsal horn circuits arising from the brainstem rostroventral medial medulla (RVM) is targeted to neurons with a strong nociceptive C fibre input (2). In young rats the influence of descending inhibition arising from the brainstem is slow to develop, and is not apparent until the fourth postnatal week (3); until that time descending control exerts a predominantly facilitatory effect upon spinal nociceptive networks. Since this period of development follows the maturation of C fibre central synapses in the superficial dorsal horn (4), we sought to examine whether the maturation of RVM control of spinal circuits is accompanied by a change a primary afferent selectivity.
Methods: Spinal dorsal horn in vivo electrophysiology was carried out in postnatal day (P)21 and P40 rats anaesthetised with isoflurane (1.8% in O2). Evoked responses of individual dorsal horn neurons (P40: n= 21, P21: n=33) were recorded extracellularly following A- and C-targeted electrical stimulation of the hindpaw receptive field before, during and after RVM stimulation at low and high intensities (10μA and 100μA).
Results: As predicted from previous studies, high intensity stimulation of the RVM in P40 rats selectively inhibits C fibre input, measured as an increased dorsal horn neuronal threshold to C fibre input (n=21). Interestingly, this increase in threshold only occurred in cells that did not display C fibre windup. In P21 rats, however, not only was C fibre selective inhibition absent, but RVM stimulation resulted in a selective excitation, measured as a decrease in A fibre threshold in a sub group of cells.
Discussion and Conclusion: Although C fibre input is present at P21, descending control is selective to the primary afferent input that is most dominant in dorsal horn at the time, that is A fibres. The facilitation of this input could lead to further strengthening of ascending and descending circuits to allow the maturation of descending inhibition and C fibre central synapses.
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Work was supported by the Medical Research Council. There are no conflicts of interests.

Program no. 2-71
MORPHINE-SULFATE BIOANALYSIS IN HUMAN URINE AND PLASMA BY LC MS/MS
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The aim was to synthesize morphine-3-O-sulfate (M3S) and morphine-6-O-sulfate (M6S) for use as reference substances, and determine the sulfate conjugates as possible heroin and morphine metabolites in plasma and urine by a validated LC-MS/MS method. Sulfate metabolites become important at early ages when glucuronidation activity is low. The method will be applied in a F7 - NeoOpioid study of opioid analgesia treatment of neonates.
The chromatographic system consisted of a ACQUITY UPLC HSS T3, 2.1 x 100 mm, 1.8 µm, kept at 60°C. Mobile phases used were 0.1 % formic acid and 100 % methanol. The LC-MS/MS was operated in the positive electrospray mode using selected reaction monitoring, transition m/z 366.15 to 286.40.
M6S and M3S were prepared as dihydrates from morphine hydrochloride by a new procedure, yields of 41% and 39% with product purities of >99.5% and >98%, respectively. The measuring range was 5-500 ng/ml for M3S and 4.5-454 ng/ml for M6S in plasma. In urine 50-5000 ng/ml for M3S and 45.4-4544 ng/ml for M6S. Quantifiable levels of M3S and M6S in authentic plasma samples and quantifiable levels of M3S and a detectable level of M6S in authentic urine samples were found.
We have for the first time demonstrated the presence of M3S and M6S in both urine and plasma as morphine metabolites using LC-MS/MS. This method full fills our requirements of analyzing neonatal samples within the NeoOpioid consortium to improve Off-patent medicine in children in the current project and development of new drugs to the pediatric population.

Program no. 2-72
Mode of delivery affects responses to cold in newborn infants
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Introduction and aims
Previous studies have indicated that mode of delivery can affect pain responses in newborn infants around the time of birth. During normal vaginal delivery, a surge of hormones appears to dampen pain responses, but this effects diminishes within hours after birth. The current study aimed to investigate whether mode of delivery and postnatal age affect responses to cold stimulation in newborn infants during the first four hours after birth.
Methods
Forty-six full-term infants born by spontaneous vaginal delivery or elective cesarean section participated. Behavioual and physiological responses to cold stimulation were

measured. Infants were videotaped in order to evaluate facial expressions using the neonatal facial coding system (NFCS), phonation was recorded for acoustic analysis and cardiac response was measured using EEG. In addition, umbilical cord sample were collected for analysis of plasma hormones.

Results

Vaginally delivered (VD) infants showed attenuated behavioural response to cold stimulation, measured lower scores in individual NFCS parameters as well as total NFCS scores for VD infants (1.75 vs. 31 points; $p=0.01$), and longer duration to onset of cry (20.0 vs. 3.6 s; $p<0.01$). Also, VD had higher plasma concentrations of norepinephrine (5.65 vs. 0.64 pmol; $p=0.02$), epinephrine (0.97 vs. 0.22 pmol; $p<0.01$) and cortisol (451 vs. 196 nmol; $p=0.01$) compared to infants delivered by cesarean section. Cardiac response increased with postnatal age, but was not affected by mode of delivery.

Discussion and conclusion

Processes occuring during normal vaginal birth reduces behavioral responses to cold stimulation within the first hours after birth. This effects could be mediated by the release of stress hormones. Cardiac response was inhibited in infants of both groups immediately after birth, but increased with time as fetal inhibition gradually faded. Our results implicate that uncomfortable clinical procedures should be performed as early as possible after birth, in order to strive for minimised discomfort of the newborn infant.

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Acknowledgement

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Conflict of interest

No conflict of interest exists.

Program no. 3-01

Incidence of Opioid-Induced Pruritus in a Paediatric Population

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Background

Pruritus is a recognised adverse effect of opioids in 0-90% of cases (Kam et al 1996) Studies are limited in the paediatric population.

Opioid-induced pruritus (OIP) can be distressing and sometimes more problematic than pain1.

The current intervention for OIP at The Royal Children's Hospital (RCH) Melbourne, is based on prescriber's preference and is varied:

Aim

What is the incidence of OIP at RCH?

Method
Data collection
• 12-week prospective audit
• All children referred to the CPMS receiving intravenous (IV) or epidural opioids
• Presence of pruritus and any anti-pruritic interventions
Pruritus:
• child's report of unpleasant / irritating sensation from skin provoking an urge to scratch
• parental or nursing observation of scratching behaviour
Inclusion criteria:
• OIP localised to the face, neck or upper thorax (including perinasal or periorbital redness or swelling).
Exclusion criteria:
• Itch localised to surgical areas, beneath dressings and surgical tapes, back and lower limbs were excluded.
Literature Review
Esmail et al (1999) reported an incidence of 12.7% among 110 children who received a morphine infusion .
Nakatsuka et al (2006), reported an incidence of 20.1% among 184 children receiving multiple opioids via multiple routes .
Audit Results
• 372 children were included.
180 children received opioids via continuous IV infusion
191 children received IV PCA +/- background
1 child received opioids via epidural infusion.
• The incidence of OIP was 10.7%
• 75% of these children required anti-pruritic intervention
Conclusion
We believe the number of children at RCH who experience OIP does not justify prophylactic treatment
• OIP occurred in 10.7% of children
• OIP may cause distress that may be difficult to differentiate from pain especially in non-verbal children and infants
• OIP did not occur in children aged 3-6 years
• Week evidence of increased pruritus in the PCA group as the continuous infusion group.
Implementation
RCH Opioid Prescription Charts revised to include a nurse-initiated treatment for pruritus:

Program no. 3-02
NURSE LED TELEPHONE FOLLOW-UP SERVICE AFTER DISCHARGE FROM MAJOR PAEDIATRIC SURGERY:
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Background and Aims Pain in the postoperative paediatric patient after discharge from hospital continues to be poorly managed (Michelle et al 2009) Most children have no medical follow up until their scheduled postoperative surgical appointment. The Children's Pain Management Service (CPMS) consults over 2000 children annually. The Clinical Nurse Consultants (CNC) saw a need for improving paediatric pain, after major surgery and developed a telephone follow-up service in 2004. The service was implemented to improve pain management, reduce readmission , reduce sub-acute referrals to the chronic pain service, detect earlier and manage side-effects attributable to analgesia, promote patient safety, to enable early detection of adverse events and provide a contact for the families owing to the lack of community support. Transporting children can be difficult particularly when children have disabilities or pain when transferring. A prospective audit aimed to determine: The length of time the child needed analgesia follow up and the correlation between duration of analgesia and surgical procedure The type of analgesia the child was discharged home on The number of additional scripts and who were the prescribers Complications or concerns arising during the phone follow up Demographics Adequacy of discharge information provided Method All patients undergoing complex surgery were identified from the CPMS database. The family was given information and contact numbers. Families were rung 2-3 times per week and asked a series of standardised questions pertaining to pain, side effects and complications. An analgesia plan was made for the ensuing days until the next phone call.
All information was then collated using an Excel spread sheet. Descriptive statistics were extracted from the raw data by the Clinical Epidemiology and Biostatistics Unit using Stata version 10.0. Results Data was provided on 429 patients over 4 years, 192 males and 203 females.Mean length of follow up was16.2 days (range 6-20 days)12.6% of patients required repeat prescriptions.86.48% of children were discharged on opioids. 4% of children were discharged home on gabapentin 32% of patients were from regional Victoria, which means a 2-5 hour drive to the Royal Children's Hospital. Commonest complications in order of reporting were; constipation anorexia sleep activity limited by pain, neuropathic spectrum pain 50 families were questioned at the time of discharge from follow-up; to establish satisfaction Conclusion The results supported the safe use of oral opioids (Michelle et al 2004) and the need for individualised pain management.

Program no. 3-03
Therapeutic Play on Outcomes of Children Undergoing Inpatient Elective Surgery
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Introduction and Aims
Children undergoing surgery often experience anxiety, exhibit negative emotional manifestations and pain perioperatively. A few studies regarding therapeutic play

intervention showed positive effects on anxiety reduction for children undergoing minor day surgeries (Li et al., 2007). No study has examined the effects of such intervention on children undergoing inpatient elective surgery. The aim of this study was to examine the effects of therapeutic play on outcomes (state of anxiety, emotional manifestations and postoperative pain) of children undergoing inpatient elective surgery.
Methods
This pilot randomized controlled trial used a two-group pretest and repeated posttest, between subjects design. Seventeen children and their parents were randomized into either intervention (n = 9) or control group (n = 8). Children in the intervention group received therapeutic play intervention in addition to the routine care. Outcomes were measured by State Anxiety Scale for Children (short-form) (Li & Lopez, 2007), Children Emotional Manifestation Scale (Li & Lopez, 2005), and Numerical Rating Scale. We obtained the ethical approval from the Institutional Review Board of the participating hospital before data collection. SPSS 19.0 was used to analyse the data.
Results
There was no significant percentage change in children's state anxiety between groups over three data collection time points. Children's preoperative anxiety reduced significantly in the intervention group, with a mean percentage difference of 24% between two groups. There was no significant difference in postoperative anxiety between the two groups. Children in the intervention group exhibited significant lesser negative emotion behaviours and less pain but without significance. Correlations were found between children's state anxiety and negative emotional behaviour as well as postoperative pain.
Discussion and conclusions
The findings showed than therapeutic play intervention effectively lowers preoperative anxiety, reduces negative emotional manifestations and lower postoperative pain for children undergoing surgery, which is consistent with previous study (Fincher et al., 2012; Li, et al., 2007). Given the promising findings evident from high percentage difference in SAS-C scores between the two groups over time as well as a clinically significant difference in pain intensity between groups, future study with a larger sample size could possibly find a significant difference in state anxiety and postoperative pain intensity between children who receive preoperative play intervention and children who did not. This study has a potential to change and improve clinical practice through the implementation of therapeutic play protocol in local tertiary pediatric institutions, and therefore improve the quality of perioperative care.

Program no. 3-04
EXPLORING PREDICTORS OF POSTOPERATIVE PAIN IN CHILDREN UNDERGOING ELECTIVE SURGERY
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Introduction and Aims. Anxiety and pain are two significant problems experienced by children undergoing elective surgery. Limited studies have been conducted to explore the relationship among pre-operative anxiety, negative emotional manifestation and postoperative pain in children undergoing elective surgery (Kain et al. 2006). The aims of this study were to examine the relationships among preoperative anxiety, negative emotional behaviours and postoperative pain among children undergoing elective surgery, and to explore the predictors of postoperative pain.
Methods. This is a cross-sectional, descriptive correlational study. Data were collected from a convenience sample of 66 children (aged 6–14 years) in a tertiary hospital in Singapore between November 2010 and January 2011, using the State Anxiety Scale for Children (short form) (Li & Lopez 2007), Children's Emotional Manifestation Scale (Li & Lopez 2005) and Numeric Rating Scale. The ethical approval was obtained from the Institutional Review Board of the participating hospital before commencement of the data collection. Descriptive statistics, Pearson's product-moment correlation coefficient, and multiple linear regression were used to analyze the data using SPSS version 20.0.
Results. Children experienced moderate preoperative anxiety and pain 24 hours postoperatively. Statistically significant positive relationships were found among children's preoperative anxiety, negative emotional behaviours and pain 24 hours postoperatively. Gender, preoperative anxiety and negative emotional behaviours were significant predictors of postoperative pain. Boys were more likely to experience less postoperative pain than girls.
Discussion and conclusion. This study provides evidence for health care professionals to pay attention to children's preoperative anxiety and negative emotional behaviours, and develop effective strategies for assessing and managing children's preoperative anxiety in order to achieve an optimal postoperative pain management outcome. Future research may focus on developing and testing interventions to reduce preoperative anxiety and negative emotional behaviour of children undergoing inpatient surgical procedure (Li et al., 2007).
Keywords: anxiety, school-aged children, elective surgery, emotional manifestation, nursing, pain, perioperative, postoperative, preoperative, Singapore
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CONFLICT OF INTEREST
We declare that there is no conflict of interest.

Program no. 3-05
Preemptive analgesia and epidural ropivacaine infusion reduces cytokine expression
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Background: Inflammation and nociceptive sensitization are hallmarks of tissue surrounding surgical incisions. Our studies were directed towards determining if epidural ropivacaine infusion with ketorolac preemptive analgesia alter cytokine production and liquor prostaglandin E after severe oncological operation in children.
Methods: A 31 patients (mean +/- SD, age 12,1+/- 2,3 year) after oncological operation was used to measure the effects of continuous epidural ropivacaine infusion ropivacaine 0.2% with ketorolac preemptive analgesia (30 mg before 60 min to starts operation) on cytokine production in blood and liquor prostaglandin E lever on 60 minutes, 6 hours after operation. We examination 31 patient, undergoing severe oncological operation in children, first group receive combination epidural infusion of ropivacaine 0.2% with ketorolac preemptive analgesia, second group (control group) receive morphine (0,1 ml per year). For statistical analysis 2 tests were used.
Results: Operative incised abdominal wall displayed profound allodynia which was reduced by ropivacaine with ketorolac preemptive analgesia combination in the 6 hours following incision. Blood and liquor samples second group patients showed enhanced levels of 3 cytokines: IL-1β, IL-6, tumor necrosis factor alpha (TNFα) in blood and prostaglandin E2 in liquor. Ropivacaine with ketorolac preemptive analgesia administration reduced levels. First group lower cytokines levels over second group (mean +/- SD, IL-1β - 3.8 +/- 1.2 vs. 14.9 +/- 2.2 pg/mg protein; IL-6- 108.4 +/- 32.2 vs. 354.4 +/- 46.2 pg/mg protein; TNFα - 8.4 +/- 1.2 vs. 28.8 +/- 2.4 pg/mg and liquor prostaglandin E2 - 3.4 +/- 1.4 vs. 7.2 +/- 1.8 pg/ml) (p Conclusion: Continuous epidural infusion ropivacaine with ketorolac preemptive analgesia administration reduces cytokine expression and liquor prostaglandin E lever . These studies suggest that continuous epidural infusion ropivacaine with ketorolac preemptive analgesia combination may alter the inflammatory reaction in oncological patients.
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Program no. 3-06
Acetaminophen improves analgesia after major oncology surgery in children
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BACKGROUND: Oncology surgery is associated with severe postoperative pain, most commonly treated with IV-administered opioids. Nonsteroidal anti-inflammatory drugs (NSAIDs), as adjuvant to opioids, improve analgesia and reduce the need for opioids. Acetaminophen, a centrally acting analgesic, does not have the adverse effects of NSAIDs and has improved analgesia in children after another surgery.
STUDY DESIGN.: A randomized, placebo-controlled, double-blind study to evaluate the effect of intravenously (IV) administered acetaminophen on postoperative pain in

children undergoing oncology surgery for severe oncology pathology.
OBJECTIVE.: To evaluate effectiveness of IV-administered acetaminophen on postoperative analgesia, opioid consumption, and acetaminophen concentrations after major oncology surgery.
METHODS.: In an institutional review board approved study, 62 ASA patient classification I to III patients of 7 to 14 (10,2 ± 2,4) years of age were analyzed. Acetaminophen 15 mg/kg, administered IV or 0.9% NaCl was administered at the end of oncology surgery, and thereafter twice at 8-hour intervals. Timed blood samples for acetaminophen determination were taken between 0.25 and 20 hours after the first dose. All patients received standard propofol-fentanil anesthesia. Pain scores (visual analogue scale [VAS], 0-10), opioid consumption, and adverse effects were recorded.
RESULTS.: In the surgical ward, 30 (48%) patients in the acetaminophen and 32 (52%) in the placebo group had a VAS pain score 6 or more ($P < 0.05$). There were fewer hours with VAS score 6 or more in the acetaminophen group compared with the placebo group (8.7% vs. 17.8% of the hours, $P < 0.05$). There was no difference in morphine consumption during the 24-hour follow-up between the 2 groups.
CONCLUSION.: IV-administered acetaminophen 30 mg/kg/day, adjuvant to morphine did improve analgesia, but did not diminish morphine consumption during 24 hours after major oncology surgery in children. All acetaminophen concentrations were in nontoxic levels.

