Department of Pediatrics Research Day

ABSTRACTS FOR POSTERS AND PRESENTATIONS

May 13, 2016

School of Medicine and Public Health
UNIVERSITY OF WISCONSIN-MADISON

Department of Pediatrics Research Day Agenda

May 13, 2016
Health Science Learning Center, Room 1345

12:30 **Lunch**

1:00 ***Research Happened While I Was Doing My Job***
Introduction and Welcome from Keynote
Aaron Carrel, MD

1:30 **Oral Presentations**

1:30 – 1:45 ***Accelerated Weight Gain Due to Gestational Hyperglycemia Manifests Only After First Year***
Allison Pollock, MD

1:45 – 2:00 ***From Pilot To Policy: Implementation Of A Pediatric Rapid Response Team Using Kotter's Change Theory***
Adam Szadkowski, MD

2:00 – 2:15 ***Utility of Resident Assessment of Illness Severity in the Ipass Handoff Tool***
Keith Hanson, MD, PhD

2:15 – 2:30 ***Microbiome Effects on Frequency of Viral Infection and Virus-Induced Exacerbations of Asthma***
Daniel Jackson, MD

2:30 – 2:45 ***Effectiveness of an Informational Lecture On Vaccination Science in Wisconsin Rapids, WI***
Amy Falk, MD

2:45 – 3:00 ***Diagnostic Criteria for Acute Bacterial Sinusitis Compared With Virus Detection***
Gregory DeMuri, MD

3:00 – 5:00
Poster Reception (with light hors d'oeuvres)
Residents, Fellows, and Faculty
HSLC Atrium

Resident Abstracts

MULTI-SECTOR APPROACHES TO REDUCE CHILD UNDER-5 STUNTING: A CROSS-SECTIONAL STUDY OF CHILD STUNTING AND UNDERWEIGHT PREDICTIVE FACTORS IN SOUTHERN ETHIOPIA

Lisa Chowdhury; Mariama Fofanah; Wellington Jogo; Riley Balikian; Sabrina Butteris; Heidi Busse

Background: Undernutrition is a major cause of child morbidity and mortality worldwide. This study reports the prevalence of child under-5 undernutrition from two zones in the Southern Nations, Nationalities, and Peoples Region (SNNPR) of Ethiopia; evaluates the potential predictive factors; and presents implications for designing community nutrition and agriculture programs and policies.

Methods: Cross sectional surveys of 300 households (HHs) in the SNNRP, Ethiopia were completed. Structured interviews with household heads were conducted by trained enumerators in the local language. HHs were selected based on location, proximity to main road, presence of at least one child age 6- 59 months, approval of elders, and willingness to participate in future nutrition trainings that emphasize consumption of sweet potatoes as part of diversified diets. Surveys were conducted in June – July 2014, and analyzed using SAS® version 9.2 for quantitative analysis. Analysis of variance (ANOVA) and cross-tabulations with significant tests were used to assess associations between child under-5 stunting and underweight with household indicators.

Results: The average HH size was 6.5 family members, <1% of HHs were female-headed, 50% of the HH heads had a primary school education or less, and the average child BMI score was 15.4. Among children under-5 years, prevalence of stunting and underweight was 39% and 16%, respectively, with differences found by child age and gender. Fifteen percent of children had diarrhea in the last 30 days, and 30% and 12% had ever had malaria and measles, respectively. Factors associated with child under-5 stunting include HH drinking water source, wealth, maternal and child health, and dietary diversity. Factors associated with underweight include those mentioned above plus complementary feeding practices and altitude.

Conclusions: Reducing child under-5 undernutrition is a national priority for Ethiopia given its potential to lead to irreversible and intergenerational impacts on health, cognitive abilities, and economic potential. Thus, determining localized prevalence and predictive factors of anthropometric factors indicative of nutritional status within a community prior to implementing a nutritional intervention is vitally important to ensure the chosen strategy can impact both nutrition specific and sensitive approaches that will provide an effective and sustainable solution.

INFANT CPR TRAINING FOR NEW PARENTS IN THE NEWBORN NURSERY

Rachael Ellis; Elizabeth Goetz

Background: Learning the basic skills about infant CPR is available for families who are expecting however not all parents pursue this opportunity. Each year about 4,000 infants die unexpectedly during sleep time (NIH) and multiple studies have showed a significant impact with initiation of CPR by lay persons prior to EMS arrival (AHA). Understanding parental views of infant CPR and barriers associated with learning infant CPR could have an impact on the health and survival of infants in our community.

Methods: This study had IRB approval and was conducted with 49 participants between November 2014-April 2015. Standardized surveys were made and provided to postpartum mothers at Unity Point Health-Meriter, Meriter Hospital at the time, during their hospitalization for child birth. These surveys assessed variable aspects of infant CPR including barriers, comfort level and perception of importance. The study only included mothers whose infants were admitted to the newborn nursery. The data was then analyzed using excel to find correlations that addressed the clinical question. Information on infant CPR resources at Unity Point Health-Meriter were also provided to families.

Results: The data demonstrated that all mothers involved in the study felt like knowing how to perform infant CPR was an important skill to know. About 48% of mothers noted lack of time as the biggest barrier followed by 22% of mothers who noted cost. The biggest interest in ways to learn infant CPR was in person classes (67%). There was an appreciated decline in their confidence and knowledge of infant CPR with increased duration of time since learning, specifically, over 1 year after learning infant CPR, about 50% of parents no longer felt confident about their skills. About 57% of mothers were interested in more resources on infant CRP while 31% were not and 12 % did not say one way or the other.

Conclusions: Mothers of newborn infants note the importance of having a knowledge of infant CPR and there was a notable interest in learning more about infant CPR among this population. There are multiple barriers to pursuing training mostly due to lack of time followed by cost. Even if a parent had previous training in infant CPR, there is a notable decline in confidence and knowledge in skills with increased duration of time since training. This brings up the importance of continued re-education for parents with subsequent pregnancies.

EFFECTIVENESS OF AN INFORMATIONAL LECTURE ON VACCINATION SCIENCE IN WISCONSIN RAPIDS, WI

Amy E. Falk; Daniel J. Sklansky

Background: Physicians face opposition to vaccination with alarming frequency, despite significant scientific data and rigorous clinical trials demonstrating that vaccinations are safe and effective. This opposition could be due to vaccine science being unapproachable to the general public, coupled with insufficient time for physicians to fully explain the rationale behind vaccines.

Objective: To determine if attendees at an evidenced-based lecture on vaccine science had initial anti-vaccine sentiments, and if present, did attending the presentation influence a change in knowledge, attitudes and beliefs.

Methods: A 7-question survey utilizing a modified Likert scale was given to attendees of an evidence-based lecture on vaccination science to members of the general public in Wisconsin Rapids, WI. Attendees completed the survey before and after the presentation. Survey questions were scored with values from 1 to 5, with 1 representing the most adverse to vaccination and 5 representing the most "pro-vaccine" stance. Total survey scores were then used to calculate percent change, and the responses were analyzed for statistical significant change in responses, using a $p<0.05$. A nonparametric Wilcoxon Signed Rank test was used to conduct the comparisons for the individual questions, and a paired t-test for the comparison of the total score.

Results: 44 surveys were submitted, with 11 omitted due to incompleteness. The majority of respondents had "pro-vaccine" response, both pre- and post-lecture. Based on percent-change data of pre- and post-lecture responses, 13/33 (39%) of respondents had no change total in pre to post test scores. 8/33 (24%) of respondents had a lower score after the lecture, and 12/33 (36%) of respondents had a higher score after the lecture. The vast majority (88%) agreed that uncommon diseases should be vaccinated against, with no change from pre- to post-lecture. Following the lecture, more respondents disagreed that vaccinations cause autism after the lecture, fewer attendees indicated that they were concerned about vaccination side effects, and the majority agreed that they follow their doctor's recommendations on vaccination. There was a statistically significant increase from pre- to post-survey assessment for question 3 (from 3.97 +/1 0.98 to 4.33 +/-).85, p=0.016), as well as for question 7 (from 3.75 +/- 1.05 to 4.00 +/- 1.03, p=0.031).

Conclusions: An evidenced-based, parent-oriented lecture may have influenced change in some knowledge and beliefs of vaccination, especially regarding views of autism and parents right to refusal for personal reasons.

NEONATAL POST-RESUSCITATION CARE IN RURAL ECUADOR: TEACHING S.T.A.B.L.E. CURRICULUM TO ECUADORIAN FAMILY MEDICINE RESIDENTS

Kristy Fitzpatrick; Kathleen Miller; Isaac Troiano; Miguel Obregon; Diego Herrera; David Gaus

Background: The majority of physicians in Ecuador are concentrated in Quito and Quayaqil, the two largest cities, leaving a paucity of providers in rural areas. Hospital Hesburgh in Santo Domingo, Ecuador is the home of a family medicine residency program which aims to provide quality education and training in rural medicine. Hospital Hesburgh also participates in the training of Ministry of Health family medicine residents in surrounding rural areas. These family medicine residents have varying and often limited exposure to neonatal care, yet they will be responsible for the care of ill neonates in these rural settings. Thus, a course addressing neonatal post-resuscitation cares was selected for an educational outreach program in rural Ecuador.

Objectives: The course objective was to enhance knowledge in post-resuscitation neonatal care of Ecuadorian family medicine residents through adaption of the S.T.A.B.L.E. Program, an established course for low-resource settings in the United States.

Methods: A total of 9 full 8 hour S.T.A.B.L.E. courses were conducted over 1-2 days in 4 rural Ecuadorian cities (Pedro Vicente de Maldonado, Santo Domingo, Porto Viejo, and Manta). These courses included the 5 core curriculum topics (hypoglycemia, hypothermia, respiratory distress, shock, laboratory analysis) and simulation. The emotional support unit of S.T.A.B.L.E. curriculum was omitted out of respect for cultural differences between Ecuadorian and American institutions. Simulations were adapted to reflect availability of local materials (ie: nasogastric tubes were adapted to be used as umbilical catheters). Written and oral feedback was obtained from course participants by the Ecuadorian family medicine faculty.

Results: A total of 91 family medicine residents completed the S.T.A.B.L.E. course. The average age was 35.5 years with a range of 28-51 years. Majority were female (59%). The average group size was 10, with a range of 4-17 people. All of the groups had improvement in their test score after completion of the S.T.A.B.L.E. course. The average pre-test score was 17.8/27 and the average post-test score was 22.4/27. Overall, feedback from the residents was very positive stating that the course was high-yield and relevant for their future careers.

Discussion: There was an improvement in the test scores after completing the course, suggesting the residents had gained knowledge of neonatal care. Based on positive feedback and the improvement in test scores, it appears that the S.T.A.B.L.E. program has the potential to be adapted to low-resource settings abroad.

****PAS Poster Presentation**

UTILITY OF RESIDENT ASSESSMENT OF ILLNESS SEVERITY IN THE IPASS HANDOFF TOOL

Keith A Hanson; Shannon M Dean; Daniel J Sklansky; Kristin A Shadman; Jens Eickhoff

Background: Changes in healthcare have led to increased inpatient handoffs. Some centers have implemented formal handoff tools in an effort to decrease the risk of handoff-related medical errors. Our institution uses the IPASS handoff tool, which includes a subjective Illness Severity (IS) assessment designating a patient as Stable, Watcher, or Unstable. It is not known if this subjective assessment correlates with likelihood of care escalation or with objective assessments, such as the Pediatric Early Warning Score (PEWS).

Objective: To determine: (1) whether patients assessed with increased acuity (Watchers) are more likely to be transferred to the intensive care unit (ICU) as compared to Stable patients; and (2) whether Watchers have a higher PEWS score as compared to Stable patients.

Methods: IS and PEWS were assigned by resident physicians and nursing staff, respectively, for patients newly admitted to the pediatric hospitalist services at our tertiary care center from October 2014 to March 2015. Data were recorded daily at the time of evening handoff until the patient was either discharged or transferred to the ICU. Customizable patient lists in the electronic medical record were used to display the data in a de-identified manner. The data were analyzed using a repeated measures mixed effects model.

Results: IS was assessed in the majority of patients (n=430) with 85% designated Stable, 7% Watcher, and 8% unassigned. Patients with an assessment of Watcher on the first day of hospitalization had an increased likelihood of transfer to the ICU as compared to Stable patients (OR 11.9, $p<0.001$). Watchers had significantly higher mean PEWS as compared to Stable patients (PEWS 1.4 vs 0.6, $p<0.0001$). Patients with a PEWS ≥2 on the first day also had increased odds of transfer (OR 2.0, $p<0.001$). The overall rate of transfer was low (13 patients or 3%). However, 18 hospitalized patients were transferred to the ICU prior to handoff and were therefore not included in the study.

Conclusions: Patients assigned a higher level of acuity in the IPASS handoff tool had higher PEWS, and higher odds of transfer to the ICU. This suggests that subjective assessment of patient acuity may have utility in determining the risk of escalation of care. Further study is needed to compare the efficacy of subjective assignment of patient acuity using a standardized handoff tool with an objective scoring tool such as PEWS.

DEVELOPMENT OF AN EPIC HEALTHLINK SMARTSET TO FACILITATE THE ESTABLISHMENT OF CARE OF NEW PEDIATRIC IMMIGRANT PATIENTS

Andrea N Jones; Greg DeMuri

Background: According to the Wisconsin Department of Children and Families, Dane County was home to 255 refugees between 2005 - 2009, with an estimated 100 refugees arriving in Madison. According to the US Census Bureau's 2014 data, the estimated number of foreign born individuals in Madison was 25,654, of which 17,079 were not US citizens. Twenty-five percent of these foreign-born individuals were <18 years of age. Established guidelines exists for the care of both refugees and immigrant children from the Centers for Disease Control and American Academy of Pediatrics. Despite these guidelines, an Epic HealthLink SmartSet designed to aid physicians in the care for new immigrant pediatric patients does not exist. Although an International Adoption SmartSet exists, the immigrant population is uniquely at risk for additional health concerns related to reasons for leaving their home countries, travel to the United States, and socioeconomic and immigrant status upon arrival.

Objective: To develop a SmartSet tailored to establishing care of new pediatric immigrant patients.

Methods: The SmartSet will include a comprehensive evaluation of typical components of the health history. In addition, it will include evaluations of exposure history, travel history, prior infectious disease screening or treatment, and mental health, abuse and trauma screening. The SmartSet will prompt providers for the necessary laboratory testing while also guiding targeted screening based on country of origin, travel history, nutrition, and exposure history. Lastly, the SmartSet will provide recommendations on topics for anticipatory guidance unique to this population as well as follow-up recommendations.

ATTEMPTING TO EASE THE TRANSITION TO PRACTICE: ASSESSING THE NEED FOR POST-GRADUATION COMMUNICATION

Heather Metcalf; Kristy Fitzpatrick; John Frohna

Background: It is well known that transitions along the continuum of medical education are times of potential self-doubt and anxiety. Some trainees find comfort in maintaining an informal connection with their residency programs after graduation. Given this, it is possible that recent graduates may benefit from a more formal connection to their prior residency programs post-graduation.

Methods: To assess this need, recent graduates and current residents were polled to determine their interest in having a website that would connect them to their residency program and to other program graduates.

Results: Overwhelmingly, recent graduates (80%) and current residents (92%) reported that they would use a post-graduation website as a resource for clinical questions and social communication with past colleagues. Attempts were made to create a website that would serve this purpose for the University of Wisconsin Pediatric Residency Program. Two separate website models were created, however, were not able to be implemented due to institutional concerns regarding assurance of HIPAA compliance.

Conclusions: A website to facilitate comminucation with colleagues is desired. Developing a HIPAA compliant website would be a priority.

CASE REPORT: MASSIVE OVARIAN CYST IN ADOLESCENT FEMALE

Danielle M. Priem

Presentation: A 15 year old female presented to the emergency department (ED) following a one month history of progressive abdominal distension. Over this course of time the patient had been trying to lose weight through dietary modifications; she suspected that her abdominal distension was related to her weight loss primarily occurring from her extremities, making her abdomen appear disproportionately larger. In the week leading up to her presentation to the ED she began to experience intermittent right upper quadrant abdominal pain. Her teachers at school were becoming increasingly concerned that the patient might be pregnant. They encouraged her to take a pregnancy test, and when the results of this were negative, they urged her to be seen by a physician given the concern that something "serious" might be causing her symptoms.

