Relationship between Abnormal Ankle Brachial Index and Metabolic Syndrome: Estimates from the National Health and Nutrition Examination Survey (1999-2004)

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Background: Peripheral artery disease (PAD), indicated by abnormal ankle-brachial index (ABI), and metabolic syndrome (MetS) have been implicated as critical risk factors for increased cardiovascular mortality. However, data establishing associations between abnormal ABI and MetS are conflicting and few have examined the role of additional cardiovascular risk factors. The aim of this study is to examine the association between abnormal ABI and MetS and the effect of cardiovascular risk factors on this association.

Methods: This study is a cross-sectional analysis among 11,766 men and women aged 40 years and older participating in The National Health and Nutrition Examination Survey 1999-2004. An abnormal ABI of <1.0 indicated a possible diagnosis of PAD. Metabolic syndrome was defined by the presence of 3 or more of the following 5 criteria: obesity, hypertriglyceridemia, low HDL cholesterol, diabetes and hypertension. Ordinal logistic regression models were used to identify an association between abnormal ABI and MetS, with adjustments for known cardiovascular risk factors in multivariate models.

Results: The odds of abnormal ABI were significantly higher in persons with MetS when compared to those without MetS, after adjustment for cardiovascular risk factors (OR 1.61; 95% CI 1.08-2.42). Additionally, the odds of abnormal ABI were highest when a greater number metabolic syndrome criteria were met (OR 2.22; 95% CI 1.43-3.43). No effect modifications were noted for gender or race. However, results trended towards a greater probability of abnormal ABI with increasing age for those with MetS compared to those without.

Conclusion: The presence of MetS is associated with an increased odds of abnormal ABI and subsequent PAD, even after accounting for known cardiovascular risk factors. Further investigations should be geared towards the specific metabolic syndrome components driving this association.
Qualitative perspectives on Neonatal Abstinence Syndrome (NAS) from healthcare providers in Ohio

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The misuse of opioids (prescription drugs and heroin) is a serious public health concern in Ohio and Appalachia. In recent years, there has been a significant increase in both pregnant women seeking treatment for opioid addiction and mothers giving birth to babies diagnosed with Neonatal Abstinence Syndrome (NAS), which results in a constellation of health issues for infants. In order to better understand NAS and inform prevention efforts, we conducted qualitative interviews with 16 key informants (e.g., physicians, nurses) knowledgeable about NAS in greater central Ohio. Our preliminary analyses suggest that NAS is widespread across socioeconomic groups. While non-pharmacologic interventions to address NAS (e.g., skin-to-skin contact, breastfeeding) show promise in reducing symptoms and hospital length of stay, women in rural areas whose babies are sent to Columbus for care face barriers related to transportation, other childcare responsibilities, and drug treatment participation that prevent them from staying with their newborn. Child welfare services also differ by county, complicating service coordination and provision. Providers further described how misunderstandings among mothers that opioid substitution therapies cannot always prevent NAS often left women feeling guilty, angry, and less amenable to engage with healthcare providers. Our results suggest that addressing NAS requires statewide coordinated efforts to reach and engage women, particularly in rural areas. Providers agreed that prevention efforts must address the underlying social determinants of drug misuse and miscommunication around drug treatment. Next, we will interview at-risk pregnant women and recent mothers of NAS infants to gain further insight into their experiences and better inform programming.
The misuse of opioids (prescription drugs and heroin) is a serious public health concern in Ohio and Appalachia. In recent years, there has been a significant increase in both pregnant women seeking treatment for opioid addiction and mothers giving birth to babies diagnosed with Neonatal Abstinence Syndrome (NAS), which results in a constellation of health issues for infants. In order to better understand NAS and inform prevention efforts, we conducted qualitative interviews with 16 key informants (e.g., physicians, nurses) knowledgeable about NAS in greater central Ohio. Our preliminary analyses suggest that NAS is widespread across socioeconomic groups. While non-pharmacologic interventions to address NAS (e.g., skin-to-skin contact, breastfeeding) show promise in reducing symptoms and hospital length of stay, women in rural areas whose babies are sent to Columbus for care face barriers related to transportation, other childcare responsibilities, and drug treatment participation that prevent them from staying with their newborn. Child welfare services also differ by county, complicating service coordination and provision. Providers further described how misunderstandings among mothers that opioid substitution therapies cannot always prevent NAS often left women feeling guilty, angry, and less amenable to engage with healthcare providers. Our results suggest that addressing NAS requires statewide coordinated efforts to reach and engage women, particularly in rural areas. Providers agreed that prevention efforts must address the underlying social determinants of drug misuse and miscommunication around drug treatment. Next, we will interview at-risk pregnant women and recent mothers of NAS infants to gain further insight into their experiences and better inform programming.
Objectives. Both oral health problems and depression among pregnant women contribute to maternal-infant health outcomes. Little is known, however, about the potential effects of clinically-significant depression on the oral health status of pregnant women. The purpose of the present study was to determine the influence of clinically-significant depression and rural- or urban-dwelling status on oral health outcomes among pregnant women.