Program no. 3-07
My Child is in Pain: developing a web-based resource for parents
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Introduction and Aims
Changes to health care delivery lead to increasing numbers of children having surgery, procedures and interventions as day-case patients, shifting the responsibility for pain management from health professionals to parents. Many parents are anxious about and insufficiently prepared to manage their child's post-operative pain and recovery. This study used a consensus approach to work with parents of children (aged 2-6 years) to develop a web-based resource to prepare and support parents' managing their child's post-operative pain.
Methods
An online survey and face-to-face and telephone interviews were undertaken with parents whose child had undergone day-case surgery. Following thematic analysis of qualitative data and descriptive statistical analysis of quantitative data, five scenarios were developed focussing on areas of pain management that parents identified as being challenging. Scripts were drafted and redrafted by the researchers to create storyboards linked to specifically developed illustrations. The materials were developed iteratively and consensually and then reviewed by a steering group of parents from the UK and pain experts from the UK, USA, Australia and New Zealand. Text in the draft storyboards was reviewed for accuracy, understandability and clarity. The illustrative

styles were reviewed and rated for visual appeal and resonance with the message. Video materials were developed to add depth to the resource; some parents who had been interviewed were filmed, and actors performed scripts developed from interviews with parents. Parents also suggested names for the resource.
Results
The web-based resource, ‘My Child is in Pain’, provides 24-hour access to five key learning scenarios to support parents in managing their child’s pain after day-case surgery. Metrics are being collected on the number of hits, time spent on the site, which videos were watched, what was downloaded, links clicked, time of day and location of user (country). Data are being collected on evaluation of the resource.
Discussion and Conclusion
The iterative, consensual approach to the engagement of parents and professionals has ensured that every element of the resource was appropriately informed. Engagement with parents ensures it addresses their needs in a user-friendly manner. The engagement of practitioners and pain experts ensured that the resource is evidence-based and trustworthy.
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Program no. 3-08
Oral Tramadol Preparation Audit
Main author: Sueann Penrose, The Royal Children's Hospital, Anaesthesia and Pain Management, Australia
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ORAL TRAMADOL PREPARATION AUDIT
Background:
Tramadol is an analgesic drug used in children for post-operative pain relief.
At the Royal Childrens Hospital (RCH) Melbourne, tramadol is supplied in a 50mg or 100mg capsule. To administer oral tramadol of less than 50mg, nursing staff must disperse the contents of a 50mg capsule in water and draw up the prescribed dose as a proportion of the total diluent volume. The RCH Drug Usage Committee have intentionally not stocked the commercially available oral tramadol drops (CSL 100mg/ml) as they believe the preparation too concentrated and may lead to inadvertent overdose. The potential for drug dilution and dosage error when dispersing the contents of a tramadol capsule into water may place children at risk. Underdosing may result in inadequate analgesia, whereas overdosing may result in adverse side effects.
Aims:
To determine the accuracy and variability of tramadol dosing when the capsule formulation is dispersed in a known volume of water.
Method:
Twenty nurses from an inpatient surgical ward gave consent to participate in this trial.

Each prepared 15 mg of tramadol as they would normally from a 50mg capsule of tramadol with instructions on how to prepare the 15mg mock dose.
The syringe size and volume of diluent used were recorded. Both the resultant samples, one containing 15mg of tramadol and the second containing the remaining 35mg were collected immediately and stored for analysis. Each sample was quantified using gas liquid chromatography.
Data Analysis:
The results were examined for both accuracy and variability. A 5% deviation from 15mg was considered acceptable.
Results and Conclusion:
The mean mock tramadol dose was 15.3 (SD 0.8; range 13.9 “ 17.1) mg with CV% 5.1%.
65% of doses prepared were within an acceptable 5% deviation and 35% were above or below the prescribed dose.
These results suggest that the current method of preparing doses of tramadol smaller than the commercially available capsule sizes for oral administration is less accurate than the drops but less potential for higher percentage error.
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Program no. 3-09
Identifying Indicators For Pediatric Pain Adverse Events: A Delphi Study
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Introduction and aims
Healthcare literature in the past 10 years has increasingly focused on adverse events. The evidence for pain management is readily available and so children experiencing moderate to severe pain could be considered an adverse event. It has been suggested the quality of pain management should be examined using an adverse care framework (Chorney et al. 2010). No such indicators exist for paediatric pain. This study, therefore, set out to identify what experts in paediatric pain management and quality improvement considered paediatric pain adverse care indicators to be.
Methods
The Delphi technique relies on the judgment of an expert panel and aims to develop consensus about a given subject area (Mead and Moseley 2001; Graham et al. 2003). When undertaking a Delphi study experts in the field complete a series of questionnaires. The first round is used to generate ideas, which are reconsidered in subsequent rounds (Hicks 1999).

In line with the Delphi technique the questionnaire for Round 1 asked a broad question: “In your opinion, what indicators would signify that acute pain in a child has not been adequately controlled?” An e-questionnaire was developed for Round 2 using responses generated from Round 1 and asked respondents to indicate the importance of each potential indicator.

Results

Sixty-three experts responded to the Round 1. The responses were grouped together in semantically similar ideas. This allowed a list of possible adverse event indicators to be produced relating to post-operative and procedural pain. Forty-three experts responded to Round 2. All but one indicator achieved a level of consensus of ≥70% so a third round was not carried out.

Discussion and conclusions

A set of retrospective and prospective adverse event indicators for post-operative and procedural pain have been developed. These need testing further but may provide a useful tool for ensuring children’s pain is managed effectively.

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Program no. 3-10

Children's pain and distress during a radiographic examination.

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Introduction and aim

Musculoskeletal injuries are common painful presentations seen in emergency departments, and before the age of 15, two thirds of boys and almost half of girls will be exposed to an injury requiring medical examination often followed by a radiographic examination. The injured child may be in acute pain and in addition, exposure to examination may cause both distress and increased pain. The aim of this study was to further investigate children's pain and distress while undergoing a radiographic examination in an acute situation.

Methods

The study comprised 29 participants 5 to15 years who were injured and submitted to an acute radiographic examination of the upper or lower extremity when the question at issue was fracture. The Colored Analogue Scale (CAS) and the Facial Affective Scale (FAS) were used as self-reporting scales to measure the children's pain and distress. The Face, Legs, Activity, Cry and Consolability Behavioral scale (FLACC)

was used as an observation tool to assess behaviors associated with pain in children. The children who matched the inclusion criteria's were
informed of the study in written and verbal in an age appropriate language, including assurance of confidentiality and withdrawal without any negative consequences in general. The study was approved by the research ethics
committee in Linköping.
Results
Descriptive statistics were used when analyzing the scores. The results showed that children experience pain
and distress in conjunction with a radiographic examination after an injury. Spearman's correlation was used to compare variables, and significant correlations were obtained between the CAS and the FLACC. Fischer's Exact
test was used to compare groups, and when using the cut-off 3.0 on the CAS, no significant correlation was found concerning the pain reported by children diagnosed with and without a fracture.
Discussion and Conclusion
Children, exposed to a musculoskeletal injury reported pain and distress in conjunction with an acute radiographic examination of an upper or lower extremity, regardless of them being diagnosed with a fracture or not. Routinely, only the children in need of further treatment, e.i. those diagnosed with a fracture would receive pain relief whereas the children not having a fracture - but still in pain - would be send home without any further treatment or pain relief. The results highlight a problem that may be solved by changed routines regarding treatment of this particular category of patients.

Program no. 3-12
Innovations in Managing Pain for Post-p Spinal Fusion Patients
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Procedural Pain
Innovations in Managing Pain for Post-op Spinal Fusion Patients
Introduction and Aims: Providing good pain relief for post-op spinal fusion patients is a real challenge. The Pain Management Team at Ann & Robert H. Lurie Children€™s Hospital of Chicago is comprised of Nurse Practitioners and physicians with many collective years of experience in pain management. Despite this, it continues to be a challenge to provide this patient population with a good pain experience post-operatively.
Methods
A review in practice innovation. A unique plan using a €œmulti-modal€← approach using a combination of epidural + PCA, along with oral medications to treat muscle spasm and nerve pain has improved transition to oral pain medications. Overall, this process provides a better pain experience than in the past.
Results
Bedside nurses and physical therapists report better pain control with this multi-modal pain management approach. Lengths of stay have been reduced, thus decreasing the

total cost. Patient satisfaction scores for how well pain is controlled have improved in the years since the multi-modal approach has been instituted as well. Surgeons continue to report an improved healing process at home after discharge.
Discussion and Conclusion
Consistent approach to pain management with this patient population aids the surgical service in giving accurate information to the patient and family about how pain will be managed post-operatively. Patients and families can then have realistic expectations of what the pain experience will be like after the surgery. Multi-modal therapy for patients with difficult pain experiences has proven to be effective in our clinical practice.
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*Discloser: There is no conflict of interests or financial support that was received.

Program no. 3-13
Predictors of Pain Trajectories After Spinal Fusion Surgery for Idiopathic Scoliosis
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INTRODUCTION & AIMS: Spinal fusion surgery for correction of idiopathic scoliosis is one of most invasive procedures performed in pediatrics. Pain following the surgery is expected to decline over elapsed recovery time. For a surprising proportion of adolescents, however, pain can persist at or beyond baseline severity levels for years after surgery and engender ongoing problems in everyday functioning (1, 2). Identifying variables that determine likelihood of enduring pain therefore has important clinical implications. The objectives of this study were to (a) determine the typical trajectory of pain through the initial 6 months following fusion surgery in patients with idiopathic scoliosis; and (b) determine the extent to which hypothesized demographic (age, sex, SES), biomedical (baseline curve severity, surgery duration, postoperative opioid consumption, baseline and perioperative pain), and psychological variables (state anxiety, mood, and pain coping efficacy) reliably predict individual differences in postoperative pain trajectories in this population.
METHODS: Fifty-five children ages 10-18 years (M = 14.45, SD = 1.90) diagnosed with idiopathic scoliosis and scheduled for spinal fusion surgery were recruited from a pediatric hospital in the Midwestern United States. Data for specified baseline predictor

variables were collected by medical chart review and questionnaires given approximately 2 weeks prior to surgery. Data for specified perioperative predictor variables were collected by medical chart review and questionnaires administered twice daily throughout the childs hospitalization. Information on pain was collected again at approximately 2-weeks, 6-weeks, 3-months, and 6-months following surgery. Linear growth models were used for primary analyses.
RESULTS: Pain intensity reported at baseline was in the mild to moderate range (M = 36/100, SD = 25), increased to higher levels during the hospital stay following surgery (M = 50/100, SD = 14.74), and then typically gradually and significantly improved over days since surgery (b = -.14 ± .02, t(124) = 6.81, p<.01). Of the demographic and biomedical predictor variables, only baseline pain predicted reliably worse pain trajectories following surgery (b = .002 ± .001, t(123) = 3.68, p<.01). Children with greater baseline anxiety also had significantly slower improvement in pain over the follow-up period, whereas children with higher baseline and perioperative pain self-efficacy had more rapid declines in postoperative pain.
DISCUSSION AND CONCLUSION: Baseline anxiety, preoperative pain, and pain self-efficacy appear to be particularly relevant in predicting the course of postoperative pain in children undergoing spinal fusion for idiopathic scoliosis. Interventions offered preoperatively that target these dimensions therefore may help optimize postoperative pain outcomes in this population.
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ACKNOWLEDGEMENTS: This project was supported in part by a Cross Foundation Clinical Scholars Award granted to the first author.
CONFLICTS OF INTEREST: None

Program no. 3-14
Age-Related Sickle Cell Pain Trajectories:Children
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Background
The epidemiology of painful episodes in infants and younger children with SCD has not been well studied, particularly for pain managed at home.
Procedure
SCD infants identified by newborn screening between Jan 1999-Jan 2008 at the Marian Anderson Sickle Cell Center were enrolled in a longitudinal observational study of pain symptoms after completion of confirmatory diagnostic testing. During the initial and

subsequent study visits (3-4 times/year) staff had the opportunity to support parents, and to discuss and teach pain assessment and management. Parents reported the presence or absence of pain during each day using paper diaries, a daily pager electronic system, or a daily calendar system with monthly phone calls depending on family preference. When sickle cell related-pain events occurred, pain occurrence, location, associated symptoms and the treatment provided also were reported. Data was not collected during any period of chronic transfusion. Latent Class Growth Curve Analysis (LCGA) was used to identify group-based trajectories of yearly frequency of pain episodes, pain days, and pain hospitalization.
Results
103 children were enrolled at a median age of 7.2 months; 50 had an SS genotype, 32 SC, 6 SB0thalassemia, and 15 SB+thalassemia. Parents/guardians reported for a median of 3.8 years (range 0.3-7.6 years) assessing for pain a total of 141,197 days, excluding any period of recurrent transfusions, with an additional 28,079 days of missing data (16%). Children had pain reported on 2,288 days (1.6%), representing 768 distinct episodes of pain, of which 108 required hospitalizations (14%). Pain locations and symptoms consistent with dactylitis were most prevalent (80%) in the 0-12 month age group, and became progressively less prevalent thereafter. LCGA modeling of parent-reported pain episode or pain day frequency yielded 4 trajectory groups differing in yearly pain frequency and the age-related pattern of onset of frequent pain; similar trajectory patterns were seen with LCGA analysis of pain hospitalization data.
Conclusions
Our study demonstrates the feasibility of initial recruitment and subsequent daily reporting of clinical events by families of infants and young children with SCD over many years, particularly when careful consideration is given to enhance parent (family) support and minimize respondent burden. Pain is relatively infrequent in SCD infants and young children. Similar to older children, pain is usually managed at home. Modeling suggested that 40-45% of SS/ SB0thalassemia and 10-12% of SC/ SB+thalassemia children in this unselected cohort developed a pattern of frequent pain sometime during early childhood.

Program no. 3-15
Analgesia and sedation after cardiac surgery in children with and without Down syndrome
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Introduction & Aims
Children with Down syndrome are often seen as difficult to sedate after surgery; retrospective studies show conflicting results1,2 ; up to 60% of children with Down syndrome have congenital heart defects.
Aim of the current study was to compare the analgesic/sedation requirements and

morphine pharmacokinetics after cardiac surgery of children with Down syndrome versus controls.
Methods
Prospective, observational case-control study, approved by the local ethics committee. Inclusion criteria were age between 3 and 36 months and ASD, VSD, AVSD or TOF repair on cardiopulmonary bypass.
All children received standardized general anaesthesia for cardiac surgery; morphine infusion was commenced at 40 mcg/kg/hr after bypass. Postoperatively nurses regularly assessed pain and discomfort with the COMFORT-B scale3.
Blood samples were obtained at regular time intervals. Morphine plasma concentrations were measured using LC-MS/MS and modelled using nonlinear mixed-effect modelling.
Results
18 children with Down syndrome and 16 controls underwent cardiac surgery between February and May 2012.
Median pain scores did not statistically significantly differ between the two groups. Children with Down syndrome had a higher risk for oversedation($P<0.001$).
Median morphine infusion rate during first 24hr after surgery was 32 [IQR 23 to 37] mcg/kg/hr in the Down syndrome group versus 32 [IQR 26 to 36] mcg/kg/hr in the control group ($P=1.00$). Morphine requirements during the following days and need for additional sedation were comparable between the two groups.
Although the range of the parameter estimations is wider for the Down syndrome group, there were no statistically significant differences in the volume of distribution of morphine or morphine clearance between both groups.
Discussion&Conclusion
Based on pharmacodynamics and pharmacokinetic analysis, there is no evidence to adjust morphine dosing after cardiac surgery in children with Down syndrome compared to children without.
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Program no. 3-16
Do Surgeons and Anesthesiologists Agree on Epidural Analgesia?
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Introduction and Aims: It is well known that postoperative epidural analgesia is beneficial in the adult population. Determining the general quality of pain control using

epidural analgesia in the pediatric population is more difficult. Our patients are frequently unable, due to age, or cognitive function, to express their level of pain, and pain relief. Furthermore, conventional methods used in the adult patient to test epidural function are often not practical in the pediatric patient, and in the nonverbal patient, this is especially challenging. As anesthesiologists at our institution, we wanted to the study the general quality of our epidural analgesia in combination with IV opioids for breakthrough pain and how it was viewed by the surgeons. By looking at daily notes, we were able to determine when surgeons and anesthesiologists recorded “success” or “failure” of our patient’s pain control and how much of the time we agreed or disagreed.
Methods: All orthopedic and general pediatric surgery patients who received either a thoracic or lumbar epidural catheter under general anesthesia for post-operative pain for one year were reviewed. Continuous epidural analgesia was provided with a local anesthetic with clonidine and/or opioid. The patients’ medical records were reviewed retrospectively, and a score of 0, 1, or 2 was assigned based on daily progress notes written by the surgeon and pain service attending anesthesiologist. A score of 0 = epidural did not appear to be working, supplementary meds needed. A score of 1= epidural appeared to be providing relief, but the patient required more supplemental analgesia than expected. A score of 2 = epidural provided pain relief with minimal additional analgesia.
Results: Data was analyzed in terms of the daily variance between scores. The yearly data showed that we were in agreement 77% of the time as to whether or not pain management was working well.
Discussion and Conclusion: We conclude that surgeons and anesthesiologists are in agreement of epidural success/failure and general pain control the majority of the time. This approach is offered as a unique way to measure post op pain experience in the pediatric patient.
References:
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Program no. 3-17
Comparison of lumbar and caudal morphine in major surgery in children
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Introduction and Aims:
In upper abdominal and thoracic surgeries, advancement of epidural catheter requires radiological confirmation and is often unsuccessful.1 However, use of morphine negates the need to advance the catheter.2 In this prospective randomized study, analgesic efficacy of morphine between lumbar and caudal route were compared.
Methods:
Sixty ASA I-II children, 2-6 years old undergoing upper abdominal and thoracic surgery were allocated in to three groups: Gr I (lumbar epidural morphine), Gr II (caudal epidural morphine, tunnelled catheter), Gr III (caudal epidural morphine, catheter without tunnelling). Intraoperative analgesia was provided with epidural morphine 50mcg/kg

with 0.1% bupivacaine (volume 0.5ml/kg, max 10ml) with intravenous morphine 100mcg/kg and further intravenous morphine 50mcg/kg was used as rescue analgesia. Postoperative analgesia was achieved with epidural morphine 50mcg/kg every 12hr; intravenous pethidine 0.5mg/kg was used as rescue analgesia.
Results:
Demographic profile, intraoperative and postoperative hemodynamics was comparable between the groups. Requirement of intravenous rescue morphine was similar (Gr I 96.4mcg/kg, Gr II 113.7mcg/kg, Gr III 117.5mcg/kg; p=0.56). Postoperative rescue pethidine requirement was also comparable (Gr I 6 patients, Gr II 6 patients, Gr III 7 patients). Two patients in Gr I had dural puncture. Two patients in Gr III and one patient in Gr I grew atypical gram negative bacilli on catheter tip culture.
Discussion and Conclusion:
In upper-abdominal and thoracic surgery in children, analgesia provided by epidural morphine through caudal route was comparable to that through lumbar route both intraoperatively and postoperatively. Caudal catheters without tunnelling had more colonisation and lumbar epidural had more incidence of dural puncture. So, tunnelled caudal epidural catheter may be preferred over other routes.3
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Conflict of Interest: nil
Source of support: nil

Program no. 3-19
A PLACEBO CONTROLLED TRIAL TO STUDY ANALGESICS IN CHILDREN WITH SEVERE ACUTE PAIN
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BACKGROUND. Placebo-controlled clinical trials in children with severe postoperative pain encounter several practical and ethical issues. The major challenge is to demonstrate efficacy using as little study participants as possible while minimizing pain during the clinical trial. Therefore we propose a design that will make it feasible to compare tapentadol with placebo in children with severe postoperative pain. Tapentadol is a centrally acting analgesic with mu-opioid receptor agonist and noradrenaline reuptake inhibition properties. Tapentadol is indicated for the relief of moderate to severe acute pain in adults, which can be adequately managed only with opioid analgesics. Efficacy and safety in children has yet to be proven.