In the ED, the patient's vital signs were notable for a blood pressure of 137/94. She was well appearing, but her abdomen was markedly protuberant. While her abdomen was non-tender to palpation, it was firm and dull to percussion. Her examination was otherwise unremarkable. Basic labs, including a CBC, CMP, HCG, and urinalysis were notable for: WBC of 3.4, hemoglobin of 7.3, platelets of 256, creatinine of 1.05, and negative HCG. An abdominal ultrasound was performed that revealed a massive cystic lesion with internal debris and echogenic foci with imaging features concerning for a ovarian cystic mass. There was also noted right greater than left hydrouteronephrosis that was thought to be secondary to obstruction from the mass. Given the size of the lesion, further imaging with MRI was recommended. This revealed a 31 cm TV x 29 cm AP x 36 cm CC cystic intraperitoneal mass. The patient was subsequently taken to surgery where a laparotomy was performed with evacuation of the cyst, with 15 L of clear serous drainage suctioned. There was no identifiable ovarian tissue left to the left ovary, as it had been displaced by the large cyst. A left salpingo-oopherectomy was performed. Pathology confirmed a follicular simple cyst and cytology was negative for malignancy. The patient ultimately did well and prior to discharge her anemia and elevated creatinine, which were likely secondary to chronic renal failure, were improving.

SURVEILLANCE IMAGING IN PATIENTS WITH WILMS TUMOR: IMPACT OF ABDOMINOPELVIC CT

Priya Puri; Kara Gill; Carol Diamond

Background: Wilms tumor accounts for approximately 5% of malignancies in children under 15 years. CT of the abdomen and pelvis is often performed as part of post-treatment imaging surveillance for children with Wilms tumor. However, the rate of recurrence in the abdomen and pelvis is low, with the lung being the most common location for relapse. Repetitive surveillance imaging with CT increases the cumulative exposure to ionizing radiation in this population. Our primary objective is to examine the role of abdominopelvic CT in routine surveillance of patients with Wilms Tumor.

Methods: With IRB approval, we retrospectively identified 41 patients diagnosed with biopsy-confirmed Wilms tumor between January 1999 and December 2014, who received definitive treatment and follow-up surveillance at our institution. Post-treatment imaging surveillance for local recurrence or metastatic disease consisting of scheduled chest radiographs, targeted abdominal ultrasound, and contrast-enhanced CT of the abdomen and pelvis was followed until one of two endpoints was reached: 1) 5 years of disease-free survival, or 2) detection of local recurrence or metastatic disease. 28 patients reached one of these endpoints, and the remainder were excluded from this analysis. Tumor stage at diagnosis, follow-up management, and imaging results were extracted from the medical records.

Results: Of the 28 patients included in our analysis, 5 developed recurrent disease (4 patients with lung metastases, 1 patient with local recurrence, average time to disease detection 12.2 months). In three of these cases (2 pulmonary metastases, 1 tumor bed recurrence) disease recurrence was detected initially by abdominal ultrasound or chest radiograph, in the remaining two patients these modalities were not used as a part of disease surveillance at the time of relapse. In all cases, recurrence occurred in less than two years from time of diagnosis. All recurrences were ultimately treated and cured with salvage chemotherapy, with our without stem cell transplant. Additionally, the mean number of diagnostic and surveillance CTs per patient was 7.2 (range 1 - 21).

Conclusions: In our study population, disease recurrence was detected initially by non-CT imaging modalities when performed as a part of the surveillance imaging, and occurred within two years of initial diagnosis. In addition, the majority of disease relapse in our study occurred in the chest. Given the low rates of recurrence overall and within the abdomen and pelvis, abdominopelvic CT imaging may not be necessary in the routine follow-up of patients with Wilms tumor following definitive treatment.

SICKLE CELL FACT SHEET: IMPROVING COMMUNICATION IN THE TREATMENT OF PATIENTS WITH SICKLE CELL DISEASE

Katie Rebedew; Carol Diamond

Background: Patients with sickle cell disease can present unique challenges for healthcare professionals. In providing care we must know patients personal histories, baseline lab values, disease complications, and what pain management strategies have been effective in the past. This information is at times difficult to ascertain and that can be a barrier to quality care.

Objective: Our goal was to create a tool within the electronic medical record (EMR) that would make it easier for providers to find all of the relevant patient data within the EMR and could be used to communicate that information with patients, families, and other healthcare providers.

Methods: Current pediatric residents were surveyed about their experiences providing care to patients with sickle cell disease. A letter template was designed within the EMR that would include sections for patient specific disease information including past history, complications, and management plans. At clinic visits providers are filling out the letter template, discussing it with patients, saving a copy to the EMR, and providing copies to the patients to share with outside medical providers. Once the majority of sickle cell disease patients have a letter on file, we will re-survey residents to see whether the tool has changed their perception of caring for this unique population.

Results: On the initial pre-implementation survey we received 29 responses (out of 45 residents). Overall residents were slightly dissatisfied with caring for inpatients with sickle cell disease. They found it more frustrating to provide care to patients with sickle cell disease compared to patients with other chronic diseases. Residents felt it was somewhat difficult to find a patient's genotype and what management plan has worked previously. Responses were neutral on how easy or difficult it was to find disease complications. Many residents commented that documentation of disease and management information in a central location within the chart would be beneficial. Further results (post-implementation survey) are pending as the implementation phase is still underway.

Conclusions: Pending

WHAT'S YOUR PROBLEM? A CHART REVIEW EVALUATION OF PROBLEM LISTS IN RECENTLY DISCHARGED PEDIATRIC PATIENTS

Kari O. Sveum

Background: The problem list is an important component of a patient's electronic health record, as it is a central repository for clearly and succinctly communicating a patient's active issues across the care continuum. An accurate problem list (PL) will directly result in more thorough and efficient patient care. In certain cases, accurate documentation of a certain problem will lead to an increased likelihood of being prescribed medications with known clinical benefit. In this study, charts from recently discharged pediatric patients were reviewed to evaluate the accuracy of a patient's PL in the time after a recent hospital discharge.

Methods: The charts of 69 consecutively discharged pediatric patients who discharged during the month of December in 2015 were reviewed. Review occurred at 3-4 months after the discharge date. Patients were included if they had a PL with 15 problems or less. The discharge summary was used to determine primary hospital problem and then this was compared to the PL to determine if it was appropriately updated as related to the hospitalization and whether the active problem was appropriately resolved if necessary. The other items on the PL were also assessed for appropriateness using the UW Health Problem List: Definition, Etiquette and Expectations Guidelines. To evaluate use of the overview feature, if even one PL entry had details listed in the overview section it was considered to have "utilized" this feature.

Results: 52 charts were included in the analysis. At the time of review, 17 patients were excluded from analysis—1 secondary to death, 2 because they were duplicate patients whose chart had already been included in the review, and 14 patients with greater than 15 problems. 98% (50/51) had their primary hospital problem added to the problem list at time of discharge. Of these 50 patients, 20% (10/50) had the hospital problem appropriately resolved, 50% (25/50) had the hospital problem appropriately left active, and 30% (15/50) had the hospital problem inappropriately left active. 55% (28/51) had an issue listed on the PL that was not a true, active problem.

Conclusions: These findings show that the primary hospital problem is being added to the problem list the vast majority of the time; however it is not always being appropriately resolved after the acute issue is over. The majority of patients also have appropriate problems on their list, but there is room for improvement. Further education to providers to help them incorporate this important task into their workflow is needed. There is also opportunity for technical/automated tools in the EHR to help providers identify problems from their documentation that could be added to the problem list, or suggest that inpatient problems be resolved before discharge from the hospital.

PULSE OXIMETRY SCREENING FOR CRITICAL CONGENITAL HEART DISEASE IN PLANNED OUT OF HOSPITAL BIRTHS AND THE INCIDENCE OF CRITICAL CONGENITAL HEART DISEASE IN THE PLAIN COMMUNITY

Kara S Vig; Kathleen K Miller; Jen C Eickhoff; Elizabeth M Goetz; John S Hokanson; Elizabeth J Oftedahl; Gretchen Spicer; Alyssa J Yang;

Background: This study evaluated pulse oximetry screening (POS) for critical congenital heart disease (CCHD) in out of hospital (OOH) births and the incidence of CCHD in this population.

Methods: Wisconsin OOH births in 2013 and 2014 were evaluated. Licensed Midwives, community birth attendants and public health nurses were supplied with and trained in the use of pulse oximeters for neonatal CCHD screening. State records were reviewed to identify deaths and hospital admissions due to CCHD in this population.

Results: Results of POS in 1,616 newborns were reviewed. 799 of the infants were from a Plain community (Amish, Mennonite and similar backgrounds), 775 were from outside the Plain community (English), and the infant's background was not reported in 42. Prenatal ultrasonography was performed in 71.9% of the English pregnancies and in 31.3% of Plain pregnancies. 1,584 babies (98%) passed their POS, 16 infants (1%) failed, and 16 (1%) were not screened. 5 infants had CCHD, all of whom were from the Plain community. 3 of these infants were detected by POS. POS sensitivity for CCHD was 60% and specificity was 99.2%.

Conclusions: POS for CCHD can be successfully implemented outside the hospital setting and plays a particularly important role in communities with high rates of CCHD and where formal prenatal screening is uncommon. The incidence of CCHD in Plain births was high at 5/799 (0.63%).

"A UNIQUE PERSPECTIVE" – BARRIERS AND FACILITATORS TO OBTAINING AND MAINTAINING QUALITY PRENATAL CARE AMONG AFRICAN AMERICAN WOMEN

Jasmine Y Zapata; Sheryl L. Coley

Background: Preterm labor is the greatest contributor to infant mortality, especially among the African American population. There are limited studies exploring the barriers and facilitators to obtaining and maintaining "quality" prenatal care among African American women. The purpose of this community based qualitative study was to explore African American women's unique perspectives into what defines quality prenatal care and the barriers and facilitators they experienced receiving it.

Methods: A diverse sample of providers (obstetrician/gynecologists, family medicine doctors, residents, nurse-midwives and nurse practitioners; n=18) and mothers who recently gave birth in 2015 (African American, Caucasian, Multiracial, n=38) completed 1 hour long semi-structured interviews. Of the 38 mothers, 13 were African American or of multiracial background. We coded and analyzed each interview transcript using thematic analysis techniques to identify main themes regarding how providers and mothers perceive prenatal care quality, facilitators, and barriers to care. Transcripts were also reviewed to examine differences in definitions of quality prenatal care between providers and mothers.

Results: Providers and mothers of all races cited similar concepts of "quality prenatal care" which included respect between mothers and providers, adequate time for listening and addressing questions, and knowledge and implementation of current evidence-based care. From the African American/ multiracial mothers' perspective, effective communication and relationship building with providers stood out as the most commonly cited facilitators of prenatal care quality whereas convenience and adequate length of time for visits were less emphasized concepts. Barriers included feelings that providers were not listening to their concerns/questions, insufficient answers to questions, and perceived disrespect as a result of providers and clinic staff stereotyping them. These concerns were less emphasized in the Caucasian mother population.

Conclusions: In our study, the African American mothers placed a much greater emphasis on provider communication skills, feelings of respect, and lack of perceived stereotyping as facilitators in quality prenatal care in comparison to their Caucasian counterparts and to the providers themselves who focused more on length of visit, scheduling issues, evidence based practices and medical documentation. Further research exploring African American mothers' unique perspectives into the definition of quality of care as well as the barriers and facilitators toward receiving it will be vital in the larger quest toward eliminating racial disparities in infant mortality.

FACULY/FELLOW ABSTRACTS

****PAS Poster Presentation**

CORRELATION BETWEEN PEDIATRIC RESIDENCY APPLICANT SCORING AND PEDIATRIC MILESTONE ASSESSMENT SCORES AT A MEDIUM-SIZED PEDIATRIC RESIDENCY PROGRAM

Dan Sklansky; Grant Syverson; Melissa Cercone; Kathleen Desantes; Jens Eickhoff; John Frohna

Background: Undergraduate medical education predictors of graduate medical education performance are poorly understood. Though USMLE Step 1 and 2 exams may predict graduation and pediatric board pass rates, they have not been linked to broader resident performance; and other residency application characteristics have not been linked to outcomes.

Objective: We sought to correlate attributes and accomplishments from residency applications with future residency performance as measured by aggregate pediatric milestone assessment scores.

Methods: An application scoring tool was designed by program leaders to assign specific scores to applicant accomplishments in areas of scholarly activity, commitment to learning, humanism, and leadership, in addition to exam scores and approximate class rank. Application scores were compared to means of all 21 required ACGME sub competency milestones compiled from end of rotation faculty evaluations of the 2014 intern class, weighted to frequency of each sub-competency evaluation. Multivariate linear regression examined the relationship between application scores and mean milestone scores, adjusting for intern gender and whether the trainee matriculated from this medical school. We also examined separate relationships between mean USMLE score and milestone means, as well as the application score without USMLE and milestone means.

Results: Strong correlation was observed between application score and mean milestone score for the 2014-15 class (N=15, r=0.56, p<0.04). Mean USMLE score was not correlated with mean milestone score (r=0.14, p=0.58). When USMLE test scores were removed from application scores, the correlation with mean milestone scores increased (r=0.63, P<0.02).

Conclusion: Characteristics available in residency applications may correlate with performance during internship as measured by pediatric milestone assessments. We did not identify relationships between USMLE score and resident performance in this sample. Further investigation involving more residents and all years of training may allow educators to refine the use of application characteristics to inform resident selection.

****PAS Poster Presentation**

DETERMINING NORMAL HEMOGLOBIN LEVELS IN EARLY CHILDHOOD: RELATIONSHIPS BETWEEN PARENTAL AND CHILD HEMOGLOBIN

Pamela Kling; Christopher Coe; Carol Diamond; Scott Hebbring; Marilyn Halonen

Background: Hemoglobin (Hb) values can vary substantially between children, are quite insensitive to iron status, but yet are clinically used as a surrogate for infantile iron status. In animal studies, early nutritional environment can impact the set point of Hb. Adult genome wide association studies show that genetic factors also impact set points, unrelated to iron status. Normal Hb values vary by race/ethnicity and after puberty by gender. All determinants of where baseline Hb levels fall are not known.

Objective: We hypothesized that both maternal (mat) and paternal (pat) Hb are predictors of child Hb.

Design/Methods: We examined mat-Hb, pat-Hb and serial levels of child-Hb in a 482 parent-child prospective unselected birth cohort, the Tucson Immune Study (IIS), enrolled from 1997-2003. The dataset contained lab values, demographic data and clinical outcome during pregnancy, infancy and childhood. Child-Hb at 2, 12, 24, 36, 60, and 96 mo (pre-pubertal) was compared to mat-Hb and pat-Hb at 60 mo.

Results: Child-Hb at each time point was directly related to child-Hb at all other points, including during the postnatal Hb nadir at 2 mo (p<0.015 for all). At the 2 mo nadir, child-Hb was unrelated to mat-Hb or to pat-Hb. Child-Hb at 12 mo was directly related to both parents (mat-Hb: R=0.144, p<0.02; pat-Hb: R=0.188, p<0.006). At each point, relationships were stronger between child-Hb and pat-Hb than child-Hb and mat-Hb. The relationships between child-Hb and each parental Hb got stronger over time until child was 60 mo (mat-Hb: R=0.306, p<0.0001; pat-Hb: R=0.332, p<0.0001).

Conclusions: Child-Hb values track over time, and are more strongly related to pat-Hb than mat-Hb. Although mother and child share an early nutritional environment, other factors such as menses or childbirth may weaken maternal-child Hb relationships. Genetic factors may dominate the child-Hb and pat-Hb relationship, but stepwise stronger relationships with child age supports some environmental impact. These data illustrate the limitation of using Hb as the sole measure to diagnose iron deficiency in early childhood and the need for utilizing a better iron index than Hb. Understanding how Hb values track in early childhood may allow definition of a more precise personalized “normal” range.

