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Prevalence and management of chronic pain syndromes during pregnancy

Shona Ray-Griffith, Bethany Morrison, Pedro Delgado, Everett Magann, Michael Mancino and Zachary Stowe

OBJECTIVES/SPECIFIC AIMS: (1) Characterize the prevalence and initial pharmacological management of chronic pain syndromes during pregnancy in a women's mental health program. (2) Describe the severity and qualitative characteristics of chronic pain during pregnancy and the acute postpartum period. (3) Compare obstetrical and neonatal outcomes between pregnant women with and without chronic pain syndromes. METHODS/STUDY POPULATION: A chart review was conducted to identify all pregnant women who presented for an initial evaluation to the Women's Mental Health Program (WMHP) at the University of Arkansas for Medical Sciences from July 2013 to June 2016. We excluded respondents <18 years of age or who did not consent to having their information used for research purposes. Demographic information, past and current medical histories, and medication history were obtained from written and electronic medical records. Chronic pain complaints and medication history are presented as counts and percentages. In an ongoing prospective, longitudinal study of pregnant women with chronic pain, women are enrolled before 20 weeks gestation and followed throughout pregnancy and the first 3 months postpartum. Study visits occur at 4-week intervals; and pain characteristics, analgesic exposures, other medications, and depressive measures are collected. Obstetrical and neonatal outcomes are obtained following delivery. Subjects will be compared based on pain types (ie, neuropathic pain, non-neuropathic pain, and controls) and treatment exposures (eg, +/− opioids). Primary outcome measures include visual analog scale (VAS). Secondary outcome measures include other pain and depression assessments. Data will be analyzed using SAS 9.4. A p-value of < 0.05 was considered statistically significant. RESULTS/ANTICIPATED RESULTS: (1) Chronic pain conditions were reported by 28.2% (44/156) of the initial referrals to the WMHP. (2) 95.5% of respondents with chronic pain were taking at least 1 medication, and 59.5% were taking 2 or more medications. Mean number of medications used were $2.6 \pm 2.1.3$. The most common medications reported were acetaminophen (43.2%), opioids (43.2%), and sedative/hypnotics (36.4%). Non-pharmacological therapy (eg, physical therapy and transcutaneous electrical nerve stimulation) was reported by 20.5% of respondents. (4) We anticipate that measures of pain severity will increase in pregnancy, peak in the third trimester, and decline in the postpartum period. (5) We foresee that the prospective results will confirm the chart review as indicated by a higher rate of medication exposures during pregnancy, including non-analgesic medications in the women with chronic pain syndromes. (6) We expect women with chronic pain syndromes to have a higher rate of obstetrical complications, specifically pre-term delivery and operative delivery. (7) Finally, we anticipate that chronic pain syndromes and management will result in a higher rate of neonatal complications, specifically neonatal intensive care unit admission, neonatal respiratory problems, and small for gestational age infants. DISCUSSION/SIGNIFICANCE OF IMPACT: Chronic pain syndromes are prevalent in more than one-quarter of pregnant women in our study with the majority of women using pharmacological agents to manage their condition. This prevalence is greater or equal to than other common obstetrical conditions, such as gestational diabetes or preterm delivery. The novel prospective data will be germane to the clinical care of pregnant women with chronic pain disorders. Clinical practice will be better informed by our data regarding the potential impact of chronic pain and its management on pregnancy course and perinatal outcomes. These data will provide the initial foundation for the development of treatment guidelines for the management of chronic pain syndromes during the perinatal period.

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Preliminary evaluation of postural stability as a cost-effective means of quantitatively and objectively differentiating between autism spectrum disorder, developmental coordination disorder, and typical development