OBJECTIVES. The objective of our trial is to show efficacy of tapentadol compared to placebo, while assuring appropriate analgesic therapy for all patients in line with standard of care.
METHODS. We performed an in-depth literature research (1,2) for potential trial designs and interviewed experts in pediatric pain and pediatric anesthesiology.
RESULTS. The research indicated that in order to avoid pain in pediatric subjects after major surgery in a placebo-controlled study, the most feasible way will be to study the opioid sparing effect of the active medication. Based on this information, we plan to randomize hundred children expected to experience severe pain after major surgery (e.g. scoliosis repair, tumor resection or other major surgery) to multiple doses of tapentadol oral solution or placebo. All study participants will be on intravenous morphine prior to receiving study treatment. During the treatment period effective analgesia will be ensured by providing supplemental morphine on demand (nurse- or patient-controlled analgesia). The primary endpoint of the clinical trial will be the morphine sparing effect after 24 hours in the treatment arm versus the placebo arm.
CONCLUSION. The proposed study design, using the morphine sparing effect as a surrogate parameter for efficacy of the study drug, makes a placebo controlled trial in children with severe pain feasible and ethically acceptable.
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Program no. 3-20
What do we really know about nurses' post-operative pain management practices?
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Introduction and aims
Over the past 20 years nursing post-operative pain practices for children have been explored in a number of studies. Yet, many children still experience undermanaged post operative pain. This poster will present the results of a systematic review investigating paediatric nurses' post-operative pain management practices.
Methods
Electronic database searches (PsychInfo, CINAHL, PubMed and EMBASE) were conducted using the following search terms: post-operative pain; nurs*; paediatrics; pediatrics; children; pain assessment; non-pharm*; analges*. Two researchers carried out initial screening using study titles and abstracts.
The inclusion criteria included peer-reviewed quantitative, qualitative or mixed methods research articles published in English between 1990 and 2012 exploring registered nurses post-operative pain management practices. Papers relating to pain management in the neonatal or paediatric intensive care unit and the recovery room (PACU) were excluded as were papers whose primary focus was children with cognitive impairment.

Twenty-nine papers from 11 countries were included in the review. Data extraction was conducted and rigor of each paper assessed by two researchers using Caldwell et al.'s (2011) checklist.
Results
Overall many studies were rated as methodologically weak. Most of the studies were descriptive in nature. Eight studies used chart audits and another eight used self-report methods (interviews or questionnaire). Observational data from four papers provided insights into nursing practices but the sample sizes were small. Two papers used experimental designs with vignettes; there were two intervention studies. The intervention studies consisted of educating nurses and measured change over three months using a self-report tool.
Data fell into five categories: pain assessment practices; use of analgesics; the use of non-pharmacological methods; documentation practices; and other. Despite improvements in analgesic administration practices over the past 20 years, practices remain sub-optimal. Children's behaviour still appears to influence nurses' pain assessment. Pain assessment using validated measures may not be carried out consistently as a significant proportion of children did not have pain scores recorded in the first 24-hours post-operatively. Pain management documentation in nursing notes was limited. Nurses' reported using several non-pharmacological methods routinely but documentation did not reflect this practice.
Discussion and conclusions
Despite research undertaken in the past 20 years we still do not have an accurate picture of nursing practices. Studies relying on reviewing documentation are problematic and may not reflect actual nursing practice. Future research should design and test interventions to improve practice using both self-report and observational data to better understand the mechanisms underlying practice change.

Program no. 3-21
Efficacy and side effects of Morphine PCA in 5,915 children
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Introduction & Aims:
Patient-controlled analgesia (PCA) is frequently employed for acute pain in children (1). Patients aged less than 19 years who were consecutively treated with morphine PCA at Great Ormond Street (GOS) hospital between 1996 and 2011 were prospectively studied. Patient demographics, efficacy, patient satisfaction, opioid usage, common side effects and serious complications were recorded.
Methods:
Observations were recorded daily onto paper records and subsequently entered into a computerised database (shortly following hospital discharge) and stored on a secure server. Database maintenance to ensure the quality and accuracy of the data was as previously described (2). Consecutive patients under 19-years-old who commenced PCA were included. Patients who were also receiving epidural or other forms of

continuous analgesia were excluded. Data on all patients under 6 years, anomalous or missing data were verified against the original record.
Results:
5915 patients were identified, 5874 patients received intravenous PCA. Average age was 12.25yrs (range 3.6-18.8yrs, median 12.5yrs). 70 patients were under 6 years (Average age 5.46yrs, minimum age 3.69yrs). Average infusion duration (47.74hrs), and morphine usage were influenced by diagnosis and patient age. 6% (356) of all patients were converted from PCA to another analgesic modality. Of these, children aged 3-6yrs old were the most frequent. In the remainder, satisfaction was reported as ‘good’ or ‘very good’ by patients or their families. Nausea (43%) was the most frequently documented side-effect with nausea plus vomiting (26%); nausea was mostly mild and well tolerated, 1% stopped PCA as a result of nausea. Itching (13%), and urinary retention (1.4%), were also observed. Change of treatment protocols was shown to significantly reduce the incidence of severe nausea ($p<0.001$, relative risk 4.9). 0.44% of all patients experienced respiratory depression. No deaths occurred.
Discussion & Conclusion:
PCA morphine is a safe and effective in children showing high levels of patient satisfaction. Success of the technique increases with age and serious complications are rare. Expected side-effects, such as mild nausea, are frequent but can be reduced by pharmacological intervention; they rarely prevented continuation of PCA in the current study.
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Program no. 3-22
NICU Nurses' Perceptions Regarding Parental Involvement in Infant Pain Management

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Introduction and Aims: New findings are emerging regarding parental perceptions and desires for involvement in infant pain management in neonatal intensive care units (NICU). Nurses play a key but varied role in enabling (or impeding) parents’ access to information and support needed for parental participation, influenced by individual, institutional and regional factors. We know very little about parental involvement from the perspective of nurses. The aim of this study was to explore views of nurses in 3 countries regarding the role of parents in infant pain management.

Methods: A qualitative semi-structured interview study involving NICU nurses was conducted in Finland (n=47), Sweden (n=14), and the US (n=26). The interviews were analyzed with a deductive framework of a range of potential parent roles in infant pain management: none, being informed, being present, providing comfort, an informant for NICU staff, an active decision maker, or advocate for infant (Franck et al. 2012).
Results: In all three countries, the nurses described two common parental roles: being informed and providing comfort. Parents were rarely described as informants, active decision makers, or advocates in relation to infant pain management. A new role of 'parent as assistant' emerged as some nurses described how parents provided infant comfort while the nurses concentrated on the technical performance of the painful procedure. Interviews also revealed that parents were sometimes actively excluded from infant pain management because their presence made nurses anxious when performing painful procedures.
In the Finnish and Swedish samples, collaborative relations with parents were emphasized. The Swedish nurses highlighted the mutual dialogue between nurses and parents. In the US sample, some nurses reported that an active parent role in pain management was not necessary or desirable, since they considered good pain management to be the responsibility of nurses.
Discussion and Conclusion: Nurses' support for parental involvement in infant pain management varies considerably. In some cases, they actively oppose or prevent parental involvement. In other instances, they facilitate parental involvement and encourage partnerships in all aspects of pain management. The transition to a more family-centered approach to infant pain management requires further examination of areas of alignment and dissonance between nurses and parents' values, needs, perceptions and roles in caring for infants at high risk for pain.
Franck LS, Oulton K, Bruce E. Parental involvement in neonatal pain management: an empirical and conceptual update. J Nurs Scholarsh, 2012;44(1):45-54.

Program no. 3-23
Analgesic requirements during anti-GD2 antibody immunotherapy for neuroblastoma.
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INTRODUCTION & AIMS: Immunotherapy with a monoclonal antibody against the tumour-associated ganglioside GD2 improves outcome in children with high-risk neuroblastoma.(1) Interleukin-2 (IL-2, Aldersleukin) may be co-administered to augment antibody-dependent cell-mediated cytotoxicity. However, treatment also activates pain mechanisms (2, 3) and can produce significant pain that may be inadequately controlled by opioids alone (4).
METHODS: Paediatric pain services were contacted via the UK Paediatric Pain Travelling Club list and invited to participate in a national audit of analgesic requirements during ch14.18 anti-GD2 antibody treatment. The project was registered

and approved by the Audit Department, Great Ormond Street Hospital. An on-line survey collected anonymised date related to: patient demographics; treatment cycles; randomization to IL-2; opioid protocol; daily opioid requirements; use of additional analgesia (ketamine and gabapentin); and side-effects.
RESULTS: Nine paediatric centres in the UK and Ireland contributed data for 101 treatment cycles of anti-GD2 antibody in 24 patients aged between 10 months and 11 years from June 2011 to March 2012. Thirteen children were randomized to also receive interleukin-2. Oral gabapentin was commenced prior to antibody infusion and continued throughout treatment in 22 patients. Intravenous morphine was administered by continuous infusion (according to the oncology protocol) in 5 patients, and in 19 patients local hospital protocols for NCA/PCA were used to improve titration of opioid. One patient was rotated from morphine to oxycodone. Significant individual variability in opioid requirements was noted within and across cycles. Intravenous ketamine was co-administered with opioid in 9 patients. Patients randomized to IL2 required higher opioid doses and were more likely to also need ketamine. Reported side-effects included: pruritis in 6 children; nausea in 4; excess sedation in one; and 2 children experienced withdrawal symptoms on cessation of opioid infusion and required weaning doses of oral opioid following the end of the antibody treatment.
DISCUSSION & CONCLUSION: Management of children receiving immunotherapy with anti-GD2 antibody requires planning and communication between oncology services and pain management teams. Individualized titration of opioid and use of agents with efficacy against neuropathic pain (gabapentin and ketamine) was required to improve pain control.
ACKNOWLEDGEMENTS: Thanks to Pain Service and Oncology Team at Great Ormond Street Hospital and Paediatric Pain Travelling Club members. Authors report no conflicts of interest.
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Program no. 3-24
Effectiveness of a Biofeedback Computer Game During Children's Fracture Care
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INTRODUCTION & AIMS: Bone fractures account for 10-25% of childhood injuries (Landin, 1997) and fracture reduction and manipulation remains one of the most painful and anxiety-provoking procedures performed in pediatric emergency departments (Migita, Klein, & Garrison, 2006). Although Bier blocks (intravenous injection of prilocaine into an exsanguinated limb) largely alleviate pain during bone manipulation, the procedure is still associated with high pediatric distress (Tsai, Lai, & Chang, 1993). While behavioral research supports the efficacy of distraction, biofeedback, and relaxation for pediatric acute distress relief, there is no evaluation of an integrated

package of these interventions for pediatric bone fracture repair. The current study evaluated the effectiveness of CalmCraft, an engaging, interactive computer game incorporating biofeedback and deep-breathing, for decreasing children's distress during arm fracture care.
METHODS: 24 5- to 11-year-old children receiving arm fracture manipulation and casting with Bier block were recruited from a pediatric emergency department. Families were randomized to Standard Care (Control), Movie (Distraction), or Interactive Biofeedback Computer Game (CalmCraft). Subjective self-report ratings, physiological indicators, and behavioral observation measures were used to assess children's anxiety and pain, their parents' anxiety, and nurses' anxiety prior to and following the procedure.
RESULTS: Overall, pain and anxiety were low across conditions. ANOVAs did not reveal significant differences in child-rated child anxiety, child-rated child pain, parent-rated child anxiety, parent-rated child pain, nurse-rated child anxiety, and nurse-rated child pain (all p's > .05).
DISCUSSION & CONCLUSION: In general, data do not support the distress-relief properties of the intervention. This might be due to low anxiety and pain secondary to the Bier block.

Program no. 3-25
Pediatric Acupuncture Decreases Post-operative Pain Following Tonsillectomy
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Introduction: Tonsillectomy surgery is a type of surgery frequently performed in children, and results in significant morbidity postoperatively, including pain, nausea and difficulty tolerating oral intake. Medications that assist in pain management, such as opioids, have limited efficacy and may exacerbate side effects such as nausea and sedation. Peri-operative acupuncture has been shown to decrease pain in adult populations. We hypothesized that intra-operative acupuncture would decrease pain and facilitate recovery in pediatric patients undergoing tonsillectomy.
Methods: 59 children age 3-12, were randomized to receive either acupuncture or sham acupuncture during anesthesia for tonsillectomy (may include adenoidectomy and PE tubes) Subjects were block randomized in groups of 10 to ensure adequate distribution between groups. Following initiation of anesthesia using a standardized protocol, subjects underwent acupuncture or sham acupuncture treatment for 20 minutes. Surgery was performed with bovie cautery at 15 W. Post-operatively, pain, opioid medication, nausea and oral intake was monitored, in PACU as well as via a home questionnaire.
Results: There were no significant differences in subject demographics between the two groups. Time in PACU, and narcotic utilization were not significantly different between sham and acupuncture groups. (acupuncture group received more fentanyl while sham acupuncture group received more hydromorphone). There was a statistical difference in pain scores on Day 1 and Day 2 postoperatively, both by patient as well as parent report. Positive trends were noted in nausea and oral intake in the acupuncture group, however these did not reach significance. No adverse events were recorded.

Discussion: This represents a pilot study investigating both the feasibility as well as efficacy of peri-operative acupuncture in patients undergoing tonsillectomy. The study demonstrates that acupuncture was feasible, well tolerated and resulted in improved pain postoperatively. Larger studies are needed to confirm these findings .
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Program no. 3-26
Hypnosis for Pain Management of Pectus Excavatum Repair: Retrospective Analysis
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Introduction and Aims: The minimally invasive thorascopic approach to repair pectus excavatum (Nuss procedure) results in a smaller scar; but unlike other minimially invasive surgeries, this approach results in significant pain. One small study reported hypnosis was associated with a shorter hospital stay after Nuss procedure (Lobe, 2006). However, the patients in Lobe's study who received pre-surgical hypnosis training also received patient controlled opioid analgesia (PCA) supplemented with intravenous and oral opioids; whereas the patients in the non-hypnosis group received regional analgesia supplemented with intravenous and oral opioids.
The purpose of this retrospective review was to analyze our initial experience of using hypnosis as a patient chosen adjunct for pain management after Nuss procedure.
Methods: All patients at our clinical site received epidural analgesia with local anesthetic, PCA, NSAIDs and eventual transition to oral opioids and NSAIDs. All patients were invited to learn self-hypnosis prior to the surgical procedure.
Results: In 2011, 8 of 22 patients who underwent Nuss procedure at our hospital received self-hypnosis training prior to the surgical procedure. We found no difference in length of stay and no difference in mean or maximum self-reported pain scores for every 12 hour post-operative interval (0-12 hours, 13-24 hours, etc). The hypnosis group used significantly less opioid by PCA (mg/hr morphine equivalents) during the 37-48 & 85-96 hour post-operative intervals ($p=0.02$ & $p=0.027$ respectively). Nausea and vomiting were significant side effects for both groups, with all but 3 patients reporting nausea and over half of the patients (5 self-hypnosis, 8 non-hypnosis) vomiting during their hospital stay. Over half of the patients needed supplemental oxygen in the first 12 hours after surgery. The number of patients needing supplemental oxygen steadily declined with no patients in the self-hypnosis group and 4 patients in the non-hypnosis

group needing oxygen during the 49-60 hours after surgery interval. Pruritis was a less commonly reported side effect, but 5 patients in the non-hypnosis group reported pruritis during the first 48 hours after surgery.
Discussion and Conclusion: More research is needed to determine the effectiveness of hypnosis for symptom management after painful pediatric surgical procedures. The results of this study provide insight for the development of a prospective study of hypnosis as an adjunct for post-surgical pain management.

Reference: Lobe, TE. (2006). Perioperative hypnosis reduces hospitalization in patients undergoing the Nuss procedures for pectus excavatum. Journal of Laparoendoscopic and Advanced Surgical Techniques 16; 639-642.