****PAS Poster Presentation**

A POPULATION-BASED ANALYSIS OF INTER-HOSPITAL TRANSFERS IN PEDIATRIC INPATIENTS

M. Bruce Edmonson; Jens C. Eickhoff

Background: Transfer bias can arise when inferences about trends in disease incidence are based on aggregated counts of hospital discharges and fail to adjust for the double-counting of hospital stays that occurs when individual patients are transferred to another inpatient facility.

Objective: To determine how commonly pediatric transfers occur and to identify patient- and discharge-level factors associated with them.

Design/Methods: We used Washington state discharge databases from 2011 and 2012 to retrospectively analyze information on inpatient hospital discharges (n=116851) for which record linkage allowed analysis of sequential hospital utilization among pediatric patients aged 0-20 years (n=97753). Discharges for routine hospital birth, obstetrical care, and cancer chemotherapy were excluded. Discharge diagnoses were systematically grouped according to Clinical Classification Software (CCS) and Complex Chronic Condition (CCC) indicators. Multivariate analysis of risk for transfer was based on mixed-effects logistic models.

Results: Discharge by transfer to another acute care hospital occurred in 3825 (3.3%) of hospital stays. Transfer rates varied widely across diagnosis groups (range: 0-100%; IQR: 1.5%-4.7%) and complex chronic condition categories (range: 2.3%-16.5%). Multivariate risk for transfer was associated with patient-level factors that included age < 1 year (odds ratio [OR]: 2.19 [vs age 5-9 years]), rural residence (OR: 1.89), and Medicaid (OR: 1.14) and with discharge-level factors that included birth hospitalization (OR: 1.99) and diagnosis codes indicating a complex chronic condition (OR: 4.24 for 3+ CCCs), an alcohol- or drug-related problem (OR: 6.94), or severe multiple trauma (OR: 3.45) ($p<0.0001$ for each factor).

Conclusions: Only a small proportion of pediatric inpatient stays are associated with inter-hospital transfer. Nonetheless, transfer bias appears to be a substantial threat to the analysis of discharge-level data on pediatric hospital stays for specific conditions and, more generally, for those that tend to arise in neonates and infants, rural residents, and children with complex chronic conditions.

A TEAM-BASED SYSTEMATIC APPROACH TO IMPROVING PEDIATRIC ASTHMA

Gail Allen; Karen Pletta

Creating a partnership team with the primary care provider, school nurse and family is important for optimal care of pediatric patients with asthma. Communication among these team members is facilitated by the use of an asthma action plan (AAP).

We embarked on a quality improvement initiative in UWHealth Pediatric Primary Care Clinics with goals of increasing the percentage of children with asthma who 1) have had a recent asthma control and 2) have an up-to-date AAP. Processes were developed to assist clinicians in asthma assessment, teaching, in the development of AAP's and in sending the AAP's to school.

In first 10 months after the initiative started the number children with asthma who had a recent asthma control test increased from 1881 to 2868, and increase from 41% to 76%. We also increased the percentage of children who had an up-to-date AAP from 667 to 1515, and increase from 15% to 40%. During that same time 13% fewer of these children required a systemic steroid for their asthma and there were 32% fewer hospitalizations.

With standard expectations, reporting, trained staff, workflows and tools to support asthma assessment and the creation of AAP's, substantially more of our medically homed children with asthma received assessment with an asthma control test and received an AAP. Early data show that since this quality initiative started, asthma severity, as measured by use of systemic steroids and hospitalizations for asthma, has decreased for this population.

CURRENT USE OF INVASIVE AND NONINVASIVE MONITORS IN ACADEMIC PEDIATRIC INTENSIVE CARE UNITS

Awni Al-Subu; George Ofori-Amanfo; Kyle Rehder; David Turner

Introduction: Cardiorespiratory monitoring is essential in the care of critically ill patients, & a number of invasive techniques are implemented for monitoring of important parameters, but these approaches pose potential risks & complications. In attempt to minimize these risks, there is growing interest in the use of noninvasive technology for cardiopulmonary monitoring.

Hypothesis: To assess the current use of noninvasive monitoring compared to traditional invasive monitoring in Pediatric Critical Care Medicine (PCCM) fellowship-training programs.

Methods: A web-based survey was distributed to PCCM program directors (PDs) at the 64 accredited FTP. Questions focused on demographics, utilization of invasive & non-invasive monitoring for specific patient populations & disease states, & fellow education regarding different monitoring technologies.

Results: Forty-four (69%) PDs responded to the survey. Capnography was the most commonly reported non-invasive monitoring technology. NIRS was utilized more frequently in post-operative cardiac patients than for other populations ($p<0.001$). Invasive monitoring with arterial & central venous catheters is used almost uniformly. Other invasive monitoring is used sparingly, including Swan-Ganz (SG) & pulse index continuous cardiac output catheters. The restricted use of SG catheter utilization has also led to decreased number of these catheters placements by fellows, with 98% of PDs reporting placement of 1 or less SG catheters during training, which are significantly fewer than arterial & central venous catheters ($p<0.001$). There were minimal differences in reported use of monitoring technologies based on either number of ICU beds or size of FTP.

Conclusions: Academic PICUs utilize a range of both invasive & noninvasive monitoring techniques. While the use of noninvasive monitors has become routine in some contexts, utilization remains variable across a wide range of critically ill children. Further investigation is needed to define the standard of care for the use of noninvasive monitors as practitioners attempt to optimize care while minimizing risks & complications.

****PAS Poster Presentation**

MEDICAL COMPLEXITY, FAMILY-DELIVERED HEALTHCARE AT HOME, AND OUTCOMES

Ryan J. Coller; Mary Ehlenbach; Gemma G.S. Warner; Jens C. Eickhoff; Paul J. Chung

Background: Families of children with medical complexity (CMC) often deliver extensive healthcare at home, with unclear implications for child health and family outcomes.

Objective: Explore relationships between family-delivered health care at home for ≥20 hours/week and hospitalizations, ED use, and parent employment outcomes.

Design/Methods: Using the 2009-2010 National Survey of Children with Special Healthcare Needs, CMC were identified from previously described approaches. Families spending ≥20 hours/week delivering healthcare at home were identified. Outcomes included parent-reported need to cut down or to stop work as a result of the child's illness, number of ED visits, and presence of a hospitalization in the prior year. Hospitalizations were assessed in only one state. Associations between family-delivered care ≥20 hours/week and outcomes were explored for CMC with weighted multivariate logistic or negative binomial regression, adjusting for patient and family characteristics. Severity of illness was indicated by the presence of ≥3 subspecialists.

Results: Families of 21.3% of CMC and 2.6% of non-CMC delivered healthcare at home ≥20 hours/week. CMC receiving care ≥20 hours/week averaged 2.6 ED visits in the prior year, with 38.6% hospitalized at least once; most families reported at least one parent having to stop work (65.4%) or cut down (51.6%). Compared to CMC with <20 hours/week, these children had more ED visits (IRR 1.16, 95% CI 1.00-1.34) and parents stopping work (AOR 2.99, 95% CI 2.31-3.85) or cutting down (AOR 1.57, 95% CI 1.22-2.03). Hospitalizations, assessed in only one state, were likely underpowered to detect a difference.

Conclusions: Extensive family-delivered healthcare at home is associated with utilization and major reductions in parent employment. Whether extensive family-delivered care directly drives utilization remains unclear.

****PAS Platform Presentation**

ARE HOSPITALIZATIONS SENSITIVE TO AMBULATORY CARE AMONG CHILDREN WITH MEDICAL COMPLEXITY?

Ryan J. Coller; Paul J. Chung

Background: Hospitalizations for ambulatory-care sensitive conditions (ACSCs) have been considered potentially preventable in general populations; however, their relevance for children with medical complexity (CMC) is unknown.

Objective: Characterize ACSC hospitalizations for CMC and children with non-complex chronic diseases ("NC-CD"), and identify associations with ambulatory care factors.

Design/Methods: Retrospective cohort study of hospitalizations at a children's hospital during 2007-2014, excluding labor/delivery and children over 21 years. The Pediatric Medical Complexity Algorithm stratified patients into CMC, NC-CD, or children without chronic disease. CMC and NC-CD were included in analyses. Demographic and primary care characteristics were compared between ACSC and non-ACSC hospitalizations with logistic regression clustered by patient. For CMC admitted with ACSCs to the hospitalist service and with PCPs at our institution, timing of ambulatory contacts prior to admission was also determined.

Results: Among 4,035 children with NC-CD, 720 (14.6%) of the 4,926 hospitalizations were for ACSCs. A PCP was identified for 94.3% of encounters. ACSC hospitalizations were associated with no insurance (OR 2.0, P=0.01) and <2 (OR 1.26, P=0.006) or no (OR 1.44, P<0.001) prior-year outpatient visits. Among 5,084 CMC, 788 (5.5%) of the 14,390 hospitalizations were for ACSCs. CMC had PCPs in 96.6% of encounters. ACSC hospitalizations were unrelated to having a PCP (P=0.3), having insurance (P=0.6), or number of prior-year outpatient visits (P=0.3). ACSC hospitalizations were much more likely among non-CMC than CMC encounters (OR 3.0, P<0.001). Moreover, among CMC admitted with an ACSC to the hospitalist service and a PCP within the institution, 77.2% actually had ambulatory clinic or phone encounters in the week prior to admission, and 97.5% in the 90 days prior to admission.

Conclusions: Among CMC, it is not clear whether ACSC hospitalizations are truly sensitive to ambulatory care.

****PAS Platform Presentation**

POPULATION HEALTH OUTCOMES FOR CHILDREN WITH MEDICAL COMPLEXITY: A SYSTEMATIC REVIEW

*Elizabeth S. Barnert; *Ryan J. Coller; Bergen Nelson; Lindsay R. Thompson; Vincent Chan; John Tran; Moira Szilagyi; Paul J. Chung (*Presenting Author)*

Background: Children with medical complexity (CMC) generate 40% of child Medicaid expenditures but comprise roughly 3% of the pediatric population. Despite being a costly and vulnerable population, there is no consensus about what outcomes matter.

Objective: To conduct a systematic literature review that defines population health and identifies health outcomes currently being measured for CMC.

Methods: We searched Medline and PsychINFO by linking combinations of key words from 3 groups of concepts: 1) pediatric, 2) medical complexity, and 3) chronicity or severity. Data on health outcomes examined by investigators were systematically extracted, and outcome domains were allowed to emerge

Results: Our search yielded 3,853 articles resulting in 492 articles for data extraction after exclusion criteria were applied. Outcome measures fell into four domains: healthcare use and cost (65% of articles included measures in this domain); family well-being (41.3%); child health and well-being (25.2%); and functional limitations (17.5%) [see Table]. The most prevalent sub-domains were access to/use of medical goods and services (41.3%), progression/complications of disease (22.6%), and family quality of life (20.1%). Notably lacking were articles examining child development, child mental health, and health promotion and wellness.

Conclusions: Researchers to date have focused on four outcome domains for CMC. Whether these domains represent consensus regarding key outcomes is unclear. Research gaps for some important outcomes should be urgently addressed as health systems and policymakers begin to codify health outcomes for CMC and other populations.

****PAS Poster Presentation**

USING A PATIENT PORTAL TO ENGAGE PARENTS IN HOSPITAL CARE

Michelle M. Kelly; Peter Hoonakker; Jenny Bunton; Shannon Dean

Background: Family-centered care improves patient satisfaction and health outcomes. Patient portals engage families by supporting information awareness in the outpatient setting, but inpatient use is limited.

Objective: Assess parent perceptions and use of a portal application on a tablet computer given to parents of hospitalized children.

Design/Methods: This cross-sectional study was conducted with parents of children <12 years old on a children's hospital med/surg unit. From Dec 2014-June 2015, parents were offered the portal (MyChart Bedside) on a hospital tablet to use during the hospital stay. The portal shows real-time vitals, medication list, schedule, lab results, education, healthcare team (HCT) information and provides a way to send staff messages/requests. Portal use was tracked using metadata. Parents completed tablet surveys upon discharge. Items included parent/child characteristics, satisfaction and perceptions of portal usability and impact on parent information needs, error detection and care quality. We described variables using means and percentages.

Results: Over 6 months, 285 parents used the portal. Parents sent 176 requests, 36 messages and made 10 tech support calls. No tablets were lost/damaged. Most used features included: vitals, medication list, HCT information, and schedule. Surveys were completed by 90 parents, mostly mothers (76%) aged 25-44 (76%) who used an outpatient portal (59%). Respondents' children were in good-excellent health (77%) and hospitalized 1-30 times (median 3; mean 4.6). Overall, parents were satisfied with the portal (90%). They perceived it was easy to use (98%), care was better with it (94%), and its use reduced errors in care (89%). Using the portal, 8% of respondents found errors in their child's medication list. A majority thought the portal reduced or did not change their number of questions for the HCT (87%).

Conclusions: Portal use in the hospital may enhance the caregiver experience. Portals may facilitate recognition of medication errors and improve perceptions of hospital quality and safety.

****PAS Poster Presentation**

A PORTAL FOR FAMILIES OF HOSPITALIZED CHILDREN: HEALTHCARE TEAM PERSPECTIVES

Michelle M. Kelly; Peter Hoonakker; Rebecca J. Rankin; Shannon Dean

Background: Patient portals are used to engage patients and families in care; however, portal implementation has been met with skepticism from healthcare teams (HCT) and primarily limited to outpatient use.

Objective: Evaluate HCT perspectives before and after implementation of a portal application on a tablet computer given to parents of hospitalized children.

Methods: This cross-sectional pre-post study was conducted with HCT members on a med/surg unit at a children's hospital. From Dec 2014-June 2015, parents of children <12 years old were given a portal application (MyChart Bedside) on a hospital tablet [figure1]. The portal shows real-time vitals, medications, lab results, schedule, education, and HCT information and provides a way to send staff messages/requests. HCT members completed pre and post implementation surveys on their perceptions of portal implementation. Portal use was tracked with metadata. Variables were described and compared using percentages, chi-squared and t-tests.

Results: Pre-post surveys were completed by 94 and 57 HCT members, respectively (response rate 94 and 57%). Respondents were similar pre-post: 27% nurses, 38% residents, 14% attendings and 21% other. Pre-implementation, all respondents had significant concerns regarding portal implementation, including 43% with concerns about tablets being lost/damaged. Over 6 months, 285 parents used the portal, sending 176 requests and 36 messages. Post-implementation, all concerns of the HCT were significantly reduced ($p<0.001$), including: parents (will) have too many questions (68 to 2% pre-post), parents (will) know results before providers (64 to 4%), staff (would be/are) skeptical of it (42 to 14%) and there (will be/is) not enough technical support (28 to 0%). Staff made 10 technical support calls and no tablets were lost/damaged.

Conclusions: All HCT members expressed concerns about the implementation of a portal for parents of hospitalized children; however these concerns were not realized after implementation.

DECODING THE EMR FOR MEDICAL STUDENTS

Kirstin Nackers; Andrea Carberry; Michael Wilhelm

Background: Electronic medical records (EMRs) are ubiquitous in academic medical centers. Evidence suggests they may negatively impact medical education, and some centers limit student documentation in the EMR. Our institution has allowed documentation in the EMR since its implementation in 2007. To provide more consistent feedback, clerkship directors (authors KN & MW) began grading all submitted admission notes ("H&Ps") this year.

Objective: Identify common themes for errors in medical student notes and determine which may be caused (or encouraged) by using EMRs.

Methods: Our institution determined this research does not qualify as human subjects research and is therefore exempt. During the pediatrics clerkship, students submit two H&Ps for grading; the standardized rubrics and narrative feedback examine data gathering (HP1) and clinical reasoning (HP2). To date, 115 student notes have been submitted and graded according to the HP2 rubric. HP2 rubric and narrative feedback were coded independently by KN and MW using open coding and constant comparative techniques. The coding structure was then validated by a third investigator (AC). Once refined and theoretical saturation achieved, the remaining 106 transcripts were coded independently; 10% were triple-coded to ensure interrater reliability (IRR). When uncertainty arose, individual HP2s were randomly assigned for independent, blinded analysis and discrepancies resolved via consensus.