Haylie Miller, Nicoleta Bugnariu, Priscila Caçola and Rita Patterson

OBJECTIVES/SPECIFIC AIMS: Individuals with autism spectrum disorder (ASD) and developmental coordination disorder (DCD) share overlap in their motor symptom profile and underlying neurology (Sumner, Leonard, & Hill, 2016, JADD). DSM-5 guidelines allow these 2 disorders to be independent or co-occurring (APA, 2013), but common clinical practice does not include systematic assessment to determine the presence or absence of co-occurring DCD in children with ASD, or vice versa. Furthermore, in many cases DCD is managed in a nonspecific manner, with schools making accommodations for a child's motor challenges without formally assigning a diagnosis of DCD. Thus, somewhat subjective, qualitative judgments are made by clinicians to classify children as DCD, ASD, or ASD + DCD in the absence of a reliable, valid, quantitative measure to distinguish between these profiles. As a first step toward developing such a measure, researchers must tease apart the nuanced differences in the motor symptoms of these 2 developmental disorders using methods that are scalable to clinical and educational settings. These methods must also be developed with consideration for logistical variables such as cost, clinical utility of data output, and ease-of-use if they are to be transferrable to physicians, school nurses, and other community health workers outside of academic laboratory settings. To that end, we conducted 2 complementary studies: 1 in the lab and 1 in the community. METHODS/STUDY POPULATION: In the community-based study, we used an affordable, user-friendly, portable balance testing system to assess postural stability during quiet standing (feet shoulder-width apart) with eyes open for 30 seconds. Data were generated from a single force plate in the balance platform. Potential participants were screened for other medical and neurological conditions that might impact their postural stability, and those with significant comorbidities were excluded. We tested 15 children with a reported diagnosis of ASD, 8 children with suspected or diagnosed DCD who were enrolled in a motor intervention program, and 30 typically-developing (TD) children with no significant developmental history reported. The ASD group ranged in age from 7 to 20, the DCD group ranged from 7 to 10, and the TD group ranged from 7 to 19. In the lab-based study, we again obtained force plate data during quiet standing (feet shoulder-width apart) with eyes open for 30 seconds, in our system that also included full-body motion capture, virtual reality, and mobile eye tracking. (Data from these additional sources are not discussed in this disseminaton, as our current focus is on identifying a simple, scalable metric that can be used to distinguish ASD from DCD.) We tested 10 children with a diagnosis of ASD that was confirmed by the research team, 10 children with a diagnosis of DCD that was confirmed by the research team, and 5 TD children with no significant developmental history reported. The ASD group ranged in age from 7 to 18, the DCD group ranged from 8 to 12, and the TD group ranged from 9 to 18. RESULTS/ANTICIPATED RESULTS: Primary outcome measures in both studies were related to Center of Pressure (CoP), including CoP sway, CoP velocity, and amount of sway relative to the base of support. Data analysis from both studies is ongoing, but preliminary trends suggest that CoP metrics may effectively differentiate between ASD, DCD, and TD. During quiet standing, individuals with DCD exhibited the greatest postural sway. Individuals with ASD followed, having greater instability than the TD group. Differences were also evident in the velocity profiles of postural sway. DISCUSSION/SIGNIFICANCE OF IMPACT: Preliminary findings suggest that CoP offers a means of differentiating between typical and atypical development specifically with respect to motor symptoms. This simple, quantifiable measure may prove a sensitive and specific means of systematically assessing co-occurrence of ASD and DCD in clinical and educational settings, leading to more accurate diagnostic classification and tailored intervention. Future directions include conducting analyses that account for participant age and developmental stage with respect to motor skills, determining whether trends hold in a larger sample, and using advanced statistical methods to determine whether CoP variables have predictive validity in discriminating between classifications of ASD, DCD, ASD + DCD, and TD. Eye-movement data were also obtained during these tasks, and may further aid in understanding the factors contributing to atypical postural control. These 2 studies also yielded methodological findings, namely that the portable force platform carries the benefit of high ease-of-use, low cost, and portability, but also has important drawbacks. Specifically, it is not capable of registering accurate CoP data for participants who weigh <40 lbs, and the error variance for the load cells is greater than that of most nonportable, higher-end plates like those embedded in our laboratory's platform. As technological advances continue to facilitate development of more portable, higher-resolution systems, these drawbacks may be significantly reduced. Future directions include further assessment of portable, affordable solutions for this type of testing to identify whether higher-resolution options are available, whether this added resolution increases classification accuracy, and how ease-of-use is perceived by clinical and community health workers.