Program no. 3-27
Consistent and inconsistent analgesia weaning patterns in critically ill children
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Introduction & Aims: Critically ill pediatric patients frequently receive prolonged analgesia and sedation to provide pain relief and facilitate intensive care therapies. Iatrogenic withdrawal related to weaning after prolonged opioid and benzodiazepine exposure can complicate recovery in critically ill children. The purpose of this study was to compare the characteristics of children who experienced a consistent vs inconsistent pattern of weaning of analgesia/sedation. Methods: The study was conducted during the baseline, prerandomization phase of a multicenter clinical trial designed to test a sedation management protocol in patients aged 2 weeks to 18
years intubated and mechanically ventilated for acute respiratory failure (The RESTORE Study: NCT00814099). All patients exposed to ≥5 days of continuous infusion or intermittent doses of opioids were assessed daily for withdrawal symptoms using the WAT-1 (Franck LS. et al. Pain 153;2012:142–148) and exited the study after hospital discharge or after 28 days. Demographic and clinical characteristics of children who were consistently weaned, defined as a steady decrease in opioid dose from peak to discontinuation, were compared with those
of children who were inconsistently weaned, defined as an irregular pattern of increases and decreases in opioid dose during the weaning period. Results: Sixty-seven patients were weaned consistently; 47 were weaned inconsistently. Patients who were weaned inconsistently were significantly younger, had longer duration of mechanical ventilation and ICU/hospital stays, and received more opioids and benzodiazepines (for more days; greater cumulative doses) prior to weaning. More patients with inconsistent weaning patterns had their day 2
opioid doses subsequently doubled prior to the start of weaning compared to patients with consistent weaning patterns (49% vs 24%, $p<.001$). There was no difference between groups in treatment with potentially opioid sparing drugs prior to weaning. However, patients with inconsistent weaning patterns received a greater number of

psychoactive agents during weaning (p<.001). More patients with inconsistent weaning patterns had WAT-1 scores ≥3 during the weaning period compared to patients with consistent weaning patterns (94% vs 70%, p<.001). Discussion & Conclusion: This study provides further characterization of the clinical profiles of children who are difficult to wean from analgesics after prolonged opioid and benzodiazepine exposure. Additional pre-weaning factors such as rate of dose escalation but not opioid sparing drugs may provide early indication of risk of withdrawal. Further research is needed to improve management of withdrawal symptoms in these children. Funding: NHLBI/NINR HL086622/HL086649

Program no. 3-29

Effect of guided imagery on adolescents post-spinal fusion pain

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Introduction and Aims. Adolescent idiopathic scoliosis is the most common orthopedic disorder in adolescent. Approximately 1 out of every 1,000 adolescents develops a curvature of the spine significant enough to require surgery (Reamy et al., 2001). it is considered one of the most invasive surgeries in adolescents that entails severe postoperative pain, > 7 on a scale of 0 to 10 (Hui yun et al., 2009). Furthermore, almost half of the patients suffer from prolonged postoperative pain at the surgical site (Wong et al., 2007), requiring high doses of analgesic drugs. This pilot study aimed to investigate the effect of a non-pharmacological intervention in pain management of these patients for one month postoperatively.

Methods: We randomized adolescents aged 11-20 years undergoing spinal fusion to standard care or standard care with intervention. The intervention consisted of a nurse-mediated screening of a video (DVD) preoperatively and at discharge (T1), comprising guided information on pain management and imagery/relaxation exercises to practice at home 3 times/week; a nurse telephoned two weeks post-discharge (T2) to reinforce technique. Both groups completed questionnaires at T1, T2, and T3 (one-month follow-up). Outcome measures included pain intensity, state-trait anxiety, coping strategies, and return to daily activities.

Results: Of 45 eligible participants during the period of March 2010 to December 2010, 40 patients were enrolled (n=20 per group). The average age was 15 ± 2.15 years, and there were 7 boys. As compared to the control group, overall pain in experimental group was significantly reduced at all time-points (P≤ 0.007). Worst pain in 24 hours was reduced at T2 (P = 0.01). State-trait anxiety remained high throughout the study period. A median 2.5-point benefit appeared in eating, sleeping (Mann-Whitney test, P = 0.002) and 2.0-point in walking (Mann-Whitney test, P = 0.003), on a scale of 0 to 10. Coping strategies showed no significant differences between groups.

Discussion and Conclusion: Addition of a nurse-guided imagery and relaxation exercises DVD for home-use was more effective than standard care for postoperative pain and resuming of daily activities. Our non-pharmacological intervention looks promising as a pilot study. Larger sample size and longer (6-9-month) follow-up would

permit refinement.

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Reamy BV, Slakey JB. Am Fam Phys 2001; 64(1):111-116.
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Program no. 3-30
Pain trajectories in youth after major surgery: Predictors of pain and quality-of-life
Main author: Jennifer Rabbitts, Seattle Children's Research Institute, University of Washington, United States
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Introduction and Aims Over 4.5 million children undergo surgery in the US each year and about half of children having inpatient surgery experience moderate-severe postsurgical pain. However, little is known about the trajectory of pain from the immediate postsurgical period to longer term follow-up in children and the impact on their physical functioning and health-related quality of life (HRQOL). The purpose of this study was to document longitudinal patterns of pain and HRQOL in children following surgery and to identify factors that place children at risk for postsurgical pain and deteriorations in HRQOL.
Methods: To date, participants include 36 adolescents (aged 11-18 years, M=14.5 years, 59% female) undergoing major general and orthopedic surgery (e.g., spinal fusion) and their parents. Youth completed one-week assessments at baseline, in-hospital, at 2 weeks and 4 months after surgery using prospective electronic daily diary ratings of pain intensity and ambulatory actigraphy (assessing sleep and physical activity). Psychological factors (anxiety, catastrophizing), clinical factors and demographic characteristics were examined as predictors of persistent pain and quality-of-life (PedsQL) and functional outcomes (CALI).
Results: We currently have baseline data available for 30 youth, in-hospital data for 27, and 2 week follow up data for 22 youth. The prevalence of moderate-severe pain was 100% during hospitalization and 82% at 2 week follow-up. Baseline (pre-surgery) pain intensity was strongly correlated with pain at 2 weeks. As expected, adolescents as a group experienced HRQOL deteriorations from pre to post-surgery (PedsQL score 75 vs. 62) and increased activity limitations (CALI 10 vs. 17).
Actigraphy measures suggested lower activity levels (mean activity 236 counts/min vs. 371 counts/min) and impaired sleep patterns (sleep efficiency 75% vs. 80%) after surgery as compared to baseline. Preliminary analyses show a strong positive correlation between the rumination dimension of child pain catastrophizing with in-hospital pain ($r = .5$, $p < .05$) and between parent catastrophizing about child pain and child reported pain at home (2 week follow-up), $r=.6$, $p < .05$.
Discussion & Conclusions: Preliminary findings suggest high rates of postsurgical pain and impaired functional outcomes in children after major surgery. Child and parent catastrophizing may be important determinants of pain outcomes. Further analyses will examine persistence of pain at longer-term follow up and relationships between sleep, physical activity and pain trajectories after surgery.

Funding: Center for Clinical and Translational Research, Seattle Children▾™s Research Institute

Program no. 3-31
Epidural infusion of ropivacaine/fentanyl in young children following major surgery.
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The aim of the study was to evaluate the efficacy of the postoperative pain relief achieved with continuous epidural infusion of 0.2 ropivacaine with fentanyl following major abdominal and urological procedures, as well as the contribution of the systemic action of the opioid in the analgesia.
Methods: With approval from local Ethics Committee (KB /2/2008), and written informed consent from parents and older children, 31 infants and children (3 mo–12.5 years, ASA PS groups I/II) undergoing major surgical and urological procedures were enrolled in prospective open label study. Epidural catheter was placed under general anaesthesia in L2-L3 or L3-L4 epidural space and threaded 4 cm cephalad. Bolus dose of 0.2 ropivacaine, 0.5 ml.kg-1 and fentanyl 2mg was given, and followed by continuous infusion of 0.2 ropivacaine, 0.15ml. kg-1. h-1 with fentanyl 1.125mg.kg-1.h-1. General anaesthesia was maintained with air/O2, desflurane, remifentanyl 0.25-1 mg.kg-1.min-1 and vecuronium. IPPV was used to maintain normocapnia. All patients were extubated in the operating room. For postoperative period ropivacaine infusion stayed the same, but fentanyl concentration was decreased to 0.375mg kg-1.h-1. COMFORT scale was used to evaluate efficacy of pain relief. Children received paracetamol, 20 mg.kg-1,q 6h if required for pain or fever. Morphine was prescribed as rescue pain medication.
Six blood samples were taken at predetermined time intervals to determine fentanyl concentration in plasma using mass spectroscopy.
Results: All children completed the study. Analgesia, evaluated every 2 hours using the COMFORT Scale, was excellent in the vast majority of cases. Approximately 50% of children received paracetamol; rescue morphine was given once only. No respiratory depression or other side effects of the epidural infusion of ropivacaine with fentanyl was noted (except of PONV, which could be attributed to many factors). All children had urinary catheter in place, so urinary retention could not be evaluated. No child complained of pruritus. Vast majority of the measured fentanyl concentration in plasma stayed within 100-600pg.ml-1 range, and none exceeded 1000 pg.ml-1.Fentanyl concentration decreased exponentially after cessation of the infusion.
Discussion and Conclusions: Continuous infusion of 0.2 ropivacaine with fentanyl provides excellent analgesia following major abdominal and urological procedures. The mechanism of pain relief seems to be complex: local analgesic and opioid act at the nerve roots in the epidural space, but fentanyl, which penetrates freely to the bloodstream, seems to provide additional pain relief via its central action.

Program no. 3-32

Pain management in hospitalized children in Portugal

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Negligence in pain management practice is a recognized problem. Since 2001, Portugal has been making a strong effort to improve health care practices in this area through the development of awareness-raising campaigns, training sessions and publication of guidelines and best practice manuals. However, there is a lack of information on the prevalence of pain in hospitalized children and on the type of treatments used to manage pain1,2.

This study aimed to identify the prevalence of pain in hospitalized children and characterize the type of treatments.

A cross-sectional descriptive study was conducted based on an analysis of the clinical records over the last 24 hours. The sample was composed of children up to 18 years old with at least 24 hours of hospitalization in 4 pediatric hospitals. The clinical records were randomly selected and included 20% of staffing from each ward, in a total of 810 hours. Data were collected between August and December, 2011. Pain intensity was measured on a 0-10 scale: No pain <1; mild 1-3; Moderate 3-6; Severe or very severe 6-10.

The analysis of the clinical records showed that children's mean age was 5 years, ranging between 0.4 and 18 years. Most participants were male (n=457, 56.4%), with at least 3 days of hospitalization, while 233 participants (28.8%) had undergone surgery. The most common diagnosis and/or reason for hospitalization were infections and fever. Pain prevalence was 24.6%: 12.4% had mild pain, 9.9% had moderate pain and 2.3% had severe or very severe pain. More than half of the clinical processes had a record of pain history (n=429, 53.0%). The prevalence of record of pain intensity every 8 hours was 63.7%. The prevalence of pharmacological treatment was 41.5% and non-pharmacological treatment was 15.3%. Non-opioid analgesics were the most frequently used drugs (36.2%), whereas distraction was the most common non-pharmacological strategy (6.3%).

It can be concluded that there is a good pain management, a low prevalence of record of pain history and pain intensity assessment. Non-opioid analgesics continue to be more widely used than opioid analgesics, and there is a low prevalence of non-pharmacological techniques.

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Program no. 3-33

The Prevalence of Pediatric Pain Services in Sweden.

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Introduction:

Pain is the most common reason to seek medical advice and it should be of high priority to manage pain in children adequately for humanitarian, medical and economic reasons. According to IASP and WHO, everybody has the right to receive pain relief regardless of age and ability to communicate. The availability to pain service is necessary all over the country. Pain management is a neglected area in Swedish health care, and the knowledge and level of education among staff concerning pediatric pain is low.

Aims:

A survey was performed to investigate the prevalence of pain services with staff specifically educated in and working with pediatric acute and chronic pain management.

Methods:

All hospitals with pediatric clinics in Sweden were invited to participate in a survey to answer whether or not they had any acute and/or chronic pain service for children, and if the service and staff were specifically dedicated to pediatric pain management. The questionnaire was sent and managed via a web-based tool called EsmakerNX2.

Results:

26 of 34 hospitals answered the questionnaire. Only 20% of them had service available specifically for children with acute pain and only 14% for chronic pain. Only four hospitals had multidisciplinary pediatric pain service, and only a few hospitals held fulltime positions for staff working with pediatric pain, acute or chronic. The distribution of positions in the country is uneven, with the majority of staff working in Stockholm.

Discussion & Conclusion:

There is a lack of specifically educated staff and pain services for children in Sweden, and a big need for recommendations for multidisciplinary handle of pediatric acute and chronic pain similar to that provided for adult pain management. The aim must be to improve care and knowledge and to increase the general level of education in pediatric pain, to minimize suffering for children with acute or chronic pain. The result of this study will be used in the aim to influence the Swedish health system to improve the pediatric pain management in Sweden.

Program no. 3-34

The development of a Paediatric Pain Management Programme in Leicester, U.K.

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Introduction and Aims

In Leicester the services for paediatric patients with chronic pain had been very disjointed with multiple health care professions involved but not in a co-ordinated patient focused manner.

Patients requiring intensive input to manage their chronic pain had previously been referred to the Bath programme which involves a residential stay with multidisciplinary input over 3 weeks. This programme is 220 kilometres from Leicester and requires parental presence over the duration of the stay which limits the number of patients that are able to access this service. The University Hospitals of Leicester have consequently developed a paediatric pain programme.
The aims of the Leicester Paediatric Pain Management Programme are:
-to provide a patient centred care which is easily accessible for Leicestershire families
-a co-ordinated multi-disciplinary group run by a physiotherapist, pain nurse specialist, psychologist and an occupational therapist
-for the young people to improve their functioning and coping strategies dealing with chronic pain
Methods
Patients are referred to the paediatric pain programme from a consultant and are discussed by the team before being invited to attend. The programme runs once a week for 6 weeks. Each session lasts 1.5 hours and parents are invited to the first and last sessions. Young people between the ages of 10-16 years are included within this service. Parents and young people are given the Paediatric pain coping inventory outcome measure to complete prior to and after attendance. Sessions include gate control theory, biopsycosocial theory, cognitive behavioural therapy, exercise and impact on pain, pacing, distraction and relaxation. The young people complete homework diaries to chart their progress throughout.
Results
Outcome measures suggest an improvement in the use of various coping strategies, with carers and young people often reporting changes in different areas.
Please see attached PDF document.

Discussions and Conclusions
The young people found the group useful, particularly valuing the opportunity to meet other young people who experienced pain, to learn how pain works and to learn strategies for coping with pain.
The programme was attended by 17 individuals in the period 2011-2012, with self reported outcome data available for 6 individuals and satisfaction data available for 7. Suggested improvements by participants include early access to the service, with some members wanting a longer programme. Considerations are to be made which the timing and length of sessions to meet the young persons health needs. Future programmes will add to this pool of data and continue to monitor outcomes and effectiveness.

Program no. 3-35
DARWeb: developing an online intervention for children with RAP and their parents
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Introduction and aims: One of the most common pain problems in children is recurrent abdominal pain (RAP). RAP has a negative effect on the individual, the family and the whole society. Psychological treatments have been developed and have shown their efficacy to reduce pain. However, these treatments are not easily accessible and most of the time are only offered to patients who suffer the most severe conditions. Our main aims were: (1) To explore the acceptance that an online psychosocial intervention addressed to children with RAP of low severity would have among pediatricians and to gather suggestions from them about how they would like to see this intervention implemented. (2) To outline an intervention that we are creating aimed to prevent long-term abdominal pain and suffering.

Methods: An online survey was developed to collect the opinion of pediatricians. Pediatricians affiliated with the Catalan and Balearic pediatric societies were invited to participate.

The content of the online intervention is being developed. Evidence-based cognitive-behavioural methods (e.g. relaxation, change of negative thoughts and pain distraction) would be taught to parents and children. These would be directed to reduce risk factors for the development of chronic conditions and pain-related disability. The IRIS® platform is being used to support this intervention.

Results: A total of 131 pediatricians participated. In a 0-10 point scale, the degree in which they would refer their patients to an online psychosocial treatment for children with RAP is mean= 6.2 (SD=2.28). Pediatricians reported that this online intervention should be simple and coherent; should provide easy access for the users, and its interface should be easy to use and attractive.

Through this poster, we will also outline the intervention curriculum, present the main functionalities of the system that supports this treatment and provide screenshots that will illustrate the user interface of the intervention.

Discussion and Conclusions:

Our goal is to develop an intervention that helps to reduce the long-term impact of RAP in children, but at the same time is appealing to health care professionals, since they are the ones that guide treatment. For this reason, we used health care professionals' point of view from the very beginning of the development process.

Program no. 3-36

Identifying innovations in childrens pain management: an international project

Main author: Joan Simons, The Open University, Faculty of Health and Social Care, United Kingdom

Introduction and Aims

Children have a right to effective pain management and guidelines are available to promote good pain management. Despite this many reports state that childrens pain in hospital settings is not managed well (Von Baeyer 2009), and many children are left to suffer unnecessary pain. However, this is not the whole picture; many areas deliver effective and innovative pain management for the benefit of children. This study

attempted to identify innovations in practice from three areas of excellence in the UK, Sweden and Australia.
Aim: To identify and learn from international examples of good practice in the management of childrens pain by visiting three areas of excellence in pain management.
Methods
I visited three countries and used an appreciative enquiry approach (Carter et al 2007) which involves the following stages:
Discovery: this phase involved data collection through visits to each study site, meeting with practitioners, educators and researchers.
Dream: at the end of each study week, presenting to the host identified examples of good practice for confirmation.
Design: On return from the final study site, writing up the findings of the three visits, highlighting innovations that could be disseminated and introduced to improve pain management practice.
Destiny: dissemination and implementation of the best practice examples identified.
Results
An array of innovations were discovered which practitioners were using to improve the management of childrens pain such as enhancing the environment to reduce anxiety and pain, providing telephone support to families with children on strong analgesics post discharge and the use of tactile touch in critically ill babies and children.
Discussion and Conclusion
In every area visited practitioners identified innovations in their pain management practice that has improved childrens pain experience in hospital. The innovations were as a result of the passion and dedication of pain teams and their colleagues who continually strive to provide the best possible pain management for children in their care. Promoting best practice is the next step.
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Program no. 3-37
Effects on paediatric pain clinician activity of the introduction of tablet computers
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Introduction and Aims
Great Ormond Street Hospital Pain Control Service has operated data collection of its opioid and neuraxial infusions since 1996. Data is prospectively collected daily for analysis to ensure high quality care. Until July 2011, data were recorded by Clinical Nurse Specialists (CNS) onto paper charts. On patient discharge, the summaries were

entered onto a secure database. Concern existed around efficiency, real-time analytical delay and transcription error. Since 2011, individual tablet computers are carried by CNS staff to collate data from the bedside directly into the database, as redesigned to connect with the hospital's Patient Information Management System. Electronic Prescribing (EP) was active prior to tablet introduction and is integrated into the devices. Paper notes are otherwise used. This audit was undertaken to quantify changes in CNS time usage following the tablet computers' introduction.