Results: Eleven categories of error were identified and used for coding the remaining HP2s. Each category was treated as a binary variable, meaning a category of error was coded as present or not; IRR 69%. The majority had errors in at least four categories. The four most common were "missing key information" (60%), "differential too broad/brief" (51%), "missing major components of the plan" (48%), and "rationale not provided/insufficient for plan" (70%). Four other categories were considered potentially related to the use of an EMR template (i.e., automated highlighting of abnormal labs that were then not addressed), and a number of other errors were classified as "errors induced by the use of a template, not otherwise specified".

Discussion: While clinical reasoning errors are expected for third-year students, a surprisingly large number of notes were missing key information, had abnormal results not addressed, or lacked key components of the plan. Despite instructions not to use EMR templates for the assignment, many errors mapped to the use of templates. Future work will determine if early structured feedback impacts notes written by these students as fourth-year acting interns.

A RETROSPECTIVE EVALUATION OF PROPAGATION MAPPING FOR THE TREATMENT OF AVNRT

Amy Van Aartsenl; Ian Law; Nicholas Von Bergen

Background: Atrioventricular Nodal Reentrant Tachycardia (AVNRT) is the most common type of supraventricular tachycardia in the pediatric population. This arrhythmia can be successfully treated by catheter ablation; however, the recurrence risk for AVNRT is as high as 10%. Given this information, development of new innovative techniques has been attempted to improve the long-term success rate. In our experience, we found that electrical activity propagates to the atrium and undergoes a wave collapse near the slow pathway area, the site of successful AVNRT ablation, however this is the first study to evaluate the use of propagation mapping for the ablation of AVNRT.

Methods: Propagation mapping was retrospectively evaluated at two institutions on all patients who had undergone voltage mapping for AVNRT. The patient demographics, procedural data, 3-dimensional mapping and acute and long-term success were evaluated. Patients were excluded if they had complex congenital heart disease.

Results: 43 patients were evaluated. The patients were between 4 and 20 years old. 42% were male. Cryotherapy was used in all patients, with one patient transitioning to RF ablation. There was acute success in all patients. The site of propagation mapping wave collapse was generally just below the successful ablation site within the triangle of Koch. In general the propagation wave collapsed near the mid triangle of Koch.

Conclusion: Propagation mapping, when used in combination with voltage mapping, may provide guidance for identification of the slow pathway, the site of AVNRT ablation. Our study was limited by the retrospect in nature and variability in procedural technique.

****PAS Platform Presentation**

SUGAR RUSH: HOW AN OPEN-SOURCE CURRICULUM LED TO CROWD-SOURCED SPIN-OFFS

Michael B. Pitt; Sabrina M. Butteris (on behalf of the SUGAR Spin-Off Investigators)

Background: Simulation Use for Global Away Rotations (SUGAR) is a standardized simulation-based curriculum designed to allow those preparing for global health electives the opportunity to experience and debrief the common practical and emotional challenges of working in resource-limited settings.

Objectives: Create and disseminate an open-source e-learning environment where global health educators could receive the necessary training to implement SUGAR at their institutions, and encourage collaboration and ownership of future projects.

Methods: We incorporated feedback from the study facilitators through surveys to determine which aspects of training were integral for successful implementation. Using this information, we created training videos of live annotated SUGAR sessions that were posted with free downloadable cases at sugarprep.org. We offered to assist any user interested in leading a spin-off project with the tech and research support to do so.

Results: Since the initial debut of the curriculum at APPD in 2014, more than 100 SUGAR facilitators have been trained from over 80 institutions in 6 countries. There are currently several collaborative SUGAR projects being led by over a dozen people trained in the curriculum. These spin-offs include: SUGAR CANE (Cases About Non-Medical Events) which focus on challenges encountered in travel in low and middle income countries; SPICE (SUGAR: Practical Information from Core Educators) which is looking to gather teaching insights for facilitators; SUGAR-4-All which is studying the impact of facilitating cases for those not interested in global health; as well as individuals taking the lead on expanding with case designers from surgery, emergency medicine, OB, family medicine, clinic environments, immigrant health, and cases for medical students.

Conclusions: By creating and disseminating an open-source curriculum that fills a need of global health educators and offering support, multiple novel collaborative projects have emerged. This process could serve as a model for other educators with a novel curriculum looking to disseminate and expand their idea.

TRKB RECEPTOR AGONIST 7,8-DHF ALTERS EFFECT OF HYPOXIC-ISCHEMIC ENCEPHALOPATHY (HIE) ON MOUSE ERG

De-Ann M. Pillers; Xingyu Liu; Eshwar Udo; Ulas Cikla; Peter Ferrazzano; Pelin Cengiz; Bikash R. Pattnaik

Purpose: Hypoxic-ischemic encephalopathy (HIE) is a birth-related brain injury caused by oxygen and blood flow deprivation that may lead to neurodevelopmental delay in neonates. Brain-derived neurotrophic factor (BDNF) is a neurotrophin that serves as a biomarker for HIE injury. BDNF likely supports neuron survival in brain, and encourages growth of new neurons and synapses via binding to the TRKB receptor. Brain and eye abnormalities are often associated. We have shown by electroretinography (ERG) that there are abnormalities in retinal function in an HIE mouse model. The a-wave is normal but the b-wave amplitude is severely subnormal, resulting in a reduced b/a wave amplitude ratio. We asked whether 7,8-Dihydroxyflavone, a small molecule TRKB receptor agonist which has been shown by our group to provide protection from brain damage in HIE, might similarly improve retinal function as demonstrated by the ERG.

Methods: Postnatal day 9 C57/BL6 mice were subjected to Vannucci's neonatal HIE model by left common carotid artery (LCCA) cauterization and exposure to 10% O2 at 37 C for 50 min. Sham operated mice had skin incision and manipulation of the LCCA without hypoxia. ERGs were done on 6 wk old mice using the HMsERG system (Ocuscience) under Ketamine (90), Xylazine (7.5), and Acepromazine (1.75) mg/kg mixed anesthesia IP. Scotopic ERGs were done at half-log unit intervals from 0.03 to 30 log cd-s/m2 intensity. Amplitudes and implicit times for the a- and b-waves were measured and averaged. Oscillatory Potentials (OP) were extracted by filtering the ERG response at 300 Hz to reflect inner retinal integrity. The Student's t-test was used for statistical analysis and a P value < 0.05 was deemed significant.

Results: A reduced ERG b/a-wave amplitude ratio of 1.4 was found for the eye on the side of the carotid manipulation in the HIE mouse, as compared to the contralateral control eye (2.5). When treated with 7, 8-DHF, the b/a-ratio for the eye on the side of HIE exposure improved to 2.2.

Conclusions: HIE is associated with visual deficits in the mouse with significant changes in the ERG b-wave. The b-wave abnormalities were lessened in mice treated with the TRKB agonist, 7,8-DHF, similar to the neuroprotection that occurs in brain. We propose that ERG analysis may provide insight into HIE retinal effects, and may be a useful tool to monitor attempts to rescue HIE in a non-invasive and longitudinal fashion.

****PAS Poster Presentation**

RELIABILILTY OF A TOOL TO MEASURE CULTURE SHOCK IN MEDICAL TRAINEES.

Nicole E. St Clair; Vanessa McFadden; Sabrina Butteris; Tifany Frazer; Ashley Hines; Zahra Ismail; Jacquelyn Kuzminski; Melodee Nugent; Pippa Simpson; Samantha Wilson

Background: A survey from 2013 documented that 58% of pediatric residency programs offered global health (GH) electives. These occur within markedly different cultural, ethical and economic paradigms, resulting in intense clinical immersions. Limited data exist regarding trainees' experience of culture shock during GH electives; however, GH educators anecdotally note frequent trainee culture shock. Difficulty coping with culture shock has been associated with increased likelihood of early departure, decreased satisfaction, and suboptimal interactions with in-country personnel. Improved understanding of trainee culture shock would inform GH elective preparation and on-site support.

Objective: Assess the reliability of the Culture Shock Profile (CSP) Questionnaire (Zapf, Social Work, 1993) to measure the degree of culture shock experienced by medical trainees during one-month GH electives.

Design/Methods: In 2015, 3 residents and 9 medical students participated in a pilot study. Participants completed a Demographic Questionnaire and Resilience Assessment (CD-RISC 10) pre-travel. During their GH electives, they were prompted to complete the CSP Questionnaire every 4 days.

Results: For the on-site questionnaires, 33% completed 7/7; 67% completed > 6/7; and 100% completed >3/7. The Resilience Assessments and CSP Scores demonstrated good-to-excellent reliability as assessment tools (Table 1). Pearson correlations showed a significant inverse relationship between resilience and culture shock for days 6 (R=0.77) and 22 (R=0.83).

Conclusions: The pilot study demonstrated good reliability of the assessment tools for medical trainees during GH electives and supported an inverse relationship between trainee resilience and culture shock severity. Scaling up this research is warranted to delineate culture shock patterns during short-term GH electives, and to identify factors that influence the severity of culture shock experienced by trainees at different levels.

****PAS Poster Presentation**

UTERINE SPACE RESTRICTION IN FETAL SHEEP IS ASSOCIATED WITH DYSREGULATED RENIN ANGIOTENSIN SYSTEM

Adam S Bauer; Rachel K Shorthouse; Sharon E Blohowiak; Jeffrey L Segar; Ronald R Magness; Pamela J Kling

Background: Uterine space restriction (USR) during ovine pregnancy induces intrauterine growth restriction (IUGR) and models many aspects of human IUGR. We previously reported aberrant fetal renal development and iron metabolism from this USR model, i.e. decreased nephron number, prolonged nephrogenesis, contracted plasma volume, and increased iron deposition. Fetal renin-angiotensin system (RAS) plays a role in nephrogenesis and intravascular fluid balance while excess angiotensin II may cause renal iron deposition. Angiotensin II acts via Angiotensin II1-8 receptors AT1R, AT2R and Angiotensin II1-7 MASR.

Objective: To test the hypothesis that USR increases angiotensin receptor expression and increased iron deposition in fetal ovine kidneys.

Design/Methods: Multiparous ewes with surgical reduction in placental / attachment sites with multiple fetuses were studied (USR). Non-space restricted (NSR) singletons served as controls. Fetal kidneys and blood were collected during non-survival surgery on either gestational day (GD) 120 or GD130 (term = GD147). Fetal blood was analyzed for plasma chemistry, renin activity and iron indices. Kidneys were analyzed for AT1R, AT2R, and MASR by Western Blot analysis and immunohistochemistry.

Results: Expression of AT1R, AT2R, and MASR increased in USR between GD120 and GD130 ($P<0.04$), while unchanged in NSR. Expression of AT2R/AT1R was upregulated in USR at GD120 and GD130 compared to NSR and between gestational dates ($P<0.05$). Plasma renin activity was indirectly related to plasma osmolarity ($P<0.02$), while AT1R and AT2R were directly related to plasma osmolarity ($P<0.02$). Total iron binding capacity was directly related to all receptors ($P<0.02$). All 3 angiotensin receptors were expressed in proximal and distal tubules, and maculae densa.

Conclusions: Although USR upregulated renal angiotensin receptor expression, receptor balance was altered with relatively greater AT2R than AT1R. The relationships between osmolarity, TIBC and angiotensin receptors support a role for RAS in regulating fetal intravascular homeostasis and iron. Altered expression and balance of renal angiotensin receptors in IUGR fetuses could contribute to the increased risk of hypertension later in life. Funding: NIH-HL87144, HL49210, HD 38843, UA Grad Research Assistantship, Nutr Sciences.

****PAS Poster Presentation**

AUTOMATIC STOP IN NICU ADMIT ORDER SET LOWERS ANTIBIOTIC EXPOSURE

M. Cora Astorga; Ann Ebert; Steven Ebert; Kyle Piscitello; Pamela Kling

Background: Suspected neonatal sepsis is a common diagnosis in the NICU. Excess antibiotic exposure poses risks in both term and preterm infants. Standard practice includes treating neonates for rule out sepsis with antibiotics for 48 hours pending culture results. Based on clinical rounding times, antibiotic dosing can exceed 48 hours. As part of a stewardship initiative, a 48-hour automatic (auto) antibiotic stop was placed in the electronic admit order.

Objective: Antibiotic orders were assessed 1 year pre and 1 year post institution of a 48-hour autostop. The admit order set included stop times for Ampicillin (Amp) and Gentamicin (Gent). We hypothesized that antibiotic doses per patient (pt), per pt days and overall unit exposure would decrease.

Design/Methods: Data on NICU patients receiving antibiotics were obtained from the electronic medical record pre and post auto stop initiative. Dosage data on Amp, Gent, Vancomycin (Vanc), Cefotaxime (Ceftx), Metronidazole (Metro) were analyzed. Clinical patient acuity measures were ascertained from Vermont Oxford Network (VON) data.

Results: Both early (0.6%) and late onset sepsis (0.9%) were uncommon in the combined pre/post groups. Chorioamnionitis and early and late onset sepsis cases did not differ between pre- and post-autostop initiative. Only the number of surgical neonates decreased in the post-autostop group ($p=0.048$). Total doses given/pt or doses/pt days were lower post-autostop ($p<0.0001$). Amp and Gent doses/pt and doses/pt days were lower post-autostop ($p<0.0001$ for both). Antibiotics outside of the order set, in doses/pt or doses/pt days also dropped: Vanc, Metro, Ceftx ($p<0.0001$ for all) with the highest percentage drop seen in Vanc.

Conclusions: The use of antibiotics beyond 48 hours is a common phenomenon in NICUs. Most antibiotic orders for presumed infection are placed on admission. It is common to wait for culture negativity before stopping antibiotics, a practice that may promote unnecessary doses. Despite unchanged pre-post acuity indicators, dramatically decreased antibiotic usage was observed. Fewer doses of Ceftx, Metro, Vanc were given post-auto stop; we can surmise that this was because of the provider awareness of the antibiotic stewardship initiative. Electronic order sets are valuable resources in the execution of stewardship goals.

FROM PILOT TO POLICY: IMPLEMENTATION OF A PEDIATRIC RAPID RESPONSE TEAM USING KOTTER'S CHANGE THEORY

Adam Szadkowski; Sushant Srinivasan; Scott Hagen; Melissa Cercone

Background: Implementation of a Pediatric Rapid Response Team (PRRT) has been associated with reduced mortality. Our hospital historically relied on an informal process of critical care consultation triggered by physician concern or a Pediatric Early Warning System (PEWS); however, there was marked variation in the perceived role and performance of this consult service.

Aim Statement: Our goal was to develop a formal PRRT process and justify its adoption as policy within one year. Six month feasibility process measure goals included: 100% PRRT activation via paging, 100% 15 min PRRT response time, and 100% complete team (MD/RN/RT) response.

Interventions: We utilized the model for improvement and Kotter's change theory to generate an inter-professional shared vision for the PRRT. We communicated with and empowered participants via educational sessions every 3 months, through 3 PDSA cycles.

Measures: Baseline perceptions from residents, RNs, and RTs were collected via pre-intervention surveys. Post-intervention surveys and focus group data were collected at the 1st cycle. Page operator and log data of PRRT responses, focus group feedback, and PEWS scores were collected at the 2nd and 3rd cycle.

Results: The plan for a new PRRT team was formalized in 4 months. Universal page activation was 79% (23/29) after the 1st cycle and 64% (9/14) after the 2nd cycle, and 100% (28/28) for the 3rd cycle. Complete team activation and response within 15 min were each 100% after the 1st and sustained in the 2nd cycle. Focus group feedback during the 1st, 2nd and 3rd cycles demonstrated sustained positive impressions of the PRRT as a more structured, collegial, and a less intimidating process. There was no statistical difference in average PEWS scores from PRRT events where disposition was to remain on the ward vs. transfer to the PICU.

Conclusions and Next Steps: Utilizing the model for improvement and Kotter's change theory we demonstrated a PRRT team was feasible and well-received by inter-professional stakeholders. Our PRRT will be policy beginning 2016.