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Phenotype and genotype in surviving relatives after sudden death in the young

Gregory Webster, Rachael S. Olson, Zachary J. Schoppen, Nicholas Giancola and Alfred L. George

OBJECTIVES/SPECIFIC AIMS: Sudden death in the young (SDY) occurs in people between 1 and 40 years of age who do not have a known premortem risk factor for early death. Cardiovascular diseases account for the majority of

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causes of SDY. Sequencing of genes associated with congenital arrhythmia susceptibility and familial cardiomyopathy reveals pathogenic variants in 30% of postmortem cases (often called "molecular autopsy"). However, better data are needed to determine the prevalence of phenotype and genotype abnormalities in surviving relatives. METHODS/STUDY POPULATION: A retrospective cohort study was performed at a tertiary pediatric center including all subjects with a family history of SDY. Cases were identified using ICD-9 codes (798.1 or .9, V17.41, V17.49, V19.8, V61.07), search of cardiology databases, and by recursive identification of all family members of a subject. Phenotype data was independently reviewed by a pediatric cardiologist. Genotype results were available when obtained by the original treating physician. RESULTS/ANTICIPATED RESULTS: Cardiac evaluations were performed in 279 subjects from 175 families, of whom 117 subjects (42%) were first-degree relatives of the proband. Mean age of the subject at time of evaluation was 9 years (SD 5.9). Most probands were over 18 years at the time of SDY: 1–4 years of age (9%); 5–12 (5%); 13–17 (16%); 18–24 (18%); 25–40 (42%). A final diagnosis was determined in 55 families (20%), and a variant in a gene potentially causative of SDY was discovered in 20/55 (36%) of those families. Variants were classified as 50% pathogenic/likely pathogenic, 50% variants of unknown significance. Cardiac testing (ECG, echo, EST, signal averaged ECG, cardiac MRI, or EP study) was abnormal in 124/279 subjects (44%). Among those with abnormal studies, 57/124 (46%) were from a family where a final diagnosis could be determined (LQT 43%, HCM 21%, ARVC 4%, other cardiomyopathy 19%, WPW 5%, CPVT 2%). However, 67/279 of total subjects (24%) had at least 1 abnormal study and a final diagnosis was not determined in the family. DISCUSSION/SIGNIFICANCE OF IMPACT: An abnormal phenotype is common among relatives referred for cardiac evaluation after SDY. While testing identifies a family diagnosis in 20% of families, many patients have abnormal cardiac testing and no clear diagnosis can be made. An improved postmortem protocol for phenotype testing in relatives of a SDY victim and improved postmortem genetic testing may lead to a higher diagnosis rate and improved risk determination in surviving family members.

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Association of medical and psychosocial risk factors with engagement in prenatal home visiting

Kelly M. Bower, Deborah Gross, Margaret Ensminger, Jana Goins and Phyllis Sharps

OBJECTIVES/SPECIFIC AIMS: The purpose of this study is to understand factors that are associated with identifying which eligible pregnant women in Baltimore City accept a referral for HV services. Taking into account demographic and obstetrical variables, we will examine the extent to which 13 medical and 14 psychosocial risk factors differentiate pregnant women who (1) accepted a HV referral, (2) could not be located, or (3) refused a HV referral. METHODS/STUDY POPULATION: In this observational study, we will use secondary data on 8172 pregnant women collected by Health Care Access Maryland (HCAM) between 2014 and 2016. HCAM is the single point of entry for all pregnant women in Baltimore City into HV. HV eligibility includes being a pregnant woman, residing in Baltimore City, being uninsured or receiving Medicaid, and being identified by a prenatal care provider who completed an assessment profile of the woman's medical and psychosocial risk (prenatal risk assessment). The outcome variable, HV engagement status (ie, accepted referral, could not be located, refused referral), will be based on HCAM discharge codes. Medical risk factors include BMI, hypertension, anemia, asthma, sickle cell, diabetes, vaginal bleeding, genetic risk, sexually transmitted disease, last dental visit >1 year ago, and taking prescription medications. Psychosocial risk factors include current pregnancy unintended; <1 year since last delivery; late entry to prenatal care (>20 wk gestation); mental, physical, or developmental disability; history of abuse or violence within past 6 months; tobacco use; alcohol use; illegal substance use within the past 6 months; resides in home built before 1978; homelessness; lack of social/emotional support; exposure to long-term stress; lack of transportation; and history of depression or mental illness. All risk factor variables are categorical (yes/no). Control variables will include demographics (eg, age, race, ethnicity, marital status, educational level) and OB history (eg, history of preterm labor, history of fetal or infant death). We will conduct descriptive statistics to characterize the sample and look for interrelatedness among the risk factors. Where there is a high level of inter-relatedness we will consider combining or omitting variables to reduce redundancy. We will use multinomial regression to examine which medical and psychological factors are associated with referral category. RESULTS/ANTICIPATED RESULTS: We hypothesize that (a) women with more medical risk factors will be more likely to accept a referral for HV services, (b) women with more psychosocial risk factors will be more likely to refuse HV or not be located, and (c) certain risk factors, such as depression/mental illness, history of abuse/violence, illegal substance use, homelessness, and exposure to long-term stress will be the strongest predictors of not accepting HV referral and/or not being located. DISCUSSION/SIGNIFICANCE OF IMPACT: The translation of effective randomized control trials (RCTs) to successful implementation in community-based programs can be challenging. Community-based programs serving low-income communities typically lack the same resources available to recruit and retain participants in RCTs. And, exclusion criteria applied in RCTs are often not applied in real world implementation which can open program to participants with more complex social and medical characteristics. Findings from this study will inform the translation of evidence-based HV programs into real world settings through an enhanced understanding of the characteristics of women who are not engaged by HV programs. This will inform development of improved outreach methods that may more effectively engage at-risk women for prenatal HV services.