Methods

An observer accompanied CNS staff who were separately observed over one hour periods. Activity was recorded per minute as travelling, bedside activity, prescribing, seeking paper notes, writing in notes, clinical discussion, tablet interaction, performing ward hygiene. Data were discarded if not collected for the whole hour. A total of 23 hours' observation was performed both before and after tablet introduction (overtly, with minimal interaction, and at a distance).

Results

Mean pre-tablet time interacting directly with patients was 10.96 min/hour. Following tablet introduction, this increased by 55% to 16.96 min/hour ($p<0.005$). A reduction of 69% spent seeking paperwork and recording information, including using EP, was observed (mean pre 20.17 min/hour, post 6.17 min/hour, $p<0.005$). Including time spent using the tablets post-introduction, a decrease of 9% was identified (mean 20.17 min/hour, post 18.39 min/hour, $p<0.005$). Included in these figures is time spent trouble-shooting the tablets. Statistical significance was achieved for all three outcomes. No variation was seen in other observed activity.

Conclusions and Discussion

Use of hand-held tablet computers reduces time spent seeking documentation and increases bedside time. Improvements to software are expected to further increase efficiency. Use of health information technology has the potential to improve service delivery and patient safety (1,2). The frequent inability to accurately self-report necessitates critical use of CNS time to ensure thoroughness when addressing the complexities of paediatric pain management.

References

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Program no. 3-38

Comfort First: a program to reduce pain and distress associated with medical procedures

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Background and Aim:

The Comfort First Programme (CFP) is an initiative of the Children’s Cancer Centre at The Royal Children’s Hospital, Melbourne, Australia. This interdisciplinary team

provides early procedural pain management interventions to children diagnosed with cancer and their caregivers. The aim of this study was to evaluate whether the CFP was meeting its goals to reduce procedural pain and distress and effectively implementing the Royal Australasian College of Physicians paediatric (RACP) pain management guidelines into clinical practice.
Methods:
This study was conducted as a single-site cross-sectional audit of one hundred and thirty five patients receiving treatment in the Day Oncology Unit. Procedural aspects related to the treatment room, carer and staff behaviour, child distress and use of pharmacological and non-pharmacological interventions were recorded.
Results:
The procedure room was mostly quiet and prepared before the child entered. Carers were typically present during procedures and comfort promoting behaviour was exhibited by Comfort First (CF) clinicians, careers and nurses. Topical anaesthesia use was standard practice and nonpharmacological interventions were utilised in the majority of procedures. Although the majority of children did not display significant distress, those children who did were more likely to be of younger age, have a longer procedure time and have a CF clinician present.
Conclusions:
The CFP is effectively implementing RACP procedural pain guidelines and meeting the program goals to minimise pain and distress in children undergoing cancer treatment through positive support during procedures and the utilisation of pharmacological and nonpharmacological interventions.

Program no. 3-39
Inpatient Crisis Management for Chronic Pain, is there a better way?
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Inpatient Crisis Management for Chronic Pain, is there a better way?
Introduction and Aims: To demonstrate the cost and outcomes of providing inpatient crisis management for paediatric chronic pain, in comparison to an outpatient model of care.
Methods: The costs associated with the inpatient pain management of a series of paediatric patients (n=7), has been collated over a 12-month period. This data has been correlated with the number of allied health, medical and nursing sessions provided to each patient. Data has also been collected on outpatient pain management sessions, provided over the same time period.
Results: The costs of providing inpatient pain management care to these 7 patients was estimated to be approximately half a million dollars (Australian dollars). This model of care, in comparison to an outpatient management program, is extremely resource heavy, and provides services for only a small group of patients. In the same 12 months period, 163 patients have been seen via the pain clinic, with 181 pain clinic sessions being completed on an outpatient basis. The outpatient services provided included

intensive outpatient programs; group and individual sessions; phone follow-up, and regular multidisciplinary team reviews. The outcome measures were comparable with 57% (inpatients) and 47% (outpatients) returning to school; 43% (inpatients) and 45% (outpatients) returning to previously enjoyed sports and hobbies; and finally 42% (inpatients) and 45% (outpatients) being weaned off their medications. One of the major issues identified was the accurate collection of ongoing outcome data, with 37% (outpatient) and 29% (inpatient) data not recorded.
Discussion and Conclusion: The Royal Children's Hospital, Brisbane, does not currently have a funded Paediatric Chronic Pain Service. An outpatient pain clinic has been established on a weekly basis, however no allied health positions are currently attached to this service. The importance of providing a multidisciplinary functional approach to the management of chronic pain has clearly been demonstrated in the literature.1 It is suggested that outpatient clinical and educational services are enhanced, to limit the number of patients requiring inpatient crisis management. A program to enable the early diagnosis and management of paediatric chronic pain is proposed, including an education and awareness program.
References:
1. Eccleston, C., E. Bruce., and Carter, B. (2006). "Chronic pain in children and adolescents." Paediatric Nursing 18(10): 30-33.

Program no. 3-40
Paediatric Persistent Pain Assessment and Education Day
Main author: Kathleen Cooke, SKiP, Support Kids in Pain (SKiP), Australia
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Paediatric Persistent Pain Assessment and Education Day
Introduction and Aims: Persistent pain has a significant burden on patients and their families, physical, psychological, social and economic. Population studies suggest up to 25% of children and adolescents complain of significant recurrent pain lasting more than a year, although only a few require specialist care. The most common pain is musculoskeletal, headache, recurrent abdominal pain and others including post-surgical and post cancer survival. The total financial burden on the UK economy of adolescent chronic pain in 2005 was estimated to be as high as 3840 million pounds. Currently in Queensland persistent pain requires expensive and fragmented inpatient management. We determined to evaluate the effect of a multidisciplinary pain assessment day and education on paediatric patients with persistent pain.
Methods: Support Kids in Pain, SKiP, is a not-for-profit organisation that raised funds and provide clinical services to enable the management of chronic pain in children and adolescents throughout Queensland. Funding secured allowed clinical services to deliver a monthly Pain Assessment and Education Day (PAD). A multidisciplinary team has been employed including a Pain Specialist, Nurse Practitioner, Physiotherapist, Social Worker, Occupational Therapist and an Art Therapist. The team, work together to provide an assessment, management plan and group education sessions for patients and families who attend the PAD. Survey and audit tools specifically designed to measure outcomes relating to paediatric chronic pain management will be utilised to assess outcomes.

Results: Paediatric Pain Assessment and Education Days supported by SKiP will commence in January 2013 with completed data, pre and post questionnaire results available in June 2013.
Discussion and Conclusion: Several medical studies have shown that between 15 – 30% of children will suffer chronic pain in their lives. This equates to over 100,000 Queensland children at direct risk. If left untreated, persistent pain places a significant burden on children and their families during the vitally important period of growth and development into adulthood. It affects personal, emotional and social development and if unchecked can severely impact quality of life as well as place a great strain on families and a heavy burden on social welfare. It is proposed the results from this study will provide strategies to enable the establishment of outpatient services to manage chronic pain in paediatric patients.

Program no. 3-41
Perceptions of Nurse prescribing in a Pain Control Clinical Nurse Specialist Team
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Introduction
Non medical prescribing was introduced in the UK in 1986 as a means of making the best use of the skills of suitably qualified health professionals, in order that patients get faster and more effective care. Previous studies of nurses prescribing analgesia for patients in pain identified benefits for both patients and themselves (Stenner & Courtenay 2008). However, legal restrictions limiting the drugs nurses could prescribe, (particularly opioid drugs), created impediments to nurses involved in pain management fulfilling their potential.
In April 2012, UK national legislation was amended, allowing nurse prescribers access to the full Formulary, including opioids. Within our service, the number of Clinical Nurse Spcialist (CNS) nurse prescribers has increased last 3 years (though not all CNSs' prescribe). These changes have resulted in prescribing being a greater feature of our role.
Aims
To identify, within a team of paediatric CNSs' in Pain Control, perceptions of the role of non medical prescribing, and to explore how they believe this influences practice.
Methods
CNSs' were categorised in to two groups as "prescribers" or "non prescribers".
Both groups were invited to complete an anonymous questionnaire designed to explore views of non medical prescribing, using themes identified in previous research. Nurses were also asked to identify what they had (or would have if they could) prescribed in a week of clinical deployment.
Results
Prescribers reported that they agreed, or strongly agreed, that their prescribing provided patients with:faster access to treatment, improved quality of care, increased safety, more appropriate prescribing, better communication and improved cost effectiveness.

Non prescribing nurse expressed more varied views, and some disagreement, with the possible benefits suggested
Both groups reported they experienced, or anticipated experiencing, increased job satisfaction, improved credibility and increased knowledge as non medical prescribers. Prescribers believed they had completed between 5 and 10 prescriptions for intravenous opioids in a week, and at least a similar number of prescriptions for oral opioid medication. Simple analgesics, anti-emetics, anti-pruritic medications had also been prescribed.
Discussion and Conclusion
This survey supports the findings of previous research that nurse believe there are benefits to both patients and nurses from non medical prescribing. CNSs' prescribed opioid drugs more frequently than any other type of medication.
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Stennar K & Courtenay M 2008 Benefits of nurse prescribing for patients in pain: Nurses' views Journal of Advanced Nursing 63(1), 27-35

Program no. 3-42
Four years experience from a paediatric pain treatment unit
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Four years experience from a paediatric pain treatment unit
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Introduction and aim: to describe four years of referrals to a paediatric pain treatment unit in a university hospital setting.
Methods: Data from data bases and from a retrospective chart review was used. All referrals were included. Data on demographics, type of pain, intervention and results was retrieved.
Results: From Jan 01, 2009 to Dec 31 2012 504 referrals were sent to the unit. The patients were 4- 21 year old (median 14 year) and 75 % were female. Two % consisted of nociceptive pain, 3 % neuropathic pain and 95 % pain of unknown origin. Of those were 22 % headache, 20 % pain in an extremity, 17 % abdominal pain, 11, % CRPS-1, 5 % pain in back/neck, and in 18 % pain of other localization. Treatment: 35 % were treated with our model of behavior medicine, using a modern model of CBT (Acceptance and Commitment Therapy), in 8 % drug therapy or sympathetic blocks were used and in 7 % there was merely a pain physician consultation leading to advice. Thus in 50 % no treatment was given! This was due to no need in 17 % (pain had resolved by itself while waiting to come to the unit). In 22 % we had judged the patient as suitable for our CBT-model and offered this treatment but the patient/parents refused treatment. In 11 % we refused usually due to major psychiatric problems.
Results of treatment: our goal was not to decrease pain due to the fact that patients with this type of diagnoses do not respond good to analgesics. Our principal outcome measures are changes in function measured by PII (Pain Interference Index, by child)

and FDI (Functional Disability Inventory, by parent). We found statistically significant increases in function after treatment. Although not a primary focus we see a significant decrease in pain scores after fulfilled treatment.
Discussion: The unit works in an out-patient setting and there are no patients with ongoing cancer. We also do not have sickle cell anemia in Sweden. Thus the vast majority have pain of unknown origin. It is remarkable that only 50 % of referred patients were treated.

Program no. 3-43
Pilot comparison of behavioral parametric scales in nonverbal critically ill patients
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Background
The World Health Organization estimated that five billion people have insufficient access to treatment for moderate to severe pain. Recommendations and guidelines of pain management have been developed, especially for patients with poor communication. Despite this, pain assessment still remains challenge for most patients due to the difficulty for precisely assessing the painhttp://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WGN-4NHV6X5-1&_user=7157921&_coverDate=10%2F31%2F2007&_rdoc=1&_fmt=high&_orig=article&_cdi=6827&_sort=v&_docanchor=&view=c&_ct=5019&_acct=C000043939&_version=1&_urlVersion=0&_userid=7157921&md5=cbc64f1f36a5dfc3c10b0f0c0647a728-bib10#bib10. Valid assessment tools are required for effective pain assessment in patients with communication difficulties, such as infants and preverbal toddlers, or critically ill/unconscious patients.
Objective
This descriptive repeated-measures study compared pain assessment tools in nonverbal critically ill patients with sedated and mechanically ventilated. Tools included the Behavioural Pain Scale (BPS), the Critical-Care Pain Observation Tool (CPOT), the Facial Rating Pain Scale (FRPS), and physiologic indicators (mean arterial pressure, heart rate, and respiratory rate).
Methods
After obtained the ethic approval from Research Ethics Committee of Tzu-chi hospital (IRB100-23), 120 independent observations simultaneously scored pain behaviours based on the three scales and physiologic indicates twice in a convenience sample of 10 patients such as: before routine painless (eye care), painful (suction) procedures, and undergoing the administrations.
Results
Median age was 66 years which range from 40 to 84 years, and diagnoses were variable. All participants with various diagnoses were admitted in the medical ICU. All BPS, CPOT, FRPS score and hemodynamic status were found to increase when patients were exposed to procedures compared with rest. They were also found to have

higher to have suction when compared to eye care. Both BPS and CPOT had respectable reliabilities (Cronbach alpha coefficients: 0.781, 0.787). An average of 70% of BPS or FRPS scores had increased during patients had suction than eye care, as opposed of 50% to CPOT. Indeed, respiratory rate remained quite stable during two procedures in this sample.

Conclusion

Whenever possible, we must measure the existence and intensity of it by the patient's self-report. Unfortunately, some patients cannot provide a self-report of pain verbally, in writing, or by other means. These patients include infants and preverbal toddlers, older adults with advanced dementia, critically ill/unconscious patients, persons with intellectual disabilities, and patients at the end of life. Each of these populations may be unable to self-report pain due to cognitive, developmental, or physiologic issues, including medically induced conditions, creating a major barrier for adequate pain assessment and achieving optimal pain control. Valid assessment tools are required for effective pain assessment in these patients with communication difficulties.

From our results, BPS and CPOT seem to be an interesting technique for assessing pain in patients with non-communicated ability as well as FRPS. Results also highlighted that conventional pain scales are not always accurate measures for pain assessment. Therefore, finding a way to accurately assess pain levels in the patient with communication difficulties is essential in good nursing practice. BPS and CPOT provide two effective scales that can be used to measure the detail of pain behaviours in such patients. These can be consequent that further validation of BPS, CPOT, and FRPS is needed to enhance pain management for the vulnerable population.

Acknowledgments

Special thanks to Joseph Wang for proofread the manuscript. Also thanks to all patients, nurses and doctors in ICU who graciously participated this study.

Conflict of interest

None.

Reference

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Program no. 3-44

The Introduction of a Pain Assessment Tool into the Paediatric Intensive Care Unit.

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Co-author(s): Isabelle Legrigore, Co-author(s): Micheal Clifford, The Royal Childrens Hospital, Paediatric Intensive Care Unit, Australia

Introduction:

Audits of patient's charts revealed that the Paediatric Intensive Care Unit (PICU) in the Royal Children's Hospital, Melbourne did not document the use of any validated pain or sedation tool. Therefore, in 2010 the Comfort B tool was introduced to the PICU. The Comfort B tool has been validated for use in critically unwell children aged 0-16 years for the assessment of pain and sedation (1)

Aims:
To assess the compliance of nursing staff following the introduction of the Comfort B tool.
To increase use of the Comfort B tool during the action and maintenance phase.
To improve pain assessment through culture change

Methods:
Monitoring tool compliance continued for two years post introduction. In 2011 a guideline was introduced for the management of pain and sedation, providing an online tool to guide pain and sedation assessments. In 2012 an analgesia and sedation treatment algorithm was introduced, of which the Comfort B tool was included. During each of these interventions, educational support for nursing and medical staff continued. Audits were undertaken at random intervals to measure the percentage of patients that had documented 4 hourly pain assessments.
Results;
In the first month, 39% of patients had a documented pain assessment. Following the introduction of a guideline, tool use increased to 47%. In the following two months the use increased to 65% and was maintained above 50%. Following the introduction of an algorithm in 2012, use increased to 80% in February, 76% in March and 88% in April.
Discussion & Conclusion:
The cultural shift that has been needed for staff to incorporate a pain tool into their practice has required creativity and perseverance. The best results have been seen in the 2 years post tool introduction, after the provision of a pain and sedation algorithm that incorporated the Comfort B Score.
Instigating a change in practice can be a difficult and slow process to achieve. Although initial compliance to tool use was less than hoped, an increase in tool uptake was seen in the 12 and 24 months following. In conclusion, this result indicates that the sustainability of the Comfort B as a pain assessment tool in our unit may still be achievable.
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Program no. 3-45
Validation of Self-Report Pain Scales & Differences Based on Patient Characteristics
Main author: Daniel Tsze, Columbia University, Pediatrics, United States
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Introduction & Aims
Self-report scales are recommended as the primary source for measuring pain. This study contributes to validation of the Faces Pain Scale €“ Revised (FPS-R) and the Color Analog Scale (CAS) in pediatric emergency department patients varying in age, sex, and ethnicity. Our aims were: 1) To determine the convergent, construct, and content validity; agreement; and reliability of the FPS-R and CAS, and 2) to evaluate for

differences in validity of these scales based on age, sex, and ethnicity.