****PAS Poster Presentation**

Accelerated weight gain due to gestational hyperglycemia manifests only after first year

Allison Pollock; Sharon Blohowiak; David B Allen; Pamela Kling

Background: Excessive maternal and child weight gain and gestational diabetes are key risk factors for eventual development of obesity and metabolic syndrome in offspring. However, it remains uncertain whether gestational hyperglycemia, either persistent or transient (isolated abnormal mid-gestation 1-hr OGTT followed by normal subsequent test) is the primary factor influencing early life excess weight gain.

Objective: Examine the hypothesis that persistent or transient gestational glucose hyperglycemia correlates with accelerated infancy weight gain by evaluating acceleration BMI gain in infants born to mothers categorized as follows: Group 1 Diabetes (1h-OGTT ≥140 & confirmed > 7 days later); Group 2 Glucose Dysregulation (1h-OGTT ≥140 & normalized); Group 3 Normal (1h-OGTT <140).

Design/Methods: This is a post hoc review of gestational 1h-OGTT results and anthropometric data from a prospective study of 316 mother-infant pairs originally recruited based on increased risk for iron deficiency. Inclusion: healthy infants born >35wks gestation, maternal age 18-40 yrs, & at least 2 risk factors (infant SGA/LGA status, maternal anemia, maternal diabetes, Medicaid insurance, African American, Latina, Asian). Offspring BMI, and BMI z-score velocity through age 1 yr were evaluated using linear mixed effects modeling.

Results: BMI z-score at birth did not differ significantly between groups: Group 1: 0.63, Group 2: 1.04, Group 3: 0.68 ($p>0.4$ for comparisons). BMI z-score velocity data from 283 mother-infant pairs through 1 yr of life are in Table 1.

Conclusions: Between 4-12 months postnatally, there was no significant difference in rates of BMI gain in offspring of mothers with normal glycemia, transient hyperglycemia, or persistent diabetes. Results suggest that factors other than maternal glycemia are paramount in promoting accelerated early life weight gain. Larger population and longer duration analysis will reveal whether these findings hold true for infants and persist with regard to childhood weight gain and diabetes risk.

INHIBITION OF THE JAK/STAT AND BCL-2 PATHWAY ENHANCES ANTI-TUMOR EFFECTS IN T CELL ACUTE LYMPHOBLASTIC LEUKEMIA (T-ALL)

Sydney L. Olson; Kirsti L. Walker; Myriam N. Bouchlaka; Christian M. Capitini

T-cell acute lymphoblastic leukemia (T-ALL) is a rare and aggressive form of pediatric cancer and Early T-cell Precursor ALL (ETP-ALL), a T-ALL subset, is correlated with mutations in recent hematopoietic stem cell descendants and induces an even more dire prognosis. We investigated a novel treatment for both T-ALL and ETP-ALL through inhibiting the Janus Activating Kinase/Signal Transducer and Activator of Transcription (JAK/STAT) and B-cell lymphoma 2 (BCL2) pathways. Inhibition of each pathway was accomplished through the use of two small molecule inhibitors, Ruxolitinib (JAK1/JAK2 inhibitor) and Venetoclax (BCL2 inhibitor). Previous studies demonstrated an upregulation of BCL2 expression in different strains of pediatric T-ALL, with ETP-ALL showing the highest overall upregulation. We hypothesize a lesser dose of Venetoclax will have a greater inhibitory effect against the human ETP-ALL cell line (Loucy) in comparison with the Venetoclax dose against the human T-ALL cell line (Jurkat) (Chonghaile et al., 2014). Both cell lines are known to initiate proliferation through the JAK1/2 and STAT1 pathways and Ruxolitinib displays high inhibition against these mutated JAK/STAT pathways. In vitro we determined optimal Ruxolitinib and Venetoclax doses against the Loucy ETP-ALL cell line through proliferation and viability assays. The combination dose demonstrated a synergistic effect that we plan to test in vivo. In vivo pilot data using immune deficient Nod Scid Gamma (NSG) mice was utilized to determine optimal doses of Ruxolitinib and Venetoclax against the Jurkat T-ALL cell line through oral gavage treatment. These optimal doses were then used in a combination in vivo experiment, which currently did not yield synergistic results. We plan to repeat this experiment and test lower combination doses using intraperitoneal (IP) injections.

THE CMYBP-C E258K HCM-CAUSING MUTATION DOES NOT AFFECT MRNA SPLICING

Willem De Lange; Nicole Bednarz; Richard L. Moss; J. Carter Ralphe

Background: Hypertrophic cardiomyopathy (HCM) is the most commonly inherited cardiovascular disease, affecting approximately 0.2% of the general population. Mutations in MYBPC3, encoding cardiac myosin binding protein-C (cMyBP-C), are common causes of HCM. Many MYBPC3 mutations cause aberrant mRNA splicing, leading to cMyBP-C truncation and cause disease through a mechanism of haploinsufficiency. The E258K mutation in MYBPC3, a prevalent cause of HCM, has been postulated to alter splicing due to its location in the exon 6 splice donor site. Our previous data, however, indicated that it may act in a dominant negative manner by altering interactions with myosin-S2 and actin.

Design: Here we investigate whether the E258K mutation alters RNA splicing and act through a mechanism of cMyBP-C haploinsufficiency, or as a true dominant negative missense mutation by assessing mRNA and protein levels in an E258K knock-in mouse model.

Results: Applying an array of RT-PCR primers designed to detect all potential miss-spliced transcripts arising from this mutation no aberrantly spliced Mybpc3 transcripts were found in mice heterozygous for E258K. Additionally, Myocardium expression of cMyBP-C protein in either heterozygous or homozygous E258K mice was similar to that of wild type control littermates and lacked evidence of truncated cMyBP-C. Interestingly, the E258K mutation results in reduced phosphorylation levels of cMyBP-C at S273 and S302, without affecting phosphorylation S282.

Conclusion: In this murine model, the E258K mutation does not affect mRNA splicing and does not appear to act through a mechanism of cMyBP-C haploinsufficiency. We previously showed that E258K cMyBP-C reduces its affinity for myosin S2 while increasing its affinity for actin, resulting in reduced twitch force amplitude and accelerated contractile kinetics. Taken together, these results suggest that this mutation acts in a dominant negative fashion.

****PAS Platform Presentation**

SCREENING FOR IRON DEFICIENCY AND IRON DEFICIENCY ANEMIA, MORE THAN A HEMATOLOGICAL DISEASE

Barbara Ha; Deirdre O'Sullivan; Carol Diamond; Jeffrey Sleeth; Pamela Kling

Background: Iron deficiency (ID) and ID anemia (IDA) in infancy constitutes a serious public health problem. In the US, routine screening using hemoglobin (Hb) for 1-year-old infants is recommended by the American Academy of Pediatrics but not by the US Preventive Services Task Force, resulting in lack of uniformity in provider screening. Utilizing electronic best practice alerts (BPA) can improve uniformity of screening rates in high-risk populations.

Objective: To explore: (1) compliance with ID screening guidelines pre/post implementation of a BPA recommending CBC in a university-based practice; (2) practice variation among clinics and providers; and (3) the efficacy of using combined dual biomarkers for detecting ID in infants.

Design/Methods: We assessed CBC, including Hb, mean corpuscular volume (MCV), and ferritin (Fer) levels in infants between 8 and 12 mo of age in Family Medicine (FM) or Pediatric (Peds) clinics. Cut-offs were 11 g/dL for Hb, 12 mg/L for Fer, and 72 fL for MCV.

Results: In 2545 infants pre-BPA and 4068 post-BPA, screening rates increased from 48% to 72%, $p<0.0001$. Post-BPA rates remained stable without drop off over time. Peds providers were more compliant with the BPA than FM. Providers elected to use Hb by itself, CBC, Fer, or CBC+Ferr. 96% of screening tests ordered were completed. 90% of infants received their initial screen at 12 mo, 6% at 9 mo, 4% at 9 to 12 mo, and <1% at 8 to 9 mo. For those using a single screen, Fer was abnormal in 15% and Hb in 13% of those tested. If 31 biomarker was available, 3 potential dual biomarker screens were assessed: Hb+Fer, Hb+MCV, and Fer+MCV. Among infants screened with Hb+Fer, 8% had low Hb only, 11% low Fer only, 4% low Hb+Fer, 77% normal. For Hb+MCV, 11% had low Hb only, 5% low MCV, 2% low Hb+MCV, 82% normal. For Fer+MCV, 11% had low Fer only, 4% low MCV only, 4% low Fer+MCV, 80% normal.

Conclusions: The BPA improved and sustained screening rates. Providers commonly used Hb instead of the recommended CBC. Fer, less commonly used, identified a pre-anemic at-risk cohort–normal Hb but low Fer, potentially enabling earlier intervention before progression to IDA. Combined testing with either an abnormal Hb or Fer identified 35% more infants than either test alone. Further quality improvement work to examine test combinations and clinical approaches after abnormal screening is needed.

****PAS Poster Presentation**

INCREASING FETAL OVINE NUMBER PER GESTATION ALTERS FETAL PLASMA CLINICAL CHEMISTRY VALUES

Micaela Zywicki; Sharon Blohowiak; Ronald R Magness; Jeffrey Segar; Pamela Kling

Background: Intrauterine growth restriction (IUGR) is linked to developmental programming of lifelong pathophysiology. Human multifetal gestation pregnancies lead to IUGR, with increasing fetal number interfering with placental nutrient delivery. Little is known about fetal blood analyses reflecting fetal nutrition, liver and excretory function in last trimester of human or ovine IUGR. In an ovine model of IUGR, it was hypothesized that fetal plasma biochemical values would reflect placental, liver, and fetal kidney dysfunction as number of fetuses per gestation rose.

Objective: To determine fetal plasma biochemical values in singleton, twin, triplet and quadruplet/quintuplet ovine gestation.

Design/Methods: We investigated morphometric measures and clinically used plasma chemistry panels with nutritional measures, liver function, and placental and fetal kidney excretory measures at gestational day (GD) 130 (90% gestation).

Results: By GD130, placental dysfunction was observed by a decrease in fetal weight as fetal number per ewe rose, $p<0.0001$. Fetal plasma glucose and triglyceride levels fell and were directly related to fetal weight, $p<0.0001$ for each. Plasma creatinine levels, reflecting fetal renal excretory function, and plasma cholesterol levels, reflecting placental excretory function, were highest in quads and indirectly related to weight, $p<0.05$ and $p<0.01$ respectively. Fetal plasma BUN, more freely diffusible across the placental due to its small size, did not follow any patterns.

Conclusions: We found progressive biochemical disturbances with increasing growth restriction accompanying the rise in fetal number. Lower fetal weight as fetal number per gestation rose indicates placental insufficiency at the maternal-fetal interface. We report evidence for impaired glucose, fat and protein transport, along with placental and fetal renal excretory dysfunction in this model of IUGR. Understanding the compensatory and adaptive responses of growth-restricted fetuses at the biochemical level may help explain the developmental deficits associated with growth restriction. This physiological understanding is important for clinical care and the generation of intervention strategies to prevent the developmental programming in multifetal gestation IUGR.

BREASTFEEDING INCREASES THE RISK OF CHILDHOOD ANEMIA IN A RURAL COMMUNITY IN SOUTH-EASTERN NIGERIA – EMPHASIS ON MATERNAL NUTRITIONAL STATUS MAY BE THE KEY TO REDUCING CHILD MORTALITY FROM ANEMIA

Sean Buck; Kevin Rolnick; Amanda Nwaba; Jens Eickhoff; Kelechi Mezu-Nnabue; Emma Esenwah; Olachi J. Mezu-Ndubuisi

Background: Child mortality rate in sub-Saharan Africa is 29 times higher than in industrialized countries. Anemia is one of the preventable causes of child mortality. Volunteer medical staff from University of Wisconsin (UW), Madison used a free humanitarian medical mission conducted by Mezu International Foundation (MIF) in rural South-Eastern Nigeria to determine the prevalence and risk factors of anemia in that region, in order to identify strategies for reduction.

Methods: We conducted a cross-sectional study on 96 children aged 1- 7years from 50 randomly selected families seeking care at the august 2015 MIF medical mission. The number of children surveyed was determined from attendance at prior medical missions. Institutional Review Board (IRB) was obtained from a collaborating local institution, Federal University of Technology, Owerri. Verbal informed consent was obtained from parents or caregivers prior to study participation. A study questionnaire was used to collect information regarding socio-economic status, family health practices and nutrition. Other clinical diagnoses were obtained from medical records at the mission. Anemia was diagnosed clinically or by point of care testing of hemoglobin (Hgb) levels.

Findings: Out of 96 children that were selected for the study, 90 completed surveys were analyzed (49% male and 51% females). Anemia was the most prevalent clinical morbidity (69%), followed by intestinal worm infection (53%), and malnutrition (29%). All children were breastfed beyond five months of age. Mean age (months) that breastfeeding was stopped was 11.8 (±2.2) in children with Hgb <11mg/dl (severe anemia), 10.5±2.8 in children with Hgb = 11-11.9mg/dl (mild-moderate anemia), and 9.4±3.9 in those with Hgb >12mg/dl (no anemia) ($p=0.0445$). Interpretation: The longer the infant was breastfed, the worse the severity of childhood anemia. Childhood anemia was likely influenced by the low iron content of breastmilk, an indication of maternal anemia and poor nutrition. Although continuous breastfeeding is a known strategy to reduce child mortality, a family-centered preventive intervention to diagnose and treat maternal anemia may be more effective in reducing childhood anemia in the community, which could lead to reduced mortality from anemia.

****PAS Poster Presentation**

VITAMIN D INHIBITS RETINAL VESSEL GROWTH IN AN IN VIVO MOUSE MODEL OF ROP

Olachi J Mezu-Ndubuisi; Thao Adams; Nasim Jamali; Nader Sheibani

Background: Retinopathy of Prematurity (ROP) is a potentially blinding disease, defined by obliteration of retinal vessels after preterm birth into a hyperoxic environment (Phase 1), and hypoxia-induced neovascularization 4 weeks later (Phase 2). Since control of oxygen remains controversial, safer treatment alternatives should be explored.

Objective: Vitamin D is a nutritional agent for enterally fed neonates. This study investigates its effect on retinal vessel growth in an in vivo mouse model of oxygen-induced retinopathy (OIR).

Design/methods: C57BL/6J mice received 77% oxygen from postnatal day (P) 7 to P12, then intraperitoneal injection of Vit D or sterile water (H2O) was given. Age-matched mice stayed in room air (RA). At P24, fluorescein angiography (FA) was done on live, anesthetized mice. Retinal vascular area, retinal vein width, and retinal artery tortuosity were quantified.

Results: Retinal vascular area was reduced in vit D (27.63±7.64%) compared to H2O and RA mice, (39.71±11.56, p=0.001). H2O and Vit D OIR mice had wider retinal veins than RA mice (p=0.003). Retinal arteries in OIR mice were significantly more tortuous than those of RA mice (p<0.003). Vit D mice had lower weights at imaging (5.53±1.17g, n=19) than H2O (8.4±1.7g, n=28) or RA mice (10.5±0.81g, n=7),(p<0.0001).

Conclusion: Vitamin D inhibited retinal vessel formation and growth in OIR mice. It may be a potential treatment for Phase 2 ROP, so its use before 4 weeks of life in preterm babies should be re-evaluated. Further studies are needed to explore the mechanisms of vitamin D's anti-angiogenic effect.

****PAS Poster Presentation**

BLOCKADE OF NOTCH PATHWAY SIGNALING SUPPRESSES HYPEROXIA-INDUCED ALTERATIONS INDICATIVE OF EPITHELIAL-MESENCHYMAL TRANSITION (EMT) IN LUNG ALVEOLAR EPITHELIAL CELLS (AEC)

Wenxiang Luo; Simran Brar; Bikash Pattnaik; De-Ann M. Pillers

Background: Epithelial-Mesenchymal Transition (EMT) is a process in normal wound healing that has been shown to contribute to the pulmonary fibrosis that is associated with recurrent lung injury in adults. We are studying the EMT process as induced by hyperoxia, an important contributing factor in lung injury that precedes neonatal bronchopulmonary dysplasia (BPD). Notch signaling plays a key role in determining cell fate and this pathway has been implicated in our previous studies of the effect of hyperoxia on the alveolar epithelial cell (AEC) response.