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Sleep apnea is associated with increased risk for sudden unexpected death in epilepsy (SUDEP)

Anwar A. Chahal, Thao Luu, Paul Timm, Paul Sheppard, David Sandness, Ashley Enke, Lucas Dueffer, Max Dresow, Stuart J. McCarter, Virend K. Somers and Erik K. St. Louis
Mayo Clinic, Rochester, MN, USA

OBJECTIVES/SPECIFIC AIMS: To assess the association between probable OSA and the sudden unexpected death in epilepsy (SUDEP-7) risk profiling index in monitored adult inpatients with epilepsy. METHODS/STUDY POPULATION: We analyzed 49 consecutive adults (>18 years) with refractory epilepsy admitted to our inpatient epilepsy monitoring unit. The SUDEP-7 inventory was performed for all subjects. Probable OSA was identified using overnight oximetry, the Sleep Apnea Sleep Disorder Questionnaire (SA-SDQ), and STOP-BANG inventory. RESULTS/ANTICIPATED RESULTS: Thirty-nine percent of participants screened positive for probable sleep apnea. Patients with high SUDEP-7 scores were more likely to have a positive screen for OSA. DISCUSSION/SIGNIFICANCE OF IMPACT: OSA is an independent risk factor for sudden cardiac death. OSA may be a hitherto unrecognized contributor to sudden death risk in epilepsy. Further studies determining the relationship between OSA, neural circulatory control and SUDEP are warranted.

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Accuracies of using Her2 for prognosis of breast cancer recurrence in Life After Cancer Epidemiology (LACE) Study

Nan Hu
The University of Utah School of Medicine, Salt Lake City, UT, USA

OBJECTIVES/SPECIFIC AIMS: The goal of the study is to evaluate the prognostic importance and accuracies of a biomarker, human epidermal receptor 2 (Her2), for breast cancer recurrence in a cohort study, namely Lifetime after Cancer Epidemiology (LACE). We specifically interested in the role that Her2 plays in prognosis of breast tumor recurrence for women after a previously diagnosed and treated breast cancer. METHODS/STUDY POPULATION: The study cohort includes 2267 women enrolled in LACE who had previously diagnosed breast cancer. Patients were enrolled from each of the 2 LACE registries in California and Utah. The main endpoint of the study is the right-censored time to breast cancer recurrence. Patients' enrollments were, on average, 2 years after diagnosis of the first breast cancer. The patients' characteristics at baseline were obtained through self-administered questionnaires. Cox proportional hazard model with time-varying covariates was used to relate the Her2 status (Her2+ and Her2−) to the primary end point (time to breast cancer recurrence). Hazard ratios (HRs) and their 95% confidence interval comparing Her2+ and Her2− arms were estimated. Time-dependent sensitivity and specificity were used to investigate the performance of using Her2 for classifying patients into high and low risk (Her2 + is classified as hi risk and Her− as low risk) of future breast cancer recurrence at time points after baseline. The time-dependent sensitivity was calculated as the proportion of patients being classified as high risk of recurrence who had breast cancer recurrence before a series of pre-specified time points after baseline, and the time-dependent specificity was calculated as the proportion of subjects being classified as low risk of recurrence who did not have breast cancer recurrence at the same time points. RESULTS/ANTICIPATED RESULTS: The average patient follow-up time was 9.8 years, and 18% of the women got positive Her2 test results at baseline. Among 2267 patients in the study cohort, 2031 had records on their Her2 status, among whom 326 (16.1%) patients were Her2+ and 1705 (83.9%) were Her2−. The mean tumor size among the 2031 patient

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