Methods
We conducted a two-center prospective, observational study of English and Spanish-speaking children ages 4-18 years. Children with painful conditions indicated their pain severity on the FPS-R and CAS pre and 30 minutes post analgesic administration. We assessed convergent validity (Pearson correlation coefficient), construct validity (comparing pain scores pre- and post-analgesic administration), and content validity (comparing pain scores in children with pain against those without pain, matched by age, sex, and ethnicity). We assessed agreement using Bland-Altman plots, comparing mean differences between scales pre- and post-analgesia, and determining the proportion scoring outside ±2 on either scale. We assessed test-retest reliability in patients who reported that their pain as "about the same" using the Bland Altman method.
Results
Of 620 patients enrolled, mean age was 9.2±3.8 years; 291(46.8%) children were female; 341(55%) were Hispanic; and 313(50.5%) younger age group (<8 years old). Pearson's correlation coefficient was 0.85, with higher correlation between scales in older children and females, but no difference based on ethnicity. In the younger group, the lowest correlation coefficient was 0.60 in four-year-olds. All groups of age, sex, and ethnicity demonstrated construct and content validity for both scales. Test-retest reliability (n=40) was acceptable for both the FPS-R and CAS, with 95% limits of agreement of 0.33-1.37, and -0.07-0.61, respectively. The difference between mean FPS-R and CAS scores pre- and post-analgesia were 0.22 and 0.04 (out of 10), respectively. The proportion of children who gave ratings differing by more than 2 out of 10 on either scale was 12.4% in the total sample, with a significant difference between the younger and older age groups (18.2% and 6.5%, respectively), as well as between 4-year-olds and 6 and 7-year-olds (34%, 16.5%, and 7.0%, respectively).
Discussion & Conclusion
The FPS-R and CAS exhibit convergent, content and construct validity across all childhood age groups, sex and ethnicity, with acceptable reliability. Convergent validity and agreement appeared to be higher in females and older patients.

Program no. 3-46
Differences in clinically significant change in pain based on patient characteristics
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Introduction & Aims
The minimum and ideal clinically significant difference (MCSD and ICSD, respectively) in Faces Pain Scale-Revised (FPS-R) has not been studied. It is not known if there are any differences in MCSD and ICSD between children of different ages, sex, and ethnicities on the FPS-R or Color Analog Scale (CAS). Our aims are to quantify the amount of change in the FPS-R required to achieve a clinically significant improvement

in pain, and to determine any differences in the amount of change on the FPS-R and CAS based on age, sex, and ethnicity.
Methods
We conducted a two-center prospective, observational study of English and Spanish-speaking children ages 4-18 years with painful conditions. We asked the children to indicate their pain severity on the FPS-R and CAS pre- and post-analgesic administration. The children then described whether their pain was “much less”, “a little less”, “about the same”, “a little worse”, or “much worse” compared to pre-analgesia. We defined the MCSD and ICSD as the median changes (for FPS-R) and mean changes (for CAS) associated with “a little less” and “much less” pain, respectively.
Results
Of 314 enrolled, mean age was 9.8±3.8 years, with 158 (50.3%) female, 180 (57.3%) Hispanic, and 140 (44.6%) in younger age group (<8 years). For the FPS-R, the MCSD was 2 (IQR 2-4) and ICSD 4 (IQR 2-4). There was no difference in MCSD based on age, sex, or ethnicity. However, the ICSD for FPS-R was higher in the younger age group (score of 5), females (6), and Hispanic children (6). For the CAS, the MCSD and ICSD were 2.4 units (SD 2.5, 95% CI 2.1, 2.9) and 4.8 (SD 3.3, 95% CI 4.2, 5.5) units, respectively. The MCSD for CAS in the younger age group was significantly higher than the older age group (3.0 SD 3.2, 95% CI 2.2, 3.8 and 2.1 SD 1.5, 95% CI 1.8, 2.4, respectively). Otherwise, there were no significant differences in CAS MCSD and ICSD based on age, sex or ethnicity.
Discussion & Conclusions
A change of 2 out of 10 is supported as the MCSD for FPS-R scores in the pediatric emergency department. A greater change in FPS-R score (4-6 out of 10) may be required to reflect an ideal improvement in pain for certain subgroups. When using the CAS, a greater change in score may be required to reflect a minimal amount of pain improvement in younger children.

Program no. 3-47
Defining Pain Severity for Pain Scales & Differences Based on Patient Characteristics
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Introduction & Aims
Mild, moderate and severe pain have not been defined for the commonly used Faces Pain Scale - Revised (FPS-R). Additionally, it is not known if pain defined as mild, moderate and severe remain consistent for both the FPS-R and Color Analog Scale (CAS) based on patient characteristics. Our aims are to define the FPS-R and CAS scores associated with mild, moderate, and severe pain in children presenting to the emergency department, and to identify any differences based on age, sex, and ethnicity.
Methods
We conducted a two-center prospective, observational study of English or Spanish-speaking children 4-18 years with painful and non-painful conditions. All children were asked to indicate their pain severity on the FPS-R and CAS, and those with pain chose

a qualitative descriptor of their pain ("a little bit of pain", "a lot of pain", or "somewhere in between"). We determined the mean and median scores associated with each level of pain severity and assessed for differences based on age, sex, and ethnicity.
Results
We enrolled 314 patients with painful conditions and 306 with non-painful conditions. For painful and non-painful patients, the mean age was 9.8 ± 3.8 years and 8.61 ± 3.65 years; 158 (50.3%) and 132 (43.1%) children were female; 180 (57.3%) and 161 (52.6%) were Hispanic; and 140 (44.6%) and 173 (56.5%) were in the younger age group (< 8 years old), respectively. For FPS-R, mean scores associated with “no pain”, a “little bit of pain”, “somewhere in between”, and “a lot of pain” were 1.4 (95%CI 1.2, 1.7), 4.9 (95%CI 4.2, 5.6), 5.4 (95%CI 5.1, 5.7), and 8.2 (95%CI 7.8, 8.6), respectively. For CAS, these pain levels were associated with means of 1.6 (95%CI 1.4, 1.9), 4.4 (95%CI 3.7, 5.1), 5.3 (95%CI 5, 5.6), and 8 (95%CI 7.7, 8.3), respectively. Figure 1 illustrates the optimal range of scores for each pain severity. For both the FPS-R and CAS, there were no significant differences in scores associated with each category of pain severity based on age, sex, or ethnicity, except for children <5 years who had a statistically higher CAS score with pain reported to be “somewhere in between”.
Discussion & Conclusion
We defined mild, moderate and severe pain when assessed by the FPS-R and CAS. These definitions are consistent across sex and ethnicity, but vary in children

Program no. 3-48
Stanford Pediatric Pain Functioning Inventory: Tool for assessment of function
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Introduction and Aims: Pediatric pain research reflects the increasing awareness of chronic pain as a significant health problem such that 15 – 25% of youth experience recurrent or chronic pain (Roth-Isigkeit, Thyen, Stoven, Schwarzenberger, & Schmucker, 2005) significant enough to impact multiple functional domains such as school attendance, sleep quality, family functioning, physical abilities, and social activities (Palermo, 2009). The Stanford Pediatric Pain Functioning Inventory (SPPFI) is a brief clinical tool designed to assess functional impairment in youth with chronic pain across clinically important domains. The goal was to develop a brief, easy to disseminate tool for providers to utilize in pediatric pain settings that was functionally comprehensive, practical for measuring treatment progress, and responsive to individual patient changes over time. This pilot study aims to study the SPPFI’s preliminary psychometric properties while highlighting features such as sensitivity to change, ease of administration, and utility in an interdisciplinary setting.
Method: Participants were 183 youth presenting to an interdisciplinary pain clinic (Mage = 14.0, SD = 2.4, age range 8 – 18 years) and their caregivers (85% mothers). The SPPFI subscale scores were compared with clinically relevant quantified criterion variables extracted from reports written by the

pain physician, psychologist and physical therapist. Test-retest reliability was assessed within 2 weeks on average, while responsiveness to change was assessed after 8 follow-up clinic treatment visits.
Results: The SPPFI demonstrated sound reliability including internal consistency (youth α = .92; caregiver α = .94), parent-child concordance (r = .79), and test-retest (p<.01). The SPPFI's validity was demonstrated with significant relationship between SPPFI subscales and clinician-established criterion variables, and responsiveness to treatment(s) over time.
Discussion and Conclusion: This pilot study provides initial support for the psychometric properties and clinical utility of the SPPFI. As a brief tool designed to help providers examine meaningful aspects of functioning in youth with chronic pain, the measure may also help to inform care regarding a patient's progress in an interdisciplinary setting over time. Future studies should assess for the SPPFI's criterion validity using previously established instruments.
Conflict of Interest: The authors declare no conflict of interest and we did not receive any financial support for this study.

Program no. 3-49
Assessment of pain in children and adolescents in palliative care.
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Pain is a constant and meaningful event for children and adolescents with chronic disease and in palliative care. In this context, the experience of children and adolescents with pain should be considered to assess and intervene in their relief. Aim. Assess pain in children and adolescents by their descriptions of the intensity, quality and location of pain. Method. The Theory of Cognitive Development Piaget was used as theoretical framework and the Oral History used as the methodological one. Results. There were done six interviews semi structured with children and adolescents from 6 to 17 years. Ethic aspects were respected according the preconized rules. The results unveiled the theme The analysis of the narratives by Theory of Cognitive Development Piaget showed the following aspects: describing the pain; Looking For a life closer to normality, despite the pain and disease; Using various alternatives for pain management and Living with self image impaired. Reports of children and adolescents revealed that pain assessment may be adversely affected by barriers of communication. Therefore, the cards pain descriptors can help nurses access to these children and adolescents and intervene to relieve pain. Another aspect highlighted by children and adolescents with regard to pain management, which should cover techniques besides pharmacological, nonpharmacological measures. This study showed that the assessment of pain when used effectively by nurses, can be seen as a key component in the care of children and adolescents in palliative care and pain situation.
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Program no. 3-50

The experience of pediatric nurses in the application of the pain quality cards.

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Pain in children and adolescents should be evaluated and treated, taking into account the age line and cognitive development of the child. Therefore, it is necessary that the nurse knows and is able to apply the adequate instruments of pain evaluation. Aims. To know the experience of nurses in the utilization of the Pain Quality Cards in children and adolescents and to identify the facilities and difficulties in the utilization of these cards by the health professionals. Method. It was a qualitative research occurred in three stages: Stage 1- Orientation of the participants in the use of the Cards; Stage 2- Application of the Instrument by the nurses; Stage 3- individual interview with the nurses. Thirteen nurses participated in the orientation and nine were interviewed. The data were collected through semi-structured interviews and analyzed using the methodological orientation of the Collective Subject Discourse. Results. Two central themes were unveiled from the responses of the nurses: Facilities and difficulties of the nurses in the utilization of pain quality cards. When facing the challenge of utilizing the Pain Quality Cards, in their professional practice, the nurses realized the positive impact of this new tool in the care to the children and adolescents and their mothers. This experience amplified the horizons to a more embracing and effective evaluation of the children and adolescents' pain. As a consequence the management and relief of the pain were made through non-pharmacological interventions. On the other hand, the professional faced some difficulties due to the inexperience in the utilization of instruments to evaluate the pain. Besides that, the nurse faced difficulties in talking about the pain with the children. The results of this study revealed that the application of the Pain Quality Cards may come to be a strategy to enhance the interpretation of the children and adolescents' pain experience by the nurse, facilitating their planning and their decision making, as well as the monitoring of the effectiveness of the pain treatment of the children and adolescents.

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Program no. 3-51

Eye of the Beholder: How Do Parents Formulate Infant Pain Judgments after Immunization?

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Introduction and Aims: The caregiver plays an integral role in an infant€™s development, not only providing basic requirements (e.g., food, protection), but also promoting their higher order needs. One setting where infants are heavily dependent on their caregivers is the medical setting. As infants cannot verbally describe their symptoms, the health care of the infant depends on how accurately a caregiver can read and assess his/her infant€™s health cues. Health professionals therefore rely on caregiver judgments when assessing infants in primary care settings. However, it is unclear what factors determine caregivers€™ pain judgments for their infant. Using acute pain as the context, the present study examined infant pain behaviours and caregiver variables for their relative roles in determining caregiver pain judgments.

Methods: Caregivers and healthy infants were part of the longitudinal cohort, naturalistically observed during their 2-, 4-, 6-, and 12-month immunization appointments. Caregiver judgment of their infant€™s pain was scored using the Numeric Rating Scale (Jensen et al., 1989). The Modified Behaviour Pain Scale (MBPS; Taddio et al., 1995), which uses behavioural indicators to determine levels of pain-related distress, was used to objectively measure infant distress during immunization appointments. Caregiver emotional availability, a broad construct encompassing sensitivity, was measured using the fourth edition of the Infancy to Early Childhood version of the Emotional Availability Scales (EAS; Biringen, 2008). Structural equation modeling was used to investigate the relationships among infant pain behaviours and caregiver variables and how both of these groups of variables predicted caregiver pain judgments

Results: Only small to moderate amounts of variance in caregiver pain report was determined by infant pain behaviours. Noteworthy differences were found in the models for older versus younger infants, in relation to the roles of caregiver sensitivity, infant gender, caregiver age, and amount of variance explained by different infant pain variables.

Discussion and Conclusions: Experts agree that infant behaviours are integral in assessing infant pain. However, our findings suggest caregiver pain ratings are based predominantly on factors other than what clinicians consider the most integral to accurate assessment, namely pain behaviour. Researchers and clinicians must be cautious about the meaning of caregiver pain judgments for diagnostic and treatment purposes, especially if it differs from their own behaviorally-based pain assessment.

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Conflict of Interest Statement: None.

Program no. 3-52
Understanding the Development of Infant Pain Reactivity and Regulation
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Introduction and Aims: When measuring acute infant pain, objective measurements often rely on analyzing the average pain score (e.g., the average score across all infants for a particular treatment). However, due to the inherent variability in pain responses, this may cause serious threats to the internal and external validity of pain scores. The present study therefore investigated whether infants could be differentiated into stable groups based on their variable pain response patterns. Importantly, both pain reactivity and regulation was measured at four infant ages over a two-minute period post immunization needle to examine the variability in pain responding.
Methods: Caregivers and healthy infants were part of the longitudinal cohort, naturalistically observed during their 2-, 4-, 6-, and 12-month immunization appointments. Infant pain was coded using the Modified Behaviour Pain Scale (MBPS; Taddio et al., 1995), which uses behavioural indicators to determine levels of pain-related distress, was used to objectively measure infant distress over three time points during the immunization appointments (immediately, one-minute, and two-minutes post needle). Growth mixture modeling (GMM) was used to examine pain responses both across age and within age across the first two minutes post immunization
Results: Distinct groups of infants were discerned at each age. Results suggest that the overall mean pain score collected immediately following the needle best described most groups well for each age. However, the overall mean pain response at one- and two-minutes post-needle was not representative of the older age groups, resulting in over or underestimation of pain responses.
Discussion and Conclusions: The findings from this study indicate that stable variability in infant pain responding increases with age across the first year of life, calling into question the validity of relying on the overall mean pain score in infant research. Researchers and clinicians must be cautious when interpreting and operationalizing infant pain experience in medical practice, keeping these group differences in mind.
Acknowledgements: This research was supported by funds from the Canadian Institutes of Health Research (New Investigator Award to Dr. Pillai Riddell, Operating Grant [PI: Dr. Pillai Riddell], Postdoctoral Training Award from CIHR Pain in Child Health Program (Dr. Sara Stevens). Funders were not involved in the design or conduct of this study.
Conflict of Interest Statement: None.

Program no. 3-53

The Adolescent Pediatric Pain Tool: psychometric properties of the Portuguese version

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Introduction and aims
Long lasting illnesses such as cancer require a multidimensional pain assessment that can provide a more complete understanding of the pain experienced by subjects.
The Adolescent Pediatric Pain Tool (APPT) is a measure of the location, intensity and quality of pain, validated in English and Spanish for children and adolescents 8 to 17 years. The measure of location consists of a body outline diagram; the measure of intensity is a 10 centimeter word graphic rating scale; the measure of pain quality is a list of 67 descriptors categorized in sensory, affective, evaluative and temporal dimensions.
This study examined the properties of the Portuguese version of the APPT, which was previously submitted to semantic and cultural validation.
Methods
Eighty-eight children and adolescents (8-17 years old) with cancer, either hospitalized or in the out-patient clinic, were asked to report their pain using the APPT. If they were not in pain, they were asked to recall their last pain episode. A principal component analysis (PCA) was conducted. We analysed if type of tumour and time elapsed since the diagnosis were related to the total number of pain descriptors used and to the number of descriptors in each dimension. We also examined the correlation between pain intensity and the number of descriptors and number of locations marked.
Results
All descriptors were used by at least one child. Only one child suggested a new word. PCA with 4 factors explained 29,48% of the variance. Two factors contain mainly sensory descriptors; one factor includes a mix of sensory and affective descriptors and one factor a mix of sensory and temporal descriptors.
Type of tumour and time elapsed since diagnosis were not related to the total number of descriptors used, to the number of descriptors used in each dimension. The correlation between pain intensity and the numbers of descriptors used was significant ($p < 0,001$, $r=0,38$).
Discussion
In the Portuguese version, the list of words seems to represent a sensory, an affective and a temporal dimension. The results are not very different from those of the original scale, although the restricted range of variance and small sample size should be considered. Concurrent validity may be supported by the correlation between pain intensity and the numbers of descriptors used.
Conclusion
The Portuguese version of the APPT is a promising tool to assess pain in a multidimensional way, requiring further research.