Objective: To determine the effects of blocking the Notch pathway on hyperoxia-induced alterations towards EMT in AEC.

Design/methods: Hyperoxic cells were incubated in 95% O2/5%CO2 whereas control cells were in room air with 5% CO2. Quantitative real-time PCR was used to measure mRNA expression in response to hyperoxia in the non-tumorigenic C10 mouse AEC line, and cell morphology changes were captured with a live-cell image system (NIH ImageJ). Additional experiments were conducted in A549 to determine effects on human AEC. Data were analyzed by ANOVA and t-test. A P value of <0.05 was deemed significant.

Results: DBZ, a Notch pathway inhibitor, reduced the induction of alpha-smooth muscle actin and serpin peptidase inhibitor clade E member1 (Serpine1) in C10 cells exposed to 24-h of hyperoxia ($P < 0.05$). In 36-h exposures, expression of hyperoxia-induced Serpine1 was suppressed by both DBZ and DAPT, another Notch pathway inhibitor ($P < 0.02$). However, expression of Il6 and occludin were not significantly affected by Notch inhibitors. Furthermore, DBZ prevented the cell morphology changes we have found to be caused by hyperoxia at both the 24- and 36-h exposures. DBZ reduced the increased ratio of Feret diameter to MinFeret diameter in C10 cells treated with hyperoxia ($P < 0.02$). Treatment with DBZ increased the reduced cell circularity caused by hyperoxia in C10 cells ($P < 0.02$). Similarly, in human A549 cells, DBZ and DAPT inhibited induction of SERPINE1 by exposure to 48-h of hyperoxia ($P < 0.03$).

Conclusions: Notch pathway blockade suppressed the expression of key hyperoxia-induced biomarkers of EMT and counteracted cell morphology changes demonstrating EMT in AEC. We suggest that the Notch pathway plays an important role in mediating EMT caused by hyperoxia and is a likely contributor to the development of BPD.

PROLONGED CELL CYCLING IN CMYBP-C-/- MOUSE MODEL PRECEDES HYPERTROPHIC SIGNALING

Annie E. Armstrong; Emily T. Farrell; Adrian C. Grimes; J. Carter Ralphe

Background: The importance of cardiac myosin-binding protein-C (cMyBP-C), a thick filament-associated regulatory protein in cardiac contraction, function, and disease has been extensively studied using mouse models with altered cMyBP-C expression. Knocking out cMyBP-C in mice results in a severe hypertrophic phenotype that models human familial hypertrophic cardiomyopathy (HCM). We previously determined that newborn cMyBP-C-/- hearts are normal in size but develop significant hypertrophy by post-natal day nine (PND9). We hypothesized that transcriptome comparison of the PND1 and PND9 cMyBP-C-/- hearts would reveal early signaling pathways critical to the development of hypertrophy. We performed microarray analysis of PND1 and PND9 WT and cMyBP-C-/- myocardium, with validation RT-qPCR of specific genes at intermediate time-points. Our microarray identified differential upregulation of cell cycle pathways at postnatal day 1 (PND1), prior to upregulation of the hypertrophic pathway at PND9 in cMyBP-C-/- vs WT hearts. Unlike WT, cMyBP-C-/- proliferation pathways persisted through PND2, preceding the prominent hypertrophic phenotype observed at PND9. These data suggest that an early upregulation in cardiomyocyte cell proliferation may contribute to the HCM phenotype by an increase in cardiomyocyte number and/or through interaction between cell cycling and hypertrophic signaling pathways. Separately, mXinβ, a gene associated with cardiomyopathy which localizes to intercalated disc, was identified in our microarray as strongly upregulated in cMyBP-C-/- hearts. Furthermore, qPCR reveals upregulation of mXinβ prior to birth and persisting through PND9, suggesting mXinβ as an early participant in the hypertrophic signaling cascade. In conclusion, we have identified gene expression differences in pre-hypertrophic cMyBP-C-/- mice suggesting that early candidates, including genes involved in the cell cycle, may mediate the development of hypertrophy and could therefore represent novel therapeutic targets.

MISSENSE MUTATIONS IN CARDIAC MYOSIN BINDING PROTEIN-C CAN CAUSE DISEASE THROUGH HAPLOINSUFFICIENCY

Dan F. Smelter; Willem J. de Lange; J. Carter Ralphe

Background: Cardiac myosin binding protein-C (cMyBP-C) is a functional protein of the cardiac sarcomere that regulates contractility in response to contractile demand. cMyBP-C is required for normal contractility of the heart, and mutations that lead to the truncation of the protein cause hypertrophic cardiomyopathy (HCM) through a mechanism of cMyBP-C haploinsufficiency. Missense mutations in cMyBP-C likely cause HCM through more complex mechanisms.

Design/Method: To gain insight into the effect of cMyBP-C missense mutations on contractile function, we introduced the prevalent W792R mutation into cMyBP-C null mouse cardiomyocytes and then formed 3-dimensional engineered cardiac tissue (ECT) constructs. Based on the predicted structure and residue charge change, we hypothesize that this mutation might affect stability of the C6 Fn3-domain and cause degradation of the mutant protein.

Results: Following adenoviral expression of the wild-type (WT) and W792R cDNA we observed equivalent mRNA transcript expression with a significant underrepresentation of the mutant protein compared to the WT control. In our ECT constructs, we observed accelerated contractile kinetics in W792R mutants expressing similar RNA levels as WT controls. We next studied whether common pathways of protein degradation are responsible for the rapid degradation of W792R cMyBP-C. Inhibition of either the lysosome or the ubiquitin-proteasome pathway was unable to increase full-length mutant protein abundance.

Conclusion: Thus our data suggest that the pathogenesis of W792R mutant cMyBP-C is through a mechanism of haploinsufficiency with resultant accelerated contractile kinetics. The mechanism of degradation and any ancillary effects upon the cell remain to be fully elucidated.

TRKB PHOSPHORYLATION IS NEUROPROTECTIVE ONLY IN ESTROGEN RECEPTOR A WILD-TYPE FEMALE HIPPOCAMPAL NEURONS AFTER IN-VITRO ISCHEMIA

Dila Zafer; Vishal Chanana; Douglas B. Kintner; Jayadevi H. Chandrashekhar; Eshwar Udho; Ayse Canturk; Peter Ferrazzano; Robert A. Shapiro; Jon E. Levine; Pelin Cengiz

Overview: Male neonate brains are more susceptible to the effects of hypoxia-ischemia (HI) related brain injury. Sex differences in expression and actions of neurotrophins may account for sexually differentiated consequences of HI. Our recent findings reveal that tyrosine kinase B receptor (TrkB) agonist, 7,8-dihydroxyflavone (7,8-DHF), exerts a profound neuroprotective effect in the hippocampi of female but not male neonate mice through phosphorylation of the TrkB post-HI (in-vivo). Differential hippocampal TrkB phosphorylation is associated with increased hippocampal ERα expression in ERα+/+ female mice and gets ablated in ERα-/- female mice. These results suggest a role of ERα in conferring responsivess to TrkB phosphorylation in female mice only. We hypothesized that differential ERα expression followed by TrkB phosphorylation and neuroprotection takes place in hippocampal neurons after in-vitro ischemia. Sexed hippocampal primary neuronal cultures were prepared from P1 C57BL/6J ERα+/+ and ERα-/- mice in estrogen free medium and exposed to either normoxia or OGD for 4 h at DIV 7 followed by VC or 7,8-DHF. After 24 h REOX, cells were stained for cell survival and p-TrkB. For multiple comparisons ANOVA was used. 7,8-DHF enhanced TrkB phosphorylation in a dose responsive manner and promoted cell survival only in ERα+/+ female hippocampal neurons following OGD-REOX ($p < 0.05$). HI and 7,8-DHF mediated increases in TrkB phosphorylation was ablated in ERα-/- male and female hippocampal neurons. Sexually differentiated TrkB hosphorylation in response to in-vitro ischemia enhanced with TrkB agonist therapy in the female hippocampal eurons is dependent on ERα. Future research will attempt to identify the time-course of ERα, bcl-2 and aromatase expressions following in-vitro ischemia in hippocampal neurons. By understanding the sexually differential role of ERα-TrkB interaction in neuronal survival, we hope to rovide novel insights into the etiology and targeted therapies post- HI.

STRATEGIES TO IMPROVE ALLOGENEIC BONE MARROW TRANSPLANT USING IMMUNOCYTOKINE

Madeline J. Adam; Kyle D. Terry; Paul D. Bates; Christian M. Capitini

Background: Overall survival for high-risk pediatric neuroblastoma is poor despite advances in current treatments. Hu14.18-IL2 is an immunocytokine that recognizes GD2 expressing tumors and has been shown to promote anti-tumor activity.

Purpose: The purpose of these studies was to determine if hu14.18-IL2 can be safely given after allogeneic bone marrow transplant (alloBMT) with T cells and to identify what kind of anti-tumor effect the combination will have on GD2 expressing NXS2 neuroblastoma.

Design/method: For each study, A/J mice were irradiated and injected with isolated bone marrow and T cells from C57BL/6 donors on Day +0. Then mice were challenged with NXS2 on Day +10. The treatment mice were then injected with hu14.18-IL2 on Days +14-16. For the duration of the study the mice were monitored for clinical GVHD scores, weight loss and tumor growth by digital caliper.

Results: Results of the study suggest that hu14.18-IL2 can be safely given after alloBMT with low doses of T cells. Although the combination of T cells and immunocytokine cannot prevent tumor growth, they do limit growth of NXS2 as compared to groups not treated with immunocytokine, suggesting biologic activity after alloBMT without lethal toxicity.

AGE-DEPENDENT MICROGLIAL RESPONSES TO HYPOXIA-ISCHEMIA IN THE DEVELOPING BRAIN

Alex Waldman; Vishal Chanana; Lucia C. Covert; Taylor Dewall, Paul Rowley; Eshwar Udho; Ulas Cikla; Grace Gavin; Douglas Kintner; Pelin Cengiz; Peter Ferrazzano

Background: The microglial response plays an important role in injury and recovery after hypoxia-ischemia (HI) in the developing brain. We have previously described regional and age-dependent differences in the microglial response to HI: infant mice (P9) demonstrated a more vigorous microglial activation and proliferation compared to juvenile mice (P30). The aim of the current study was to assess for differences in the effect of microglial suppression on HI-induced brain injury in P9 and P30 mice. We hypothesized that administration of minocycline after HI would result in suppression of microglial activation in both age groups, and would improve brain injury after HI in younger mice.

Methods: HI was induced in P9 and P30 mice by unilateral carotid artery ligation and exposure to 10% O2 for 50 minutes. Minocycline or vehicle was administered at 2 hours and 24 hours post-HI. Microglia responses and neuronal injury were characterized using flow cytometry and immunostaining at 2 days and 9 days post-HI. T2-weighted MRI was performed at 9 days and 60 days post-HI to assess for HI-induced cerebral volume loss. HI-induced impairments in memory/learning were assessed using Morris Water Maze testing at 2 months post-HI. Results: Minocycline administration effectively suppressed the microglial response in P9 and P30 mice at day 2 post-HI. In contrast, at day 9 post-HI, minocycline-treated P9 mice demonstrated persistent suppression of microglia activation while P30 mice demonstrated a rebound increase in microglial response. P9 minocycline-treated mice demonstrated improved injury at days 2 and 9 post-HI, however no improvement in cerebral atrophy or Morris-Water Maze was seen at 60 days post-HI. Conversely, while minocycline treatment did not improve the early injury in P30 mice, these mice did demonstrate significant improvement in cerebral atrophy and Morris Water Maze performance at 60 days post-HI.

Conclusions: The effect of microglial suppression on HI-induced brain injury varies with age. Neonatal minocycline-treated mice demonstrate an early improvement in injury which is not sustained out to 60 days post-HI, while P30 treated mice demonstrate sustained improvements in cerebral atrophy and memory. This suggests that the late microglial response seen in P30 mice but not P9 mice is neurotrophic and contributes to the observed improvements in cerebral atrophy and neurologic function. Ongoing studies will assess for age-dependent differences in microglia polarization after HI which may account for developmental differences in susceptibility to HI, and the therapeutic effect of suppressing neuroinflammation after injury in the developing brain.

****PAS Platform Presentation**

DIAGNOSTIC CRITERIA FOR ACUTE BACTERIAL SINUSITIS COMPARED WITH VIRUS DETECTION

Gregory DeMuri; James Gern; Ellen Wald

Background: Published clinical guidelines recommend that a presumptive diagnosis of acute bacterial sinusitis be based on presentation with persistent, severe or worsening symptoms. However, persistent or worsening symptoms may be due to closely spaced sequential viral infections mimicking sinusitis.

Objective: The aim of this study was to compare the clinical diagnosis of sinusitis based on published guidelines with the detection of viruses during upper respiratory illness (URI). We describe the detection of respiratory bacteria and viruses in the healthy state, at the outset of URI and when sinusitis was diagnosed.

Methods: Children 4-7 years of age were followed prospectively for 1 year. URIs were characterized with a symptom score on day 2-3, 7, 10 and 14. Nasal washes were obtained during well surveillance visits, at onset of symptoms (acute) and on day 10-14 (when sinusitis was diagnosed). PCR was used to detect respiratory viruses and S. pneumoniae (Sp), H. influenzae (Hi) and M. catarrhalis (Mc). Sinusitis was defined in concordance with AAP and IDSA guidelines.

Results: 404 URIs were reported in 305 children. 32 met criteria for sinusitis; 5 were excluded due to incomplete data. Sinusitis was diagnosed based on persistent symptoms in 15 (56%) and worsening in 12 (44%). The frequency of detection of viruses at the acute visit was: adenovirus 6%, bocavirus 3%, coronavirus 21%, enterovirus 6%, influenza 3%, human metapneumovirus 6%, respiratory syncytial virus 12%, rhinovirus 32% and no virus in 12%. The day 10-14 sample was negative in 12 (44%), had the same virus (as acute visit) in 7 (26%) and had a new virus in 8 (30%). Subjects diagnosed based on persistent symptoms and worsening symptoms had a new virus 20% and 42%, respectively. Mean bacterial densities in surveillance, acute and 10-14 day samples were (log cfu/ml): 6.6, 7.8, and 6.7 for Sp; 1.4, 5.6 and 5.6 for Hi, and 5.6, 5.4 and 6.0 for Mc. The difference in Hi between surveillance and acute samples was significant (p=0.5). An increase in colonization with any respiratory pathogen was found 78% of the time between surveillance and acute samples.

Conclusions: A diagnosis of sinusitis was based on worsening symptoms nearly as frequently as persistent symptoms. Most suspected episodes of sinusitis were unique illnesses rather than closely spaced sequential viral infections. New viral infections were more common in patients diagnosed based on the criteria of worsening symptoms.

****PAS Platform Presentation**

SUSTAINABILITY IN THE AAP BQIP COLLABORATIVE

Kristin Shadman; Matthew Garber; Shawn Ralston; Jens Eickhoff; Ryan Coller

Background: Adherence to the American Academy of Pediatrics (AAP) recommendations for management of bronchiolitis significantly improved through the AAP's multi-institutional Bronchiolitis Quality Improvement Project (BQIP); however, how well these improvements were maintained following completion of the collaborative is unknown.

Objective: To evaluate whether improvements were sustained 1 year after completion of the AAP BQIP collaborative.

Design/Methods: Multi-disciplinary project teams were initially formed at 21 hospital sites. In each season, institutions conducted chart reviews to gather data on key process and outcome measures for inpatient bronchiolitis management. Teams reviewed baseline data (Season 1) and conducted Plan-Do-Study-Act (PDSA) cycles (Season 2) to improve performance using evidence-based best practice toolkits tailored to individual site needs. In the subsequent bronchiolitis season, a subset of sites submit sustainability data (Season 3). To assess sustained improvement, data from season 3 was compared to season 1 and 2 data using generalized linear models for categorical data and analysis of variance for continuous variables, adjusting for site.