Materials and Methods. The Center for Oral Health Research in Appalachia (COHRA), after an initial study of families, has initiated, since 2011, a second, longitudinal investigation of health, including oral health, among pregnant women and their babies in north central Appalachia. Participants included pregnant women (N=685) in rural (i.e., West Virginia) and urban (i.e., Pittsburgh, Pennsylvania) areas of north central Appalachia enrolled in the COHRA2 cohort. They were assessed by calibrated examiners regarding gingivitis, oral hygiene, and DMFT, completed the Center for Epidemiologic Studies–Depression scale (CESD), and provided demographics. Participants were categorized based on clinically significant depressive symptoms (CESD>=16) and rural/urban domicile.

Results. Women with depression and those living in rural areas had worse oral health on all three indices than their non-depressed and urban counterparts.

Conclusions. Depression, particularly among women in rural areas, impacts certain oral health indices, and represents a modifiable target for intervention. Moreover, treatments designed specifically for rural populations may be of particular utility. Women who are pregnant or planning to become pregnant may benefit from regular depression screenings from their dental and medical healthcare providers.
Poster Number: 1
Category: Student/Resident/Fellow

Musculoskeletal Ultrasound in American Occupational Medicine Residency Programs: A Survey of Program Directors

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INTRODUCTION: Recently, interest and use of musculoskeletal ultrasound has increased among clinicians. While MSK US can provide the Occupational Medicine clinician many advantages for diagnosis and intervention, training is necessary to develop proficiency.

OBJECTIVES: The objectives of this study were twofold: describe the current state of MSK US training in OM residency programs and to gauge interest in MSK US among program directors (PD's). A web-based survey was sent to all 22 United States OM residency programs.

RESULTS: 59% (13 of 22) of program directors completed the survey with 2 assistant program directors completing the survey for a total of 15 responses. 93% of programs have an occupational medicine clinic, yet no programs offer access to MSK US in clinic. 23% of the responders reported including any MSK US training (formal and informal courses) with one respondent reporting 6-10 hours of exposure being the maximum amount of time. 23% of respondents report providing resident's access to US machines for training purposes outside of OM clinic. 77% percent of respondents indicated that they were interested in attending MSK US training.

CONCLUSIONS: There is a disparity between Occupational Medicine program directors desire to use and be trained in MSK US and the presence of US machines in clinic. The interest in learning MSK US clearly exceeds the portion of residency programs including this in their curriculum. This level of interest suggests this modality will become increasingly useful for diagnosis and interventions as clinical practices evolve.