Program no. 3-54

Development of a new multidimensional scale for suffering in adolescents with cancer

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Introduction and Aims:
Suffering related to cancer has increased over the years. It is a particularly difficult aspect of the illness, especially in adolescents who are in the midst of a dynamic developmental period. Suffering can lead to several negative consequences if not well-managed. Its subjective and hidden nature makes it difficult to effectively explain its components without the use of a validated instrument. The aim of this study was to develop a scale designed to measure suffering in adolescents with cancer.
Methods:
A pool of items was generated from semi-structured interviews with 19 adolescent patients and 16 healthcare professional, as well as with a thorough review of the literature. Interviews were transcribed and qualitative data analysis (QDA) was conducted on the verbatim using MAXQDA 10 software to assist with coding. Process was repeated by an external reviewer followed by a peer debriefing to compare results. Emergent themes related to the suffering of adolescents with cancer were quantified using the QDA software. A preliminary version of the scale was assessed for content validity by five content experts and four lay experts. Content validity index (CVI) and inter-rater agreement (IRA) were also calculated.
Results: Analysis of the verbatim yielded the following themes: physical, psychological, spiritual, social, cognitive and global suffering. The scale's CVI was 0.98 and the IRA was 0.88 among content validity experts. Last iteration of revisions yielded a 41-item Likert scale (Adolescent CanCEr Suffering Scale (ACCESS))
Discussion and Conclusion:
Findings support very good content validity of the ACCESS. Adolescents felt that it reflected their experience and that it was appropriate to their age while healthcare professionals found it very relevant and representative of the experience of their adolescent patients. Scale's validity requires to be pursued through a pilot study with a larger sample.

Acknowledgment
Study supported by grants from Quebec Interuniversity Nursing Intervention Research Group (GRIISIQ) and Saint-Justine University Hospital Center (UHC) Foundation and Research Center and the Foundation of Stars. We would also like to acknowledge all the Registered Nurses, Physicians, Psychologists of the hemato-oncology department as well as the

patients and their families for their cooperation and contribution to the study.

Program no. 3-55

Exploring assessments of functional change in a pain rehabilitation program

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Introduction and Aims: Growing evidence supports positive functional outcomes of intensive interdisciplinary pediatric pain rehabilitation programs. However, the measurement of functional outcomes varies by discipline within programs (e.g. PT, OT, Psychology), and few efforts have compared results from discipline-specific outcome measurements. This study evaluates both patient self-report and objective measures of functional progress from the physical, occupational, and psychological perspectives in a pain rehabilitation program across several time points.

Methods: Of 287 children enrolled in Boston Children's Hospital's Mayo Family Pediatric Pain Rehabilitation Center (PPRC), 180 were included in analyses. All had chronic musculoskeletal or neuropathic pain. Participants completed the Lower and/or Upper Extremity Functional Scale (LEFS/UEFS; Binkley, 1999), Canadian Occupational Performance Measure (COPM: Law et al, 2005) and Functional Disability Inventory (FDI; Walker & Greene, 1991) at admission, discharge, and 12-month follow-up. Objective measures include school attendance, a standardized test of manual coordination, and a timed 100-foot shuttleblock run.

Results:

1. Correlations among self-report (FDI, LEFS/UEFS, COPM Performance and Satisfaction scores) and more objective functional indicators (school attendance, manual coordination scores, 100-foot shuttleblock run times) were computed at each time point. Self-report measures all correlated significantly (Rs from 0.15, $P<.05$ to 0.79, $P<.001$). Correlations between objective and self-report measures varied. Manual coordination scores were not significantly correlated with COPM scores at discharge, shuttleblock run time was not correlated with COPM satisfaction scores or FDI scores at 12-mo. follow-up ($r=-0.23$; $r=0.1$, NS).
2. All measures (self-report and objective) improved significantly from baseline assessment to 12-month follow-up. For self-report measures and manual coordination test, Fs range from 15.44 to 523.80, all $P<.001$. For 100-ft shuttleblock, $F=4.75$, $P<.05$. T-test of school attendance at baseline vs. follow-up=4.39, $P<.001$.
3. Using accepted definitions of clinically meaningful change, improvement percentages on self report measures ranged from 33%-88%. At 12-month follow-up, improvement percentages from admission ranged 19%-31.5%. 78% improved on 2/3 of indictors. However, no participants with complete data demonstrated clinically-significant change on all 3 measures.

Discussion/Conclusion: Participation in intensive interdisciplinary pain treatment is associated with long-term, significant clinical changes by patient report. Correlations among measures of functional ability used across disciplines are large. Agreement

between self-report and objective indicators is more variable, highlighting differences between self-perceptions of disability and other measures of functional gains. Trends in improvement are similar across measures but no patients meet the definition for clinically-significant improvement on all three measures, suggesting that each method of assessment captures some distinct functional changes.
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Program no. 3-56
Pain Assessment of Children with Autism
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Introduction: Pain assessment of individuals with Autism Spectrum Disorders (ASD) is largely unexplored. However, the core deficits of ASD significantly interfere with this populations ability to effectively utilize traditional pain assessment tools (e.g. FACES self report scales). When children with ASDs encounter the health care environment, accurate pain assessment is crucial to providing quality care.
Aims: To describe how children with ASDs understand and communicate about pain. Specifically, (1) identification of a vocabulary familiar to this population that holds meaning with respect to describing pain and (2)understanding common frames of reference for pain among individuals with ASD.
Methods: Qualitative, descriptive study design using semi-structured interviews including interactive, electronic technology to enhance communication. Subjects include children with an ASD experiencing acute pain following a surgical procedure at a large urban tertiary childrens hospital.. Specific eligibility criteria: English speaking individuals between the ages of 6 and 18 years oldand verbal communication skills commensurate with that of a typical 6 year old or above.
Results: To date, 11 interviews have been conducted with children ranging in age from 8-17 years (mean 12.91, S.D. 3.24), 9 (81.8%) males, and 7 Caucasian, 1 Black, 1 Hispanic and 2 mixed race. ASD diagnoses include 4 (36.4%) with Aspergers syndrome, 2 (18.2%) with Pervasive Developmental Disorder and 5 (45.5%) identified as Autism, unspecified. The majority of the 11 children were interviewed within first three postoperative days. Surgical interventions included abdominal or bowel surgery (5, 45%), orthopedic surgery (5, 45%), and Ear, Nose, Throat surgery (1, 10%). Surgical interventions included abdominal or bowel surgery (5, 45%), orthopedic surgery (3, 27%), pectus repair, tonsillectomy and VEPTR expansion. Preliminary findings indicate that pointing to the location of pain was a preferred method of describing pain. Use of an intensity scale was limited in many subjects by choice of either the highest or lowest scores. Most of the participants had extensive vocabularies to describe the character of their pain such as terrible, sore, and excruciating. As expected, many of the children were unable to discriminate facial expressions of pain from other negative emotions (e.g. anger, sadness) when reviewing representative pictures of real life children with exaggerated expressions.
Discussion/conclusion: Individuals with ASD require alternate pain assessment tools to

most successfully communicate about pain.
Funding support by The May Day Fund

Program no. 3-57
Validation of the Chronic Pain Grade in pediatric tertiary care.
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Introduction and aims:
The Chronic Pain Grading (CPG; Von Korff et al., 1992) as a comprehensive measure of pain intensity and pain-related disability has become the standard to describe pain problem severity in adults. However,
in children and adolescents, the CPG has only been validated in a school sample (Huguet and Miro, 2008), but not in the actual target population, i.e., clinical populations with pain. In the present study the CPG was applied to a
sample of pediatric chronic pain patients in tertiary care. The study had three objectives: 1) determining the convergent validity of CPG in terms of associations with pain characteristics and other indicators of pain problem
severity such as health care utilization or emotional distress; 2) examining the CPG's sensitivity to change; and 3) testing the prognostic utility of CPG for treatment recommendation.
Methods:
We applied the CPG to a tertiary sample of adolescents with chronic pain (N=1242). CPG groups were compared concerning pain characteristics, health care utilization and emotional impairment to assess construct validity. To examine sensitivity to change the shift of CPG assignment from first to second appointment (2-4 months later) was tested in a subgroup of adolescents (n=533). To examine prognostic utility of CPG, group assignment was contrasted with treatment recommendation (inpatient / outpatient) by means of a receiver operating curve (ROC) analysis.
Results:
Only 3% of the adolescents were assigned to the lowest pain problem severity grade (CPG I). The remaining patients were equally assigned to the three higher severity grades (CPG II-IV). Higher CPG assignment was
associated with more pain locations, higher pain frequency, longer pain duration, extensive use of health care and more depressive symptoms. Assignment to CPGs changed at the follow-up assessment, indicating sensitivity
to change. The majority of adolescents improved to a less severe CPG; changes were more common in the high severity range. Adolescents with a high CPG received recommendations for inpatient treatment more often; however, the prognostic utility for therapy recommendation - as operationalized in this study - was low.

Discussion and Conclusion:
The CPG may be a useful approach to characterize adolescents with chronic pain in tertiary care. It may also be applicable to assess outcome in clinical trials. However, in this study it could not be used to predict treatment allocation. Future work should focus on developing a comprehensive assessment tool for assigning patients to different treatment options.

Program no. 3-58
Cultural adaptation of a translated observational pain assessment measure
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Introductions and Aims: Clinicians may understand a measure differently from the scale developer's intention. Exploring and addressing such issues may reduce respondent errors when the measure is later applied (1). Cognitive interviews give insight into respondents' understanding. The aims of this study were to explore the usefulness of cognitive interviews in the translation and cultural adaptation of the COMFORT behavioral scale (2), and demonstrate a structured approach to the analysis of cognitive interview data.
Methods: Qualitative study; individual cognitive interviews based on assessment with the COMFORT behavioral scale of a small child in a painful situation depicted in a film vignette. N=12; eight nurses, three physicians and one nurse assistant. The clinician first read and then used the COMFORT behavioral scale to assess pain based on information gained from the film vignette. Two cognitive interview techniques were applied; Thinking Aloud, where the participant verbalized his/her thought process while filling in the COMFORT behavioral scale, followed by Verbal Probing where the interviewer asked specific questions related to understanding of the measure, information recall and the decision process (1). A structured, iterative method to analyze interviews and tabulate results was applied. The study was approved by the Norwegian Social Science Data Services (no 21863).
Results: Participants identified few problems when reading the scale, but a number of problems when applying it on a film vignette. All identified problems could be categorized either as Scale problems; translation errors, words and content not understood as intended and subtle differences between the COMFORT behavioral scale and the original COMFORT scale (3), or Rater-training problems; unfamiliarity with the scale, assessments based on a film vignette and lack of knowledge and experience.
Discussion and Conclusion: Identified scale problems were used to refine the translated measure. Cognitive interviews seem a valuable complement to existing translation and cultural adaptation guidelines.
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Program no. 3-59

Premedication and stress and pain reduction in preterm neonates measured by SCA

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Introduction and aims: There is no knowledge about the stress and pain perceived by neonates during intubation while sedated and / or paralyzed. Our aim was to visualize presence or absence of stress and pain in neonates during nasal intubation using Skin Conductance Algesimetry (SCA).
Methods: Twenty neonates were randomized and premedicated with either morphine / vecuronium or propofol, the 2 most used regimens in the Netherlands. Skin conductance parameters were collected prior, during and after the procedure. Intubation conditions, blood pressure, heart rate and arterial oxygen saturation were registered.
Results: Despite clinically adequate sedation and excellent intubation conditions, Propofol does not prevent stress during the painful stimuli associated with intubation, as measured with SCA (mean 0.28±0.25 peaks / sec). Morphine 10 ± 5 min. before administration of vecuronium does not appear to have any analgesic effect when a painful stimulus is applied (0.23±0.12 peaks/sec). Curiously, vecuronium virtually abolishes skin conductance parameters(0.03±0.03 peaks/sec). A significant decrease in systolic blood pressure occurred 10 min. after administration of propofol (43 vs 63 mmHg, $p<0.05$), which resolved spontaneously. There were no statistically significant changes in heart rate or oxygen saturation during the procedure for either premedication regimen.
Discussion & Conclusion: Neonates still perceive significant stress during intubation, despite clinically adequate sedation with propofol. Morphine does not reduce stress within 10-15 min. before intubation. Vecuronium reduces skin conductance parameters to virtually zero. We postulate that vecuronium might inhibit the sympathetic effector junction in the plantar sweat gland. This effect precluded further analysis of the effects of morphine during intubation.

Program no. 3-60

A pedtiatric patinets´ pain evaluation in the emergency unit

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A pediatric patients´ pain evaluation in the emergency unit

Introduction and aim

Helsinki University Hospital for Children and Adolescent treats patients from 0-16 years with both pediatric and surgical problems. The patient arrives to the emergency unit by ambulance, referral or by the triage nurse decision. The most common reason for visiting the emergency unit is of some kind pain. Pain itself, is treated and medicated, but the pain evaluation is not done properly, even though VAS pain scale is supposed to be used. The aim of this study was to find out how the pediatric patients pain is evaluated and treated in the emergency unit.
Procedural pain is treated with medicine and non medical pain treatment.

Methods

The work was made as a literature review using the research results from the last decade. Information was searched from databases called Cinahl, which is international, and Medic, which is a Finnish database. The keywords used were: pain, child, trauma, documentation, evaluation, emergency and assessment.

Results

As a result many valid pain scales that are used in the emergency unit nursing were found. One useful scale for our hospitals emergency unit would be CEM, Collage of Emergency Medicine tool for assessing pain in children in emergency department. (Emergency nurse, Melby- McBride- McAfee 2011:36.)
Non medical procedure pain treatment came up in many researches as useful in pediatric pain treatment. Non medical pain treatment can be devided into three parts; physical methods, emotional support and cognitive- behavioral methods. The aim of cognitive - behavioral method is to decrease fear, stress and pain and improve the patient self-determination. (Pölkki 2008: 17-21.) Non medical treatment is cost efficient and decreases the need of pain killers.
Another result that came up was that when a child comes to the emergency unit with pain the triage nurse should raise the child higher up in triage. Educated staff usually means that the child gets pain medication quicker.

Discussion and Conclusion

It would be interesting to do research on how the systematic use of a pain scale increases the child´s pain treatment and also how non medical pain treatment decreases the pain and fear in a pediatric patient. The problem in our hospital is that we treat so many different age groups and patients with different kind of medical problems. To find a pain scale that is valid in all groups is a challange.

Program no. 3-61

Teen and Parent Report of Health-Related Quality of Life in Chronic Pain

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Introduction & Aims
There is limited research on the health-related quality of life (HRQoL) among adolescents with chronic pain syndromes. The literature does show chronic pain impactsspecific areas of functioning, including physical activity, mood, peer relations and school attendance. The degree of impact may, though, be perceived differently based on self-report or parent report. This study aimed to: 1) compare adolescent-report and parent-report of HRQoL to normative data, 2) examine agreement between adolescent- and parent-report of HRQoL, and 3) explore the relationship among demographic, health-related factors, and HRQoL.
Methods
This retrospective study included 90 males and females between the ages of 13 and 18 years-old, as well as their parent. Diagnoses were equally divided between Amplified Pain Syndrome, Complex Regional Pain Syndrome, and Fibromyalgia. Participants were being seen for an initial Diagnostic Evaluation in a pediatric pain clinic at a mid-western pediatric hospital. The Pediatric Quality of Life Inventory (PedsQL) (1) was administered as part of this initial intake. The PedsQL consists of four subscales: Physical, Emotional, Social, and School, and three summary scores: Psychosocial Functioning, Physical Functioning, Total QoL Functioning. Electronic medical chart reviews were conducted to obtain information about co-morbid conditions, healthcare utilization variables and mental health diagnoses.
Results
Descriptive statistics will be assessed for participants according to gender, age, and diagnoses. Z tests will be calculated to compare PedsQL data from participants to published norms for healthysamples. Adolescent and parent responses will be compared using t-tests. Intraclass correlations will be used to assess the convergence between adolescent and parent responses on the PedsQL. Analyses will be conducted for total sample and for separate diagnostic groups. Chi-square tests will be employed to examine relationships between categorical variables, including diagnoses, sex, and mental health status. Pearson correlations will be calculated to investigate associations among continuous variables, including PedsQL, age co-morbid conditions, and utilization rates.
Discussion & Conclusion
The study will provide pertinent information on the HRQoL in adolescents with chronic pain, as well as the relevance of obtaining both patient and parent perspectives.
Acknowledgements
Appreciation is given to patients and their parents for completing the PedsQL.
Conflict of Interest
None.

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Program no. 3-62

Cutpoints for mild, moderate, and severe pain on the VAS - one size fits all?

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Introduction and Aims

The ability to accurately measure and interpret pain intensity is central to any research endeavors in the domain of pain. Cutpoints that classify pain-intensity into mild, moderate and severe levels are widely used in pain-research and clinical practice. At present there are no agreed-upon cutpoints for the visual analogue scale (VAS) in pediatric samples. We applied Serlins procedure (Serlin, Mendoza, Nakamura, Edwards, & Cleeland, 1995) that was previously only used for the 0-10-NRS to empirically establish optimal cutpoints (OCs) for the VAS and used bootstrapping to estimate the variability of these thresholds (Hirschfeld & Zernikow, 2012).

Methods

We analyzed data from the German Health Interview and Examination Survey for Children and Adolescents (KIGGS; Ellert, Neuhauser, & Roth-Isigkeit, 2007) study and defined OCs both for parental-ratings of their childrens pain and adolescents self-ratings of pain-intensity. Data from 2,276 children (7.41±2.26years; 54% female) and 2,982 adolescents (14.66±2.00years; 61% female) were analyzed. OCs were determined in a by-millimeter analysis that tested all possible 4851 OC-combinations, and a truncated analysis were OCs were spaced five mm apart resulting in 171 OC-combinations.

Results

The OC-method by Serlin identified two different OCs for parental ratings and self-report both in the by-millimeter and truncated analysis. Estimating the variability of the by-millimeter analysis we found that the specific OCs were only found in 11% of the samples. The truncated analysis showed however that cutpoints of 35:65 are identified as optimal in both samples and are a viable alternative to separate cutpoints.