Results: 9 of the original 21 sites submit data from all seasons (season 1, n=466; season 2, n=457; season 3, n=403). There were no significant differences in aggregated season 1 measures between the sites that did and did not submit sustainability data; however, season 2 participants had greater improvement in bronchodilator measures. Between season 2 and 3, orders for intermittent pulse oximetry increased significantly, from 68.5% (95% CI: 64-73%) to 79.9 % (95% CI: 76-84%) (p=0.002)). There was no significant difference between season 2 and 3 measures of respiratory score assessment, use of score to assess bronchodilator responsiveness, bronchodilator use, chest radiograph obtainment, or steroid doses (p values ≥ 0.05). Length of stay and 72-hour readmissions were also not significantly different from season 2 to 3. Despite sustained improvement in bronchodilator doses per patient, approximately 25% of patients still received at least one bronchodilator dose.

Conclusion: Following completion of the BQIP collaborative, no measures demonstrated worsening during the sustainability period and use of intermittent pulse oximetry showed continued improvement. Sites have ongoing opportunity for reduction in bronchodilator use.

****PAS Poster Presentation**

EXPERTS' PERSPECTIVES TOWARDS A POPULATION HEALTH APPROACH FOR CHILDREN WITH MEDICAL COMPLEXITY

Elizabeth S. Barnert; Ryan J. Coller; Bergen Nelson; Lindsey Thompson; Vincent Chang; John Tran; Cesar Padilla; Thomas S. Klitzner; Moira Szilagyi; Paul J. Chung

Background: Consensus population health outcomes for children with medical complexity (CMC) do not yet exist. Through systematic literature review, we identified 17 candidate health outcomes for CMC. It is unclear which of these outcomes would be most feasible or impactful to measure.

Objective: To gather expert opinion to help identify a core set of population health measures for CMC.

Methods: We are conducting qualitative analysis of interviews with 22 diverse, nationally renowned experts on CMC to identify core population health outcomes for CMC. Interviewees include child and family advocates; health and social service providers; and research, health systems, and policy leaders. Interviews are nearly complete, and iterative thematic content analyses are in progress.

Results: All interviewees agreed that CMC can be defined as a discrete population with important and measurable common health outcomes. Interviewees generally defined health for CMC as a broad measure of current and long-term potential. Interviewees emphasized child and family-centered approaches to measuring population health for CMC that include but also extend beyond traditional health metrics. Core recommended outcomes included quality of life (child and family), mental health (child and family), participation in school (child) and employment (parent), social engagement, community integration, care coordination, and access to appropriate care. Interviewees emphasized mental health as an under-discussed yet highly prevalent challenge facing CMC and their families.

Conclusions: Experts have taken initial steps in identifying key population health outcomes for CMC. Successfully capturing these outcomes will require a broad approach to measuring health that emphasizes families' abilities to optimize their child's potential. Capturing these outcomes for CMC may help reveal opportunities to improve health measurement for all children.

****PAS Poster Presentation**

A SURVEY OF SAFE SLEEP PRACTICES ACROSS WISCONSIN MATERNITY FACILITIES

Andrea P. Suarez; Nan M. Peterson; Kristin A. Shadman

Background: In 2011, the American Academy of Pediatrics (AAP) expanded recommendations for a safe sleep environment to prevent sudden infant death syndrome (SIDS). Maternity hospitals play a unique role in educating new families and modeling best practice sleep recommendations.

Objective: To assess current Wisconsin birth hospitals' safe sleep policy as well as need for support in implementing AAP recommendations and disseminating information to staff and families.

Design/Methods: This telephone and web-based survey was administered to 49 (52%) of 94 Wisconsin maternity hospitals, excluding birth centers and facilities with less than 20 deliveries per year. It documented components of institutional safe sleep policies, trainings for staff and educational programs for families following the AAP recommendations. The survey assessed perceived barriers to improving safe sleep practices. Chi square analysis was used to test the correlation between having a written policy and a staff training and education program.

Results: Of 49 maternity hospitals surveyed, 35 (71%) had an established written policy describing a safe sleep environment for newborns. However, only 16 (45%) of those included all the APP recommendations. Only 58% addressed avoidance of exposure to tobacco smoke and use of alcohol and illicit drugs after birth, and 23% included avoidance of overheating. Over half of the hospitals reported training staff, including: nurses (100%) nurse assistants (50%), and obstetrical/pediatrics physicians (23%). Maternity facilities without staff training in place reported interest in help to implement staff training in their department (79%). Formal infant cribs and rooms' audits for adherence to safe sleep practices occurred infrequently in maternity facilities (13%). Cultural and family practices accounted for the majority of perceived barriers for achieving a safe sleep environment for newborns. Nearly 80% (38) of the facilities reported the presence of an educational program for families. There was no statistical significance association between facilities that had a written policy and those that offered a staff training and education program ($p>0.1$).

Conclusions: The majority of Wisconsin hospitals have a written policy addressing a safe infant sleep environment; however, most policies are incomplete, staff training is lacking and formal assessments of hospital sleep environments are rare. Many opportunities exist for further enhancement of infant safe sleep education.

****PAS Poster Presentation**

PEDIATRIC RESIDENT PERCEPTIONS OF IMPORTANT SKILLS FOR INTERNSHIP

Andrea Carberry; Kirstin Nackers; John Frohna

Background: In 2011, the American Academy of Pediatrics (AAP) expanded recommendations for a safe sleep environment to prevent sudden infant death syndrome (SIDS). Maternity hospitals play a unique role in educating new families and modeling best practice sleep recommendations.

Objective: To assess current Wisconsin birth hospitals' safe sleep policy as well as need for support in implementing AAP recommendations and disseminating information to staff and families.

Background: The Association of American Medical Colleges developed a set of core entrustable professional activities (EPAs) for internship. The pediatrics milestone project focuses on competencies for resident development. No data has been published regarding resident perceptions of the importance of these EPAs and competencies for a successful internship.

Objective: To explore pediatric resident perceptions of important skills for internship.

Design/Methods: A survey of 25 skills was developed from the EPAs, pediatrics milestone project, and observation of common intern challenges. Survey items were identified by expert consensus by the authors. A total of ten survey items were derived from the EPA's, four from the pediatric milestones project, and 11 from observation of challenges interns commonly face. The survey was anonymously distributed to 44 pediatric residents via Qualtrics. Residents were asked to assign the priority of each skill on a 4-point scale consisting of "high", "intermediate", "low", or "not a priority". A response of >50% (n=17) was considered a majority. The University of Wisconsin IRB declared this project exempt.

Results: 75% of pediatric residents (n=33) responded to the survey, with similar responses across years of training; 10 PGY-1s, 11 PGY-2s, and 12 PGY-3's. Ten of the 25 questions on the survey had a majority response of high priority. Seven out of 10 of these dealt with skills needed for daily tasks such as oral presentations and note writing. Three out of 10 dealt with management of stress and conflicts. The highest ranked skill was dealing with a difficult patient or family with 94% of respondents ranking this high priority. Of the skills ranked high priority, two were derived from the milestones project, 6 were derived from the EPA's, and two were derived from observation. The three skills derived from observation related to managing stress and conflict.

Conclusions: Many of the skills residents perceive as necessary for a successful internship relate to activities for daily care of patients, with recognizing/managing patients requiring emergent care as the highest priority skill. Interestingly, skills related to dealing with a difficult colleague or family, collaborating as a team member, and stress management were also perceived as high priority for internship and were derived from observation of common intern challenges. Future effort should focus on ways to emphasize development of these skills during medical school.

DOSE RESPONSE TO THE TYROSINE KINASE B AGONIST, 7,8-DIHYDROXYFLAVONE, IN NEONATAL MICE AFTER HYPOXIA ISCHEMIA

Ayse A. Canturk; Kaylyn Freeman; Stephanie Marquez, Jasmine Sanchez; Grace Gavin; Douglas B. Kintner; Jayadevi H. Chandrashekhar; Eshwar Udho; Dila Zafer; Peter Ferrazzano; Pelin Cengiz

Male neonate brains are more susceptible to the effects of hypoxia-ischemia (HI) related brain injury. Sex differences in expression and actions of neurotrophins may account for sexually differentiated consequences of HI. Our recent findings reveal that tyrosine kinase B receptor (TrkB) agonist, 7,8-dihydroxyflavone (7,8-DHF), exerts a profound neuroprotective effect in the hippocampi of female but not male neonate mice through phosphorylation of the TrkB (pTrkB) post-HI (in-vivo). However, the optimum dose of the 7,8-DHF has not been determined in the immature brains. This study aims to identify the optimum dose of the 7,8-DHF after neonatal HI. Postnatal day 9 mice were exposed to Vannucci's HI model and then received 1, 5, or 10 mg/kg of 7,8-DHF intraperitoneally for 3 days. Mice perfused fixed 3 days after HI and the brains were stained for MAP2 (dendritic), pTrkB, NeuN (neuronal nucleus) for dose response and neurodegeneration. Stained slices were imaged using fluorescent or confocal microscope. Brains were scored using MAP2 neurological damage score. Totaling the intensity of staining was done semi-quantitatively for pTrkB and NeuN positive neurons. For multiple comparisons ANOVA was used. The 5 mg/kg dosing of the 7,8-DHF resulted in lowest MAP2 neurological damage score in both sexes 3 days after HI. All doses increased the p-TrkB quantification in female more than male hippocampus except the 10 mg/kg dosing were more damaging to the hippocampus in both sexes. By understanding the sexually differential role of TrkB phosphorylation and the optimum dose, we hope to provide translational targeted therapies post- HI.

CASE REPORT: SUDDEN CARDIAC ARREST WITH A NOVEL MUTATION IN THE CARDIAC ION CHANNEL

Jacob L. Goldberg; Jayme L. Frank; Kathleen R. Maginot; Nicholas H.Von Bergen; Heather L. Bartlett

Background: Catecholaminergic polymorphic ventricular tachycardia (CPVT) is a severe arrhythmogenic disorder that is induced by an adrenergic stimulus. CPVT typically presents in children with otherwise normal cardiac conduction, structure, and function. Mutations in four genes have been identified to cause CPVT in an autosomal recessive or dominant pattern. All four genes are involved with calcium handling in cardiomyocytes. Mutations in RYR2, which encodes the cardiac ryanodine receptor, is causative in 60% of cases. Herein we describe the clinical presentation and genomic evaluation of a novel RYR2 mutation.

Clinical presentation: A child found unresponsive with a cardiac rhythm of pulseless polymorphic ventricular tachycardia was evaluated. (Any additional presentation?) Sanger exome sequencing of RYR2, CASQ2, KCNJ2 was performed. Results were compared to data from the NHLBI Exome Sequencing Project that includes deep whole exome sequencing of >7000 individuals. In silico analyses were done to evaluate the impact of variants.

Results: Sanger sequencing identified a single nucleotide variant in the RYR2 gene not previously identified. The variant, c.12268C>T, causes a proline to serine missense mutation at residue 4090. Proline residue at position 4090 is highly conserved between species. The Pro4090Ser mutation inserts a residue with a polar side chain in the cytosolic region of the protein. In silico analyses of this substitution predict alterations in protein structure. This region is a hot-spot for pathogenic mutations based largely on CPVT mutations clustering in the region. This region of ryanodine receptors is the cytosolic component of the "channel region". Missense mutations inserting a serine in this region have been identified to cause CPVT. The biochemical function of this functional motif has been minimally studied but is highly conserved and is thought to be involved in channel regulation.

Conclusions: As genotyping becomes more widely available, cost effective, and quicker, additional mutations in RYR2 will be discovered. Knowledge regarding how mutations affect channel function will be important as different genotypes may present in a phenotypically distinct manner. Additionally, understanding benign vs pathogenic mutations in the implicated ion channel will help guide patient counseling and guide targeted pharmacotherapy.

GLOBAL IMPROVEMENT OF THE PEDIATRIC BONE MARROW TRANSPLANT DISCHARGE PROCESS FOR PATIENTS AT THE AMERICAN FAMILY CHILDREN'S HOSPITAL, UNIVERSITY OF WISCONSIN

Mohamed Elsaid, Carisa Baker, Bethany Severson, Lisa Keller; Kathleen Montgomery, Joyce Kilgore, Sharon Frierdich, Kenneth DeSantes

Background: Allogeneic (Allo) and autologous (Auto) hematopoietic stem cell transplantation (HSCT) provide the potential to cure otherwise fatal diseases but they are resource-intense therapies. This patient population have significantly lengthy hospital stay and often require complex medical care involving multiple medical specialties. Published studies confirm the high costs associated with HCT. Studies also highlighted the high readmission rate in the pediatric HSCT population when compared to general pediatric population; 50% to 6.5%. (P <0.001). With the recent changes affecting the health system management focus on decreasing the readmission rate, increasing patient's satisfaction, and decreasing medical costs; it is extremely important to define new strategies to help pediatric Bone Marrow Transplant (BMT) centers to decrease the hospitalization cost and maintain a high level of care.

Methods: We conducted a retrospective medical record review of children who underwent HSCT at our institution between January 1, 2011 and August 31, 2014 (pre-intervention cohort). We analyzed data of the average hospital stay per transplant, which causes led to unnecessary hospitalization days, and readmission rates and causes in the first 30 days after hospital discharge from HSCT. We implemented the recommended interventions utilized from this data analysis including pre-admission patient education session, RN led rounds, discharge care conference, uniform engraftment criteria and 24 hours inpatient parents care session for patients receiving HSCT between September 1, 2014 and April 1, 2016 (post intervention cohort) within our institution with a goal to maintain a high level of care, increase the patient's satisfaction and minimize the cost by decreasing the unnecessary hospitalization days and readmissions.

Results: 48 children underwent HSCT within the pre-intervention cohort at our institute. Of these, 3 patients were excluded because the initial hospitalization was longer than 6 months. Of the remaining 45 patients, the average length of hospital stay was 40.2 days (range 20, to 93). Average days of hospitalization after medically ready for discharge was 1.09 (N=46) per transplant, 1.10 (N=30) for Allo-HSCT and 1.06 (N=16) for auto-HSCT. The readmission rate was 22% among this cohort. Of these, 80% were patients that received Allo-HSCT and 20% were patients that received Auto-HSCT. 12 children underwent HSCT within the post intervention cohort. . Of these, 1 patient was excluded because she died during her initial hospitalization. Of the remaining 11 patients, the average length of hospital stay was 36.7 days (range 24, to 67). Average days of hospitalization after medically ready for discharge was 0.9 days (N= 6) per transplant, 0.57 days (N=4) for Allo-HSCT and 0.4 days (N=2) for Auto-HSCT. The readmission rate was 36 % among this cohort. Both patients that received Allo-HSCT and Auto-HSCT had a 50% readmission rate. Delay in early co-ordination of the discharge process, delay in switching medication to an oral form, unsettled nutritional plan and uncertain displacement plan were the leading cause for unnecessary hospitalization. Fever was the most common cause of early readmission on both pre and post intervention cohorts, 50 % and 25% respectively.

Conclusion: Implementing a structured step fashion early discharge plan significantly decreased the length of unnecessary hospital stay and increased both staff and patient family satisfaction. These findings and future research in this area will help improve both patient education and resource utilization.

DO MATERNAL KNOWLEDGE AND ATTITUDES TOWARDS CHILDHOOD IMMUNIZATIONS IN RURAL UGANDA CORRELATE WITH COMPLETE CHILDHOOD VACCINATION?

Bryan J. Vonasek; Francis Bajunirwe; Laura E. Jacobson; Leonidas Twesigye; James Dahm1; Monica J. Grant; Ajay K. Sethi; James H. Conway

Introduction: Improving childhood vaccination coverage and timeliness is a key health policy objective in many developing countries such as Uganda. In rural areas of developing countries, there has been relatively little research into parents' knowledge and attitudes towards childhood immunizations (KATCI)1. Surveying KATCI is an important first step towards understanding the factors that influence vaccine non-acceptance in a particular setting. In the Sub-Saharan African country Uganda, vaccine coverage rates remain well below the WHO goal of 90%, with 82% of children receiving the measles vaccine and 78% completing the three dose series of pentavalent vaccine providing protection against diphtheria, tetanus, pertussis, hepatitis B, and Haemophilis influenza type B (DPT-HB-Hib) in 20132.

Objectives: 1) Determine basic KATCI by women of childbearing age living in Sheema District, Uganda. 2) Demonstrate how these maternal KATCI correlate with the full, on-time

Methods: From September to December 2013, we conducted a cross-sectional survey of 1000 parous women in rural Sheema district in southwest Uganda. The survey collected socio-demographic data and knowledge and attitudes towards childhood immunizations. For the women with at least one child between the age of one month and five years who also had a vaccination card available for the child (N=302), the vaccination status of this child was assessed. We made timeliness of vaccination a requirement for full vaccination status with the following cutoffs: Polio "at birth" by 30 days after birth, BCG + second dose of polio + first dose of DPT-HB-Hib by 2 months, third dose of polio + second dose of DPT-HB-Hib by 4 months, fourth dose of polio + third dose of DPT-HB-Hib by 6 months, and measles vaccine by 12 months. Infants less than one month old were not included in the analysis because of the leeway given with the first polio dose and BCG, which are "scheduled" to be given at birth.

Results: Reasons why parents in their community may not have their children fully vaccinated as reported by all women surveyed (N = 1000) and only those with a child between the ages of one month and five years with a vaccination card (U5+Card, N = 302). Frequency of specific vaccinations missed by children between the ages of one month and five years that had vaccination history documented but were not fully up to date.

Discussion: Knowledge and attitudes towards childhood immunizations vary greatly in different settings. An understanding of the degree to which vaccines are acceptable in communities and the reasons behind any hesitancy from parents to vaccinate their children is important for the success of immunization programs. We are only aware of four published studies conducted in SSA in the past 15 years that assessed KATCI. Only one of these studies analyzed how maternal attitudes towards immunizations correlate with the vaccination status of a child by undergoing a limited bivariate analysis of mother's negative attitudes towards local healthcare facilities providing vaccinations and child's measles vaccination status. Limitations of the study: 1. Confounding cannot be underestimated given that we relied on bivariate analysis to determine factors associated with full vaccination coverage. 2. The issue of small sample size and inadequate power was largely due to our exclusions of mother-child pairs that didn't have vaccination cards available. 3. Our survey did not collect information about women's educational background and place of delivery for mother-child pairs. 4. Distance to location of vaccination was estimated by caregivers rather than a more precise measurement. 5. We only assessed KATCI of mothers, and fathers were not included in this study.

Conclusion: Most studies analyzing factors influencing caregivers demand for childhood immunizations in rural, resourcelimited settings do not focus on caregivers' KATCI. Our analysis shows that in this rural setting of western Uganda, mothers with a basic understanding of the importance of childhood immunizations were more likely to have timely, full vaccination of their children. Many of these women suggested that poor vaccination rates in their community are due to caregivers' fear of side effects and disinterest or ignorance towards vaccinations. Prospective, larger scale analyses are needed to delineate the community-specific influence caregivers' KATCI has on children's vaccination status. This will allow for the development of more effective interventions and policy to improve vaccination coverage in developing countries.

ASSESSMENT OF WHEEZING FREQUENCY AND VIRAL ETIOLOGY ON CHILDHOOD AND ADOLESCENT ASTHMA RISK

Halie Anderson; Rob Lemanske; Michael Evans; Ron Gangnon; Jim Gern; Dan Jackson

Rationale: We have previously reported that early rhinovirus (RV) wheezing illnesses are the most robust predictor of asthma development at age 6 years in high-risk children in the Childhood Origins of ASThma (COAST) birth cohort study. We sought to assess the role of etiology and frequency of wheezing illnesses in asthma risk from ages 6 to 13 years.

Methods: A total of 259 children were followed prospectively to age 6 years, and 217 were followed to age 13 years. A generalized additive logistic regression model (GAM) of asthma was fit for asthma diagnosed at ages 6, 8, 11, 13 years, with smooth terms for number of RV wheezing illnesses, number of non-RV wheezing illnesses, and their interaction. In the absence of significant interaction the main effect p-values are reported.

Results: The number of RV wheezing episodes in early childhood was significantly associated with asthma at all ages (6 years: $p<0.0001$; 8 years: $p<0.0001$; 11 years: $p=0.0006$; 13 years: $p=0.002$). The number of non-RV wheezing episodes was not significantly associated with asthma (6 years: $p=0.06$; 8 years: $p=0.09$; 11 years: $p=0.06$; 13 years: $p=0.33$).

Conclusion: RV wheezing illnesses remain an important predictor of asthma development in high-risk children and continued research efforts should focus on defining host and viral factors that promote wheezing RV illnesses in early childhood

OMALIZUMAB DECREASES RATES OF COLD SYMPTOMS IN INNER-CITY CHILDREN WITH ALLERGIC ASTHMA

Ann Esquivel; Agustin Calatroni; Peter Gergen; Kristine Grindle; Rebecca Gruchalla; Meyer Kattan; Haejin Kim; Petra Lebeau; Andrew Liu; Stephen Teach; Joseph B. West; Jacqeline Pongracic; Jeremy Wildfire; William Busse; James Gern

Rationale: Omalizumab can reduce virus-induced asthma exacerbations, however little is known about its effects on colds. Our previous data show that omalizumab treatment reduces duration of viral detection, and that omalizumab can improve interferon/antiviral responses. Thus, we hypothesized that omalizumab treatment would decrease weeks with symptomatic upper respiratory illnesses.

Methods: The Preventative Omalizumab or Step-up Therapy for Severe Fall Exacerbations (PROSE) study was a randomized trial of guidelines-based asthma care vs. add-on fluticasone boost vs. add-on omalizumab in 478 asthmatic children (6-17 years) from low-income census tracts. Cold symptom scoring sheets were collected weekly over the 4-month treatment period and virology was performed on weekly samples of nasal secretions. Adjusted illness rates (colds per sample) by treatment arm were calculated using an over-dispersed Poisson regression.

Results: In total, 5873 cold assessments were completed and 1034 (18%) symptomatic illnesses were detected. Rates of colds (per sample) were significantly reduced ($p=0.01$) in participants treated with add-on omalizumab (0.15, n=259) compared to guidelines-based asthma care alone (0.20, n= 89), a decrease of 27%. Interestingly, this reduction was seen across asthma treatment steps, with the same rate of reduction observed in children with moderate vs. severe persistent asthma. Omalizumab reduced the duration and magnitude of viral shedding, but not the number of infections.

Conclusions: Omalizumab significantly decreases rates of cold symptoms and viral shedding in children with allergic asthma. These findings indicate that IgE contributes to the frequency and/or duration of upper respiratory illnesses in this population.

MOLECULAR MECHANISMS OF OXYTOCINERGIC SIGNALING AND ITS INHIBITION OF KIR7.1 IN THE RPE

Nathaniel York; Patrick Halbach; Michelle A. Chiu; Ian Bird; De-Ann M. Pillers; Bikash R. Pattnaik

Purpose: Oxytocin (OXT) is a neuropeptide that activates the oxytocin receptor (OXTR), a rhodopsin family G-protein coupled receptor. We have localized OXTR to the retinal pigment epithelium (RPE) and OXT has been found in the adjacent cone photoreceptors. We hypothesize that there is OXTR signaling in the retina and sought to characterize this signaling in the RPE and explore the downstream effects of OXT on cellular signaling, focusing on the regulation of inwardly rectifying K+ channel Kir7.1.

Methods: Ca2+ response to OXT was measured in cultured human fetal RPE cells (hfRPE) using Fura-2AM in the presence of 2-APB and nifedipine, pharmacological inhibitors of Ca2+ signaling pathways. HEK-293 cells where used to establish stable expression of human OXTR and signaling was visualized using live cell imaging following transient expression of PH-GFP and PKC-GFP, monitors of GPCR metabolites PIP2 and DAG. Whole cell patch clamp electrophysiology was performed on HEK-OXTR cells transfected with GFP-fused Kir7.1 as well as freshly isolated mouse RPE cells to monitor Kir7.1 current.

Results: OXT treatment of RPE cells in culture resulted in a transient increase in cytoplasmic Ca2+ that was reduced by 95% in the presence of the IP3R antagonist, 2-APB ($P < 0.001$). Upon bathing the cells in Ca2+-free extracellular solution or nifedipine, the Ca2+ response to OXT was not altered. Independent of the amplitude of response, time to recover from the rise in [Ca2+]i peak was not indicative of a role for [Ca2+]ec, with time constants (τ) of 1.00 ± 0.24 (r2 =.99), 2.66 ± 1.44 (r2 =.99), and 1.69 ± 0.61 (r2 =.98) min for Ca2+-free, nifedipine, and Ringer's solution, respectively. We also demonstrate that OXTR activation blunted Kir7.1 channel current, which has a physiologic role in RPE function. In isolated mouse RPE, we observed an average 61.81 ± 4.77 % decrease in K+ inward current amplitude at -160mV and an average 11.4 ± 3.2 mV depolarization in resting membrane potential.

Conclusion: We propose that OXTR stimulates a mobilization of intracellular Ca2+, independent of extracellular Ca2+, through intracellular signaling molecules coupled to OXTR/G-protein in the RPE. This OXT-OXTR signaling in the RPE cell also integrated the parallel modulation of the Kir7.1 channel. We suggest that novel OXT-OXTR signaling pathways in the outer retina will be of fundamental importance for eye development, health and visual function.

READ-THROUGH OF LCA16 NONSENSE MUTATION THERAPY USING IPSC-RPE CELLS

Pawan K. Shahi; Dalton Hermans; Nathaniel York; Simran Brar; Katarzyna Borys; Elizabeth Capowski; Richard Gatti; Ellen Welch; De-Ann M. Pillers; David Gamm; Bikash R. Pattnaik

Purpose: Mutations of KCNJ13 gene, retinal pigment epithelium (RPE) inwardly potassium channel (Kir7.1) protein, cause Leber congenital amaurosis (LCA-16). We recently discovered a nonsense mutation in KCNJ13 gene (c.158G>A: p.W53X) in a young boy. Nonsense mutations are target of read through drugs that permit translational read-through to generate full length protein product. We hypothesized that read-through drugs will suppress W53X non-sense mutation and produce a functional Kir7.1 protein using patient derived iPSC-RPE cells.

Methods: iPSC-RPE were differentiated from a LCA16 patient (LCA16 iPSC-RPE) and a healthy individual (ctrl iPSC-RPE) skin fibroblast using the controlled and defined methods. Molecular and biochemical assays were performed on differentiated cells to verify RPE cell identity and maturity. We used isolated cells to perform whole-cell electrophysiology and compare Kir7.1 current recordings between drug (Gentamicin, novel small molecules RTC-14 and NB-84) treated for 36 hours vs. untreated and control cells.

Results: Monolayer of hexagonal cells with pigmented appearance was seen after 6 weeks of culture in transwell. Both PCR and immunostaining confirmed the expression of RPE cell markers RPE65, bestrophin-1, and ZO-1. Kir7.1 was detected by PCR in both ctrl iPSC-RPE and LCA16 iPSC-RPE cells. Only LCA16 iPSC-RPE had the mutation 158G>A. Kir7.1 protein product in LCA16 iPSC-RPE was also truncated. Electrophysiology revealed Kir7.1 inwardly rectifying current (IKir7.1) measuring 144pA @ -160 mV with a zero current potential (Vm) of -54mV. Rb+, which is highly permeable through the Kir7.1 channel increased inward current by 10 fold. Compared to ctrl iPSC-RPE cells, LCA16 iPSC-RPE cells measured IKir7.1 of 98 pA, Vm of -28mV and no effect of Rb+. Gentamicin (500µM) had no measurable change in LCA16 iPSC-RPE cell whole cell parameters. On the other hand, both small molecules RTC-14 (5µM), and NB-84 (500 µM) treatment rescued Vm completely with variable recovery of current.

Conclusions: LCA16 iPSC-RPE expressed all the RPE markers and can be used as a model for the LCA16. Readthrough drugs RTC-14 and NB-84, completely rescued Kir7.1 current in patient iPSC-RPE cells but not gentamicin. Hence, we plan to develop NB-84 as a drug for inherited retinopathy such as LCA16 through a precision medicine approach.

****PAS Poster Presentation**

OXYTOCINERGIC SIGNALING IS FUNCTIONAL IN THE HUMAN ALVEOLAR EPITHELIAL CELL

Indira Bhagat, Bikash R. Pattnaik, Pawan Shahi, Nathaniel York, and De-Ann M. Pillers

Background: Oxytocin (OXT) regulates the function of diverse tissues in the body by cell signaling that occurs via the oxytocin receptor (OXTR), a GPCR-type receptor. Throughout the first two trimesters of gestation, the OXT level is consistently low but the OXT level increases during the last trimester in preparation of birth. Infants born preterm before the last trimester may not be exposed to any potential beneficial effect of OXT on the fetal lung, and this may increase the risk of subsequent development of respiratory distress in preterm infants. We previously showed OXTR localization on the membrane of the A549 cells (human alveolar epithelial cells) with immunocytochemistry, and confirmed OXTR mRNA expression using RT-PCR. Now we look for OXT-OXTR signaling within the A549 cells to support our hypothesis that OXT may play a role in lung maturity and function. .

Objective: To determine if treatment of alveolar epithelial cells by OXT activates OXTR through the traditional GPCR mechanism as shown by mobilization of intracellular calcium.

DESIGN/METHODS: The A549 cell line (American Type Culture Collection, VA) which is commonly used as an in vitro model for type II pneumocytes is derived from lung adenocarcinoma tumor explants. Western blot analysis was used to confirm OXTR protein expression in cultured A549 cells. Oxytocin signaling was measured by FURA-2 ratio metric Ca2+ imaging. We used HEK cells stably expressing OXTR as a positive control for intracellular calcium measurement.

Results: A 45 kDa band corresponding to the OXTR was present in A549 cell lysates and positive control samples as seen on Western blot analysis. Treatment of A549 cells with OXT resulted in an increase of intracellular Ca2+ in both A549 as well as HEK-OXTR cells. This increase was transient and completely reversible. Calcium mobilization in both cell types was comparable to the activation of an in-house P2Y GPCR receptor by ATP.

Conclusions: Consistent with our previous findings, OXTR is expressed in A549 cells. Our finding of OXTR mediating intracellular Ca2+ mobilization in this alveolar epithelial cell model is novel. Since A549 cells represent type-II alveolar epithelial cells, we suggest that OXT-OXTR mediated Ca2+ signaling plays an important role in lung function. The role of this signaling mechanism in lung development and disease remains to be explored.

FARM EXPOSURE IS ASSOCIATED WITH REDUCED RATES OF VIRAL RESPIRATORY ILLNESSES IN EARLY LIFE

Jamee Castillo; Christine Seroogy; Matt Keifer; Iris Reyes; Jeffrey Van Wormer; Jennifer Meece; Michael Evans; James Gern

Rationale: Early-life exposure to farm animals is associated with reduced allergic diseases. The aim of this study is to determine effects of farm exposure on rates of viral infections and illnesses through age 2 years. We hypothesized that the rate of viral infections will be the same between farm and non-farm children, while the rate of illnesses will be lower in farm children.

Methods: In a prospective birth cohort study, nasal mucous samples were collected from farm and non-farm children at scheduled intervals (2, 9, 12, and 18 months of age), and during respiratory illnesses (at least mild symptoms≥2 days). Farm children were born to women who reside or work on cattle or dairy farms. Infection rates were determined by viral detection (multiplex PCR) at scheduled visits.

Results: 210 nasal specimens from 28 farm children and 24 non-farm children were analyzed. Mean length of time for follow-up was 10.1 months for farm children and 10.3 months for non-farm children. Viral detection rates were similar in farm and non-farm children at scheduled visits (2 months: 8/28 vs. 9/24, p=0.49; 9 months: 7/15 vs. 8/15, p=0.72; 12 months: 3/11 vs. 4/6, p=0.11; 18 months: 1/3 vs. 1/3, p=1.00). Non-farm children had increased numbers of viral respiratory illnesses/child/year (mean 2.69, 95% CI, 1.79-4.04) compared to farm children (mean 1.45, 95% CI 0.94-2.25), a 1.85-fold increase (95% CI 1.02-3.35, p=0.04).

Conclusions: Despite similar rates of viral infection, farm versus non-farm children have significantly decreased rates of respiratory viral illnesses. Early life farming exposures may impact anti-viral immune maturation.