The Severity of the Metabolic Syndrome Increases over Time within Individuals, Independent of Baseline Metabolic Syndrome Status and Medication Use: The Atherosclerosis Risk in Communities Study.
The severity of the metabolic syndrome increases over time within individuals, independent of baseline metabolic syndrome status and medication use: the atherosclerosis risk in communities study

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Background and Aims: The severity of the metabolic syndrome (MetS) is linked to future cardiovascular disease. However, it is unclear whether MetS severity increases among individuals followed over time.

Methods: We assessed changes in a sex- and race/ethnicity-specific MetS severity Z-score over a 10-year period (visits 1-4) among 9,291 participants of the Atherosclerosis Risk in Communities study cohort. We compared sex- and racial/ethnic subgroups for the rate of change in the MetS severity score and MetS prevalence as assessed using traditional ATP-III MetS criteria. We further examined effects of use of medications for hypertension, diabetes and dyslipidemia.

Results: Over the 10 years of follow-up, MetS severity Z-scores increased in 76% of participants from an overall mean of 0.08 ± 0.77 at baseline to 0.48 ± 0.96 at visit 4 with the greatest progression in scores observed among African-American women. Baseline MetS severity scores predicted the time until ATP-III MetS diagnosis, with a model-predicted 77.5% of individuals with a visit 1 MetS severity score of 0.75 progressing to ATP-III MetS within 10 years. The rate of increase in MetS severity score was higher among those younger at baseline but was independent of baseline MetS status or the use of medications to treat blood pressure, lipids and diabetes.

Conclusion: The severity of metabolic derangements as measured using this MetS severity score increases over time within individuals and predicts diagnosis of ATP-III MetS. These data may have implications for tracking MetS related risk within individuals over time.
Poster Number: 3
Category: Student/Resident/Fellow

NSQIP-Based Analysis of Risk Factors and Perioperative Outcomes of Patients Undergoing Vascular Surgery in the State of West Virginia.

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Background: Patients from West Virginia have a higher prevalence of specific risk factors compared to patients elsewhere. This study investigated preoperative and perioperative risk factors associated with vascular surgery among patients in West Virginia compared to those in other states.

Methods: Data on all patients who underwent vascular surgery from April 1, 2011 to March 31, 2013 were reviewed using the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database. Main endpoints were mortality, myocardial infarction and surgical site infection within 30 days of surgery. Secondary outcomes included readmission and reoperation rates within 30 days of surgery. Logistic regression along with odds ratios (OR) was performed to investigate significant risk factors associated with the above endpoints.

Results: Patients treated at WVU had more severe comorbidities, higher ASA scores, were functionally dependent, and were more likely to undergo emergency surgery. WVU patients in 2011 had a higher likelihood of 30-day myocardial infarction and superficial surgical site infection (ORs with 95%CI: 2.23 (1.14-4.34) and 2.40 (1.42-4.08), respectively). In 2012, WVU patients had a higher likelihood of 30-day myocardial infarction, superficial and deep surgical site infection, and reoperation (ORs and 95%CIs: 2.95(1.59-5.47), 3.16 (1.96-5.10), 2.50 (1.14-5.50), 1.67 (1.15-2.43), respectively).

Conclusions: WVU patients were sicker and had higher odds of having myocardial infarction, surgical site infection and reoperation within 30 days compared to patients treated elsewhere. The results of this study provide insight into the reasons behind higher perioperative complication rates at WVU and indicate a greater need for risk factor control.
Acute kidney injury after placement of antibiotic-impregnated bone cement in an infected total knee arthroplasty

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Background: Antibiotic-laden cement is used for treatment of prosthetic joint infections. Nephrotoxic complications are rarely considered with this type of antibiotic delivery method. Few case reports implicated aminoglycoside-impregnated cement in acute kidney injury (AKI) after surgery for an infected total knee arthroplasty (TKA).

Case: We describe a 74-year-old female who developed acute kidney injury with creatinine clearance dropped from baseline of 78 to 25 ml/hr, 48 hours after undergoing revision of an infected total knee arthroplasty with the use of cement spacer impregnated with a combination of Vancomycin and Gentamycin with added Tobramycin, serum Tobramycin level was 4.2, Gentamycin level was 0.8 and Vancomycin level was 4.5. No intravenous aminoglycoside or Vancomycin was given to the patient. After careful consideration of other possible etiologies, the acute kidney injury could not sufficiently be attributed to other causes; Tobramycin was the etiology of the patient’s AKI in our case.

Conclusion: The use of antibiotic-impregnated bone cement for treatment of infected total joint arthroplasties is a common practice, but it has the potential for systemic toxicity. Potential for renal injury due to side effects of the antibiotics added to the cement should be considered prior to utilization as well as in patient’s who develop this complication after implantation.
Assessing Physician Knowledge and Attitudes towards Electronic Cigarettes: A Pilot Study

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**Background.** Electronic cigarettes (e-cigarettes) are a recent addition to the tobacco marketplace. While these products have as yet not established long-term safety or definitive usefulness as a harm reduction strategy in smoking cessation therapy, they remain popular among the nicotine-using community. To date little data exists assessing physician attitudes and comfort with counseling patients regarding e-cigarettes or in determining physician opinions regarding safety and efficacy or these products as a means of harm reduction.

**Methods** 56 clinicians were asked to complete a 26 question electronic survey in which baseline knowledge of e-cigarettes and opinions as to their use by the patient population were answered.

**Results** 80% of physicians surveyed reported never using any tobacco products and 73.4% counseled the majority of their smoking patients, spending on average between 1-5 minutes per patient on the topic. 65% of physicians counseled patients on e-cigarettes, although the majority report having not read any peer reviewed literature (53.3%), packaging inserts (65%), or attended any formal conferences (96.7) that discussed e-cigarettes. Physician comfort level discussing e-cigarettes and their use as a smoking cessation tool were varied, although opinions favored not utilizing e-cigarettes in smoking prevention and that e-cigarettes are not safe for personal use.

**Conclusion** This study is the first of its kind in surveying physicians as to their knowledge base and comfort in discussing e-cigarettes with their patient populations. This information can prove invaluable in determining future healthcare policy and direct continuing medical education as more is learned about e-cigarettes.
Health communication and inpatient hospitalization: The experience of Appalachian patients

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BACKGROUND: Patient experiences during hospitalization are often impacted by socio-demographic factors, such as sex, race, and ethnicity. Geographic factors such as residence in an Appalachian county may inform patient ratings of care—especially health communication—as residents of Appalachia are at risk for lower educational attainment. This study evaluates the satisfaction of Appalachian patients with their healthcare and communication during hospitalization.

METHODS: Post-hospital ratings of care were collected via the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey at an academic, tertiary-care medical center. The patient’s county of residence was designated Appalachian or non-Appalachian according to ARC listing. A total of 3334 responses received during a 6 month period were aggregated and used for analysis. Patient responses were compared between Appalachian and non-Appalachian patients using multivariate regression to adjust for self-reported overall health, level of education, ethnicity, and primary language.

RESULTS: Patients from Appalachian and non-Appalachian counties were approximately matched for age, gender, and length of stay. Appalachian patients reported lower levels of education and self-rated health. Patients from Appalachian counties reported more positive experiences with nurses listening (p<0.01), nurses explanations (p<0.02), doctor courtesy (p<0.01). Non-communication aspects of care were also rated significantly higher by Appalachian patients including the overall hospital rating (9.9 vs. 9.6, on a 10-point scale; p<0.001), and mean scores for cleanliness and quiet (p<0.01).

DISCUSSION: Patients residing in Appalachian counties appear to report higher satisfaction with health communication and other domains of care following hospitalization. The reasons underlying this finding bear further investigation.
High Risk Drug-Related Behaviors Among People Residing Appalachian Counties in Ohio, Kentucky, & Tennessee

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Appalachian areas have disproportionately high rates of non-medical use of prescription opioids, which has been paralleled by high rates of opioid overdose fatalities. While states like Ohio have initiated overdose prevention programs in Appalachian areas, barriers to addiction treatment persist and overdose fatalities have continued to increase. This study reports on a subset of data (n=256) that was pooled across three regional cross-sectional surveys from two overdose prevention programs and a syringe exchange program; including only participants from Appalachian counties in Ohio and Kentucky. The sample was predominately (97%) white, 48% male and the mean age was 35 years old. The majority (75%) of participants reported having ever injected drugs in their lifetime, 71% had witnessed a drug overdose, 37% had overdosed themselves and 21% reported having attempted suicide during their lifetime. The average age of first injection drug use was 25 years old and 26 years old for age of first overdose. The most common (57%) source of first opioid exposure was a prescription from a physician, 23% reported receiving it from a friend or family member and 18% reported purchasing it from someone. The lifetime rates of injection drug use, witnessing and experiencing a non-fatal overdose in this sample are significantly higher than previous reports (Havens et al. 2007; Havens et al. 2011). The findings from this study suggest the need for multidimensional interventions to reduce high-risk drug-related behaviors and suggest a potential high risk of infections, like hepatitis c, that are related to injection drug use.
White Matter Myelination and Cognitive abilities in pre-Adolescent Children.

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Resting state functional connectivity MRI (rs-fcMRI) and diffusion tensor imaging (DTI, and Fractional Anisotropy-FA) methods are not routinely used for clinical applications. Rs-fcMRI and DTI could provide a mean to quantify functional and structural connectivity abnormalities. Our group has previously suggested that rs-fcMRI can map differences in brain connectivity related to cognitive functions. The goal of this project was to determine if FA measures in the developing brain are clinically significant, and if these measures in brain areas involved in cognition can be used as biomarker of cognitive function.

Diffusion weighted data were obtained from 8 healthy children (4 males, 6 females) on a 3T Siemens scanner using a 12-channel coil. FA measures were determined the freely available software package DSI-studio. ROIs were drawn freehand for each subject in ten, clinically relevant brain regions including, fornix cingulum, superior longitudinal fasciculus, uncinate fasciculus, and hippocampus; corticospinal tracts and genu and splenium of the corpus callosum were used as control regions for white matter development. Cognitive testing included: Full Scale Intelligence Quotient (FSIQ), Verbal Comprehension Index (VCI), Working Memory Index (WMI), Processing Speed Index (PSI) and Stroop Task. Based on cognitive testing scores, subjects were divided into higher and lower functioning groups. Preliminary analysis does not demonstrate significant FA differences between the groups, suggesting that functional connectivity measures (rs-fcMRI) could be a more sensitive biomarker of cognitive ability than structural abnormalities (white matter myelination). This preliminary findings need to be confirmed with a larger subject sample size.
Effect of nutritional status on white matter development in a population of premature neonates <29 weeks Gestational age (GA) with Very Low Birth Weight (VLBW)

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Hypothesis and objectives: Adequate nutrition for preterm infants is critical to achieve normal growth and appropriate neurological development. Pre-term infants with early growth failure are at risk for developmental delay including cognitive deficit. The objective of this study was to determine the effect of strictly optimized nutrition on white matter development -measured by Fractional Anisotropy (FA)- in premature infants (<29 weeks GA) with Very Low Birth Weight (VLBW).

Methods: Electronic medical records of premature neonates who underwent term-equivalent MRI were reviewed to collect the following clinical data: sex, gestational age, birth weight, APGAR scores, weekly anthropometric measurements (head circumference, length and weight) and cumulative caloric intake. Optimized Caloric intake was defined as consistently receiving =100 kcal/kg/day from day 7-28 of life. Co-morbidities affecting growth and/or brain development were identified. Subjects were assigned to two groups based on optimal/sub-optimal caloric intake. MRI images were processed using DTI-studio and MRICron software packages. Regions of Interest (ROI) were manually placed bilaterally in multiple brain locations including corticospinal tracts, corpus callosum, temporal, occipital, periventricular white matter and thalamus to obtain diffusivity measures. Inter-rater reliability for ROI placement between two investigators was determined by intra-class correlations.

Results and Discussion: Preliminary results demonstrate lower FA in every brain region of the sub-optimal nutrition group. The statistical significance of this preliminary finding needs to be determined with a larger sample size. The significance of these findings and its correlation to neurodevelopmental outcome remains to be determined.
Recruiting in WV for a peer-led, social marketing campaign that promotes health on college campuses

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Introduction: Many barriers face today’s college students that affect their health and academic success. Stress due to school, changes in environment, unhealthful diets, and negative peer relationships all factor into their overall lifestyle. Evidence suggests that having positive peer role models and making health “cool” will decrease obesity in this population.

Objective: The ‘Get Fruved’ study is a four-university wide, peer-led, social marketing project aimed at changing campus environments as well as increasing healthful diets, stress management and physical activity. WV recruiting was aimed at retaining 30 social marketing and environmental intervention (SMEI) students and 50 peer mentors (PM).

Methods: Recruiting in West Virginia for our SMEI training course (intervention planners) and PM training course (mentors of at-risk freshman) was developed over the course of 5 months. Over 60 undergraduate researchers, 40 graduate researchers 10 Doctoral students, and 40 PhD researchers across four intervention states found the best ways to get information out. Emails, announcements, administration talks, class talks, informational booths, chalking sidewalks and hanging flyers were all applied. The plan was implemented by reaching out to over 270 student organizations, as well as administration and specific colleges at WVU.

Conclusion: 25 students signed up for the SMEI course and 42 students signed up for the PM course. By developing partnerships with motivated students, we will ensure planning and implementation of healthy campus events, environmental audits, and a fun social marketing campaign to decrease unhealthy lifestyles in these young adults.
Introduction: College is a major adjustment for first time college students. Being out on their own leaves them susceptible to unhealthful influences or environments that leave them unable to be as active as possible. Providing a lifestyle intervention like ‘Get Fruved’ gives these first-year students an opportunity to be involved in a program that can aid in their success and health.

Objective: Get Fruved is a project aimed at helping first year students succeed with all of the stressors that are new to their life. A group of social marketing and environmental intervention (SMEI) students across 4 intervention universities (WVU, SDSU, UT, UF) developed 26 weeks of events based on diet, physical activity and stress management. Another group of students were trained as peer mentors (PM) to be matched to incoming first-year students.

Methods: SMEI and PM students and went through a semester of training for their portion of the project. Teams of SMEI students from four intervention universities developed a week of informational events to be implemented on the college campuses during the 2015-2016 year. Baseline measurements on freshman students are being taken from August 2015-October 2015.

Conclusion: Upon implementation of this 26-week intervention, we hope to see an improvement in health and lifestyles of college aged students, specifically at WVU in the Appalachian Region, as well as prevention of the “freshman 15”. Furthermore, this large intervention in an area like Morgantown, WV will give this portion of the “obesity belt” the opportunity to become healthier.
Nutrition Intervention to Profile Metabolic, Microbiome and Vascular Health in Young Adults at Risk for Disease: FRUVE Domic Pilot Study

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We investigated the effects of an 8-week nutritional intervention on the microbiome, metabolome and cardiovascular indicators young adults (18-28 years-old) “at-risk” for metabolic syndrome (MetS). Thirty-seven subjects were recruited at West Virginia University and randomized into one of three intervention groups: 1) “Fruved” (50% fruit & vegetable); 2) “Fruved+LowCHO” (low refined carbohydrate); and 3) “Fruved+LowFat” (low fat). Venous blood and stool sample were collected pre and post intervention. Alterations in the fecal microbiome were assessed using high throughput sequencing of the V3-V4 regions of the 16S rRNA gene (Illumina MiSeq). Targeted and non-targeted metabolomic approaches are currently being used to investigate the influence of diet on ceramides and its potential downstream regulators and to obtain a global understanding on the metabolome. Significant increase in Firmicutes and decrease in Bacteroidetes was observed in Fruved + LowCHO group, whereas decrease in Firmicutes and increase in Bacteroidetes observed in Fruved+ low FAT group. No changes were in the Fruved only group. Amino acid, carbohydrate, fatty acid, and sphingolipid metabolism is being analyzed to make correlations with the microbiome. This is an ongoing investigation identifying the microbiotic and metabolic changes associated with diet changes in individual “at risk” for MetS.
Individuals with autism develop adaptive neural mechanisms to integrate audiovisual information

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The rate of autism diagnosis has been steadily increasing in the U.S. Sensory processing dysfunction is a core feature of autism that impacts a person’s ability to attend to what’s pertinent in their environment, increases anxiety and social isolation. Differential structural and functional connectivity have been seen in individuals with autism depending on the age of the participants, level of stimulus complexity, and task demands. In addition, the timeframe within which sensory information is perceived is altered in this population. Despite these differences, autistic children and adults often perform at or above the level of their peers on many tasks. Exactly how individuals with a spectrum of autism phenotypes develop adaptive neuronal mechanisms to process and integrate sensory information has not been determined. The objective of this research is to characterize cortical processing mechanisms engaged in high-functioning adolescents and adults with autism during a simple selective attention task using real world (complex) stimuli. We hypothesize that differences in structural and functional connectivity induce adaptive neural mechanisms that impact the timing of incoming sensory inputs and alter neuronal processing when integrating sensory information. We used functional magnetic resonance imaging (fMRI) to characterize these adaptive brain mechanisms when processing input from one sensory modality (visual) vs. integrating two types of sensory information (audiovisual). This research is significant because it utilizes real world stimuli to investigate cortical activation differences in children and young adults with autism that will inform models of plasticity in this heterogeneous disorder and aid in the refinement of interventions.
Vitamin D is more than just a vitamin. This fat-soluble vitamin is a secosteroid hormone that can alter gene expression on over 2000 genes. Sufficient levels obtained through sunlight exposure, diet and supplementation. Unfortunately sufficient levels can rarely be obtained via diet and sun exposure alone and supplementation is often required. Vitamin D deficiency is correlated with adverse outcomes in bone health, immunity, muscle function, and physical performance. Vitamin D sufficiency is defined at 25-hydroxyvitamin D3 > 30ng/mL and ultimately being below 30 ng/mL is considered deficient and results in possible morbidity. The testing for vitamin D, 25-hydroxyvitamin D3, deficiency is obtained from a simple, non-fasting blood test and termed deficient if <30 ng/mL. Vitamin D deficiency among athletes is practically an epidemic, even at the elite collegiate and professional levels. There remains a direct correlation between vitamin D and the frequency of stress fractures, musculoskeletal pain, sickness, and even inflammatory processes. When levels are sufficient all the aforementioned have decreased frequency. It is now understood that in order to achieve performance enhancement that levels of 25(OH) D need to be greater than 40 ng/mL. Increasing vitamin D levels can also decrease pro-inflammatory cytokines while simultaneously increase anti-inflammatory cytokines. Applying our knowledge of vitamin D to rehabilitation is the next step. It is imperative that physical therapists understand the applications of correcting vitamin D deficiency. It is very reasonable to assume that physical therapists can improve functionality and decrease musculoskeletal injury recurrence with vitamin D deficiency correction during rehabilitation.
Risk Score Model for Predicting Long-term Survival Following Elective Endovascular Abdominal Aortic Aneurysm Repair

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Objective: To identify significant predictors of long-term mortality after elective endovascular abdominal aortic aneurysm repair (EVAR).

Methods: We included all elective EVAR cases based on a national data-set from the Society for Vascular Surgery Patient Safety Organization. Clinical and anatomic variables were analyzed with a Kaplan-Meier and Cox-regression to determine predictors of mortality, develop a score equation, and categorize patients based on mortality risk.

Results: A total of 5678 EVAR patients were included with an average age of 73.6 ± 8.2 years. The majority were male (81.6%) with a history of smoking (86.1%). There were three deaths within 30-days (0.1%). Overall survival was 81.2% and 69.2% at 5 and 8 years, respectively. Several factors were associated with poor survival: unstable angina (Hazard Ratio [HR], 2.8; P=0.008), on dialysis (HR, 3.7; P<0.001), eGFR <30 (HR, 1.7; P=0.044), eGFR 30-59 (HR, 1.4; P=0.002), age >80 (HR, 3.2; P<0.001), age 75-79 (HR, 2.2; P<0.001), COPD on oxygen (HR, 3.3; P<0.001), aortic diameter >5.8cm (HR, 1.2; P=0.043) and high risk for surgery (HR, 1.4; P=0.043). Pre-operative aspirin use and BMI 25-35 were both found to be protective (HR, 0.78; P=0.017 and HR, 0.8; P=0.024, respectively. Five and 8 year survival rates for patients with low, medium, and high risk were 89.2 and 79.7%, 80.7 and 68.9%, and 64.1 and 47.5%, respectively (P<0.001).

Conclusion: Eight-year survival following EVAR in patients with a high-risk score utilizing the model provided was 47.5%. Patients with multiple co-morbidities at risk for decreased long-term survival can be identified with our model.
The obesity epidemic in the US has reached over 150 million people. Obesity is associated with an elevated risk of cardiovascular disease, metabolic disease, and cardiac mortality. The use of bariatric (gastric bypass) surgery has been shown to decrease excess body weight and reduce cardiovascular risk. Although, more than 100,000 procedures have been performed in the past decade, it is unclear the contribution to vascular change during post-operative weight loss.

Twelve (12) Roux en-Y gastric bypass patients have been assessed pre-operative and 1 week post-operative. Measurements include echocardiograms, manual brachial blood pressure, radial applanation tonometry, diastolic function analysis using Doppler examination, as well as peripheral arterial and endothelial function along with heart rate variability.

As expected, weight decreased drastically 1 week post-operatively, coinciding with a reduction in abdominal adiposity. Preliminary testing results have also found a drop in central systolic blood pressure, while no changes were found in traditional brachial blood pressure measurements or endothelial function. These findings show that Roux en-Y gastric bypass surgery improves the parasympathetic to sympathetic input on the heart and peripheral arterial stiffness despite no change in endothelial function. The reduction in arterial stiffness, leading to a decrease in cardiac afterload, ultimately leads to more efficient cardiac effort, and therefore improved cardiovascular function.

These preliminary study results have further informed researchers of the specificity of the study parameters and patient inclusion criteria. The time commitment from patients is crucial for continued success, therefore steps are being taken to increase enrollment and study adherence.
Validation of Duplex Ultrasound (DUS) to Measure Stenosis in Comparison to Angiography

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**Introduction:** Duplex ultrasound (DUS) is a non-invasive diagnostic tool that measures blood flow, and normally is expressed in terms of Peak Systolic Velocity (PSV).

**Objective:** Validate the correlation between DUS values and angiographic stenosis measurements, and to determine a cut-off value for predicting significant stenosis (>=50%).

**Methods:** This was a retrospective observation study based on medical records from May 1999 to July 2013. A cut-off value was obtained using receiver operator curve (ROC) analysis. The North American Symptomatic Carotid Endarterectomy Trial (NASCET) method was used to measure the angiographic stenosis.

**Results:** We examined 102 arteries for 75 patients. The majority of the arteries were for females (73.5%) with a mean age of 66 ± 11.