Discussion and Conclusion

We found a set of cutpoints that can be used both parental-ratings of their childrens pain and self-reports for adolescents. Adopting these cutpoints greatly enhances the comparability of trials. We call for more systematic assessment of diagnostic procedures in pain-research.

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Program no. 3-63

Minimally clinically significant differences for adolescents with chronic pain

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Introduction and Aims

A core aspect in the evaluation of pain-therapies is the assessment whether a change in pain-intensity is considered clinically meaningful or not (Farrar, Young, LaMoreaux, Werth, & Poole, 2001). Such an assessment requires standards for their interpretation, i.e. cutpoints that define minimal clinically significant differences (MCSD). To-date there are no agreed-upon MCSD for use in pediatric chronic pain. In the present paper a Receiver-operating characteristic (ROC)-based method is utilized for the first time to establish MCDS for the 0-10 NRS for adolescents with chronic pain, while taking into account their variability (Hirschfeld & Zernikow, 2012).

Methods

Data from 160 adolescents who completed a 3-week inpatient therapy between January and December 2012 were analyzed. Patients' global impressions of change (PGIC) were used as anchor against which alternative MCSDs for raw-change and percentage-change were evaluated. MCSD were those cutpoints that yielded an optimal balance between sensitivity and specificity. Bootstrapping was used to quantify the variability of the cutpoints.

Results

Overall a raw-change of 1 NRS-point and a percentage-change of 12.5% emerged as the optimal cutpoints for meaningful clinical change. The bootstrapping analysis found that the cutpoint for the raw-change was identified as optimal in almost all (n = 986) of the 1,000 pseudo-samples. However, for the percent-change the 12.5%-cutpoint was identified as optimal in only 389 pseudo-samples. Several alternative cutpoints between 10% and 16.7% were also identified as optimal in more than 50 (5%) of the pseudo-samples.

Discussion and Conclusion

The MCSD determined in our sample of adolescents who completed an intensive inpatient pain treatment were smaller than the raw-change (1.74) and percent-change scores (30%) determined for adults (Farrar, et al. 2001). This may be due to the fact that children are more perceptive to smaller changes, or that their expectations for standards for improvement are lower. If this is replicated in other samples different criteria should be considered.

On a methodological level the large variability for the percent-change scores indicates that researchers should routinely calculate and report the variability of their cutpoint-estimates to foster the integration of findings.

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Program no. 3-64
The Pain-QuILT©: Clinical feasibility of a web-based chronic pain self-report tool
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Introduction & Aims
The Pain-QuILT© [formally known as the Iconic Pain Assessment Tool] is the first web-based tool that records pain quality, intensity, and location using a mixture of icons and word descriptors on a time-stamped virtual body-map. It has been iteratively developed and evaluated using a phased approach, including content validation, usability testing, and icon refinement in several different chronic pain populations. The first version (http://www.emiliemcmahon.ca/pain-tool.html), created for individuals with central post-stroke pain, was subsequently adapted for adults with chronic pain as well as adults and adolescents with arthritis (http://www.painquilt.mcmaster.ca). This study aimed to examine the clinical feasibility of the Pain-QuILT© from the perspective of adolescents with chronic pain and their multidisciplinary health-team. The Pain-QuILT© was assessed for: (i) ease of use, (ii) time required to complete, (iii) perceived clinical usefulness, and (iv) perceived barriers to implementation.
Methods
All participants provided free and informed consent (Research Ethics Board approval #07-339; #1000026482). Adolescents diagnosed with chronic pain (aged 12-18) were recruited from a single multidisciplinary pain clinic in a university-affiliated pediatric tertiary-care centre in Ontario, Canada. The web-based Pain-QuILT© was administered alongside a paper-based comparator tool, which was based upon the standard interview questions typically used to assess pain in this clinic. Adolescents used the Pain-QuILT© and comparator (randomized order) to self-report pain before a scheduled clinic appointment, and then took part in a semi-structured interview. The health-team used these pain reports (Pain-QuILT© and comparator) during patient appointments, and subsequently took part in focus groups. All interview transcripts underwent simple content analysis. Results
A total of 17 adolescents and 9 health-team members completed the study. All adolescent participants described the Pain-QuILT© as easy to use and understand. The median time required for adolescents to complete the Pain-QuILT© and comparator tool was 3.3 minutes and 3.6 minutes, respectively. Adolescents characterized the Pain-QuILT© as clinically useful for facilitating clear communication with their health-team. The health care team endorsed the tool as easy to interpret and useful for eliciting

detailed sensory information about pain. They also identified surmountable barriers to future implementation such as ensuring patient privacy and adjusting clinic workflow to accommodate the tool.
Discussion & Conclusion
This study has uniquely evaluated clinical feasibility of the Pain-QuILT© in the context of a multidisciplinary pediatric chronic pain clinic appointment. Results indicate that the Pain-QuILT© may offer unique advantages over traditional interview methods and empower patients to better communicate and track their chronic pain.
Funded by a Trainee Research Grant from the Canadian Pain Society. The authors have no conflicts of interest to declare.

Program no. 3-65
Painometer: an app to assess pain intensity
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Introduction and Aims
The use of the so-called Information and Communication Technologies is increasing in the assessment of people with pain. This work aims (1) to introduce Painometer, a Smartphone app that helps users to assess momentary pain intensity, and (2) to report on its usability (i.e., user performance and satisfaction) when it is used by healthcare professionals and potential patients. Painometer includes four well-validated pain intensity scales: the Faces Pain Scale-Revised, the Numerical Rating Scale, the Colored Analogue Scale, and the Visual Analogue Scale.
Methods
A convenience sample of healthcare professionals (n= 19, mean age= 31.2 years, SD= 16.9), and potential patients (n= 14; mean age= 17.9 years, SD= 4.9) were recruited. A qualitative usability testing approach with a semi-structured interview, adapted from Stinson et al.'s (2010) work, was conducted. Healthcare professionals were asked to use Painometer as if they were using it with a patient, whereas potential patients were requested to report the intensity of their own pain.
Simple content analyses and descriptive statistics were conducted.
Results
Participants had an average experience of 10 years in using computers. 76% had been using Smartphones for 6 months at least. None of the professionals had any previous experience in using the scales.
Easiness of use. 100% of patients and 74% of professionals rated Painometer as an easy app.
Usage errors. 17% of professionals and 50% of patients were mistake free, 83% of professionals and 50% of patients had minor issues.
Most liked characteristics. Painometer was rated as: easy, simple, intuitive, attractive, comfortable and useful. Patients liked the most that they could interact with the app by touching the screen.
Suggested changes. Adding some user explanations and modifying minor configuration

and interface details.
Acceptability. 89% of professionals would use the app as their first choice to assess pain intensity.
No effects of age, gender or previous use of technology were found.
Discussion and Conclusion
Painometer has been found to be a useful, nice, and user-friendly app. Adding instructions and changing format and layout details will be implemented to solve the reported usability problems.
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Conflict of Interest: none.

Program no. 3-66
A functional look at the concept validity of the CAPS's pain and anxiety faces scales
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Introduction and Aims
The CAPS is a set of two face scales, composed of 5 drawn faces each, for evaluating pain intensity and anxiety in children. The goal of the present study was to assess whether the two sets of faces actually address distinct constructs. Rather than looking at convergent validity, it did so by examining the rules whereby the inner features of faces in each set are combined by subjects while issuing pain and anxiety judgments.
Methods
The study rested upon the methodology of Information Integration Theory. Faces in each set were divided into upper- and lower half-faces (grossly, "eyebrow-eyes" and "nose-mouth"), which were factorially combined to produce 25 pain- and 25 anxiety-faces.
Two groups of children (9-11 years old) participated in the main study: children without a regular experience of pain ("pain-free"; n=23), and children undergoing a post-operatory period ("acute-pain"; n=21). Both groups evaluated the pain faces as to pain intensity and the anxiety faces as to anxiety/fear in two separate tasks. The faces were randomly presented on a computer screen and answers given on a 600 pixels horizontal graphical rating scale.
An additional group of pain-free children (n=20) took part in an ancillary study, in which the judgment dimension was reversed between the two sets of faces (pain judged from "anxiety faces", an anxiety/fear from the "pain faces).
Results
Parallel plots and a statistically null interaction were found for the "anxiety faces".

Rightward convergence in the factorial plots and a significant interaction were found for the “pain faces”. These outcomes were replicated in both groups.
Functional measures derived from the integration models revealed that “eyes-eyebrows” got the most importance in the pain set, while “mouth-nose” got the most importance in the anxiety set. This was replicated in both groups.
Reversing the judgment dimension (ancillary study) didn’t change the integration rules or the patterning of relative importance in neither group.
Conclusions
A robust difference in the way facial features were combined, as in their estimated relative importance, was found among the two sets of faces. This difference cannot be accounted by the judgment dimension, as shown in the ancillary study. No differences among the “pain-free” and “acute-pain” groups were found as regards these findings. Outcomes do support the claim that the CAPS’ anxiety and pain faces scales address distinct constructs.

Program no. 3-67
Domains of Functional Disability and Associated Factors in Children with Chronic Pain
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Introduction
Chronic pain affects over a quarter of children and adolescents and is associated with disability across a range of domains including: sleep, school, social and physical activities. While some children are disabled across all areas, other children’s disability may be restricted to one or two domains. Clinically, it is helpful to examine disability across multiple domains as total scores may fail to capture this variation.
Aims
To examine rates of disability in sleep, school, social and physical activities within a cohort of children with chronic pain and to determine differences by gender, diagnosis, pain duration and intensity.
Methods
This descriptive cohort study included 97 children (mean age 14.3 ±2.36; 62 females; 35 males) referred to a specialized pediatric pain clinic. Children were diagnosed with varied pain conditions (primary diagnoses: 43% musculoskeletal; 24% neuropathic). All children completed a clinical pain assessment including a clinician-rated 5-point disability scale (SickKids Disruption Scale, SKDS) for assessing severity of disability in sleep, school, social, and physical activities. SKDS scores of 0 were defined as “no disability”, 1-2 as “mild,” and scores of 3-4 as “severe.” Pain intensity was rated on a 0-10 scale.
Results
The most commonly reported domain of disability (scores > 0) was physical activity (90%), followed by social (74%), sleep (71%), and school (59%). Sixty-two percent of patients had severe levels of disability in at least one domain (pain intensity: M=4.39, SD=2.39; pain duration: M=29.94 months, SD=28.09) and 10% had severe disability

across all four domains (pain intensity: M=5.43, SD=3.20; pain duration: M=36.33 months, SD=18.28).
Functional disability level within each domain did not vary by age or pain duration (Mann-Whitney tests, all p's>.05). Comparisons of no versus severe disability revealed higher rates of school disability for children with nocioceptive pain (50% severe) versus neuropathic (15% severe), and male (54% severe) versus female gender (30% severe), [X2(1)=7.07, 3.68, respectively, p's<.05]. Mann-Whitney tests reveal higher current pain intensity scores in children with severe (Mdn=6.00, SD=3.11) versus no sleep disability (Mdn=3.00, SD=2.85; U=204.00, p=.024); and children with severe (Mdn=6.50, SD=3.15) versus no social disability (Mdn=3.50, SD=2.76; U=83.00, p=.034).
Discussion and Conclusion
Almost two thirds of this cohort presented with severe disability in at least one functional domain. Domain scores reveal specific information about correlates of children's disability. Domain scores should be considered when evaluating children's level of disability in both clinical and research contexts.
Funding: Canadian Institutes for Health Research. No conflict of interests.

Program no. 3-68
Validation of the Children's Acute Pain-Functional Ability Questionnaire (CAP-FAQ)
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Introduction and Aims: The Pediatric IMMPACT statement recommends the development of measures of physical function and recovery for children experiencing acute pain. To address this need, we developed and validated an acute pain functional ability measure called the Children's Acute Pain Functional Ability Questionnaire (CAP-FAQ). As part of the validation of this measure we evaluated the psychometric properties in youth with sickle cell disease (SCD) hospitalized for an acute pain episode.

Methods: An initial draft of the CAP-FAQ was devised from review of prior studies, input from experts in pain and functional assessment, and feedback from youth hospitalized with acute pain. The preliminary CAP-FAQ included 40 items representing a range of functional activities (self-care, physical movement, social interaction, etc) in which youth rated perceived difficulty of completing each activity using a 5-point Likert scale. We evaluated preliminary psychometric properties of this measure in 159 SCD patients (55.3% female), ages 7-21 (M=15.73, SD=3.63) who were hospitalized for vaso-occlusive episodes at four children hospitals. The majority of the sample reported their race to be Black (86.0%). SCD genotype was predominantly HgbSS (67.7%). Reliability was determined using internal consistency and test-retest reliability. An exploratory factor analysis (EFA) was conducted to examine the preliminary factor structure, and to help reduce the number of items for the final scale. Construct validity was determined by comparing the factor scores to measures of pain burden, motor function, functional ability, mood and quality of life.

Results: EFA using varimax rotation was conducted to assess the underlying factor structure of the CAP-FAQ. Results yielded a 2-factor model with 12 items retained on the final solution assessing movement (n=8), and activities of daily living (n=4). Using the final item pool, the CAP-FAQ demonstrated strong internal reliability (α=0.92) and test-retest reliability (r=0.82, p<0.001). CAP-FAQ total scores were associated in the expected direction with measures of pain burden (r=0.36, p<0.001), motor function (r=-0.35, p<0.001), functional ability (r=0.30, p<0.001), and quality of life (r=-0.41, p<0.001). Discriminant validity was demonstrated by the lack of relationship between the CAP-FAQ score and mood.
Discussion and Conclusion: The CAP-FAQ is a new measure of children's functional ability in the acute pain setting. Evaluation of this measure in a variety of acute pain states and determination of longitudinal responsiveness are necessary to establish additional psychometric validation.

Program no. 3-70
The Stress Numerical Rating Scale-11 (SNRS-11): An Efficient Clinical Tool
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Introduction & Aims: Despite the importance of stress in chronic pain, available measures possess disadvantages such as lengthy administration time, complexity, and retrospective bias. Stress has been linked to the development and perpetuation of pain conditions, with transition periods highlighted as particularly important. This study is a preliminary validation of a single-question stress measure.
Methods: As part of a larger study, emerging adults completed the Stress Numerical Rating Scale-11 (SNRS-11), a single-question stress scale modeled after the Pain NRS-11, with 0 = ‚No Stress, and 10 = ‚Worst Possible., Respondents completed variants of the SNRS-11 including level of stress ‚Sright now, and Average/Highest/Lowest stress over the past week. Measures to assess construct validity included the Perceived Stress Scale (PSS), Liebowitz Social Anxiety Scale (LSAS) and variants of pain intensity similar to those for the SNRS-11. To evaluate discriminative validity, SNRS-11 scores were compared between participants, with and without a history of chronic or recurrent pain.
Results: The sample consisted of 438 emerging adults (18 to 24 years old, M=21; 66% female; 72% Caucasian). Seventy-six percent were students; 25% (n = 104) reported experiencing chronic or recurrent pain prior to age 18. SNRS-11 scores demonstrated good range and distribution: Current M = 4.8 ± 2.5, range 0-10. Average M = 5.3 ± 2.1, range 0-10. Highest, M = 7.3 ± 2.1, range 0-10, and Lowest stress, M = 2.7 ± 2.1, range 0-10. All SNRS-11 scores were significantly correlated with PSS scores (r range = .41 - .47, p

Discussion & Conclusion: This study provides preliminary support for the use of the SNRS-11 to assess stress in emerging adults with pain. Given the importance of stress in chronic pain, and the challenges associated with commonly used stress measures, it is important to continue to examine the benefits of this efficient clinical tool in pediatric pain.
Conflict of Interest: The authors have no conflicts of interest or financial support to declare.

Program no. 3-71
FETAL PAIN SCIENTIFIC AND BIOETHICAL ISSUES
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FETAL PAIN SCIENTIFIC AND BIOETHICAL ISSUES
Aim: Review the scientific and bioethical issues related with fetal pain.
Methods: Review of the scientific evidences of fetal pain: anatomical, physiological and behavioral; the use of fetal anesthesia and analgesia during pre-natal surgery and the bioethical issues related.
Results and Discussion: Fetal pain requires a scientific appraisal independent of the controversies
regarding abortions, women's rights, or beginnings of human life. These implications include pain perception in preterm neonates, anesthesia for fetal surgery or intra-uterine procedures, and long-term consequences of perinatal anesthesia on neurodevelopment. The fetus is incapable of verbal expression; therefore, evidence for fetal pain must be based on surrogate sources, including anatomical, functional, physiological, and behavioral indicators correlated with painful/invasive procedures.
Many studies now report the use of direct fetal analgesia during prenatal surgery. It is important to
assess the effectiveness (or the excess) of this analgesia to be sure that the amount of drugs we use is enough. Fetal pain can provoke sudden fetal movements that can interfere with surgery, and can have long term risks as well. Several validated tools exist to assess pain in premature babies; to assess fetal pain, we can use scales used for premature babies who have the same gestational age. Yet, this approach can find some counterargument, because of the objective difference of environment between premature baby and fetus, and consequently difference of visualization or of some other variables. Therefore, pain scales specifically developed and validated for fetuses is desirable. Here we propose some possible approaches to this problem.
The fetal pain controversy comes across four problems: scientific, skeptical, conceptual and bioethical. Two perspectives are observed: skeptical and sympathetic, both invoke the same data about neurophysiology and behavior, but the interpretation leads to opposite conclusions. A Bioethical analysis is made by Bioethical Principles vs. Utilitarianism. Bioethical principles are not enough to face the problem; Bentham´s Principle of Utility is based on

pain and pleasure; for John Stuart Mill all living things seek pleasure and avoid pain; the Practical Ethics of Peter Singer is almost based on pain.
Conclusion: Scientific evidence including pain-specific behaviors, sensory cortical activation, neuroendocrine or hemodynamic stress responses support that human fetuses may experience pain from 20 weeks of gestation. We need to create fetal pain assessment scales; a Bioethical Utilitarian approach is the most adequate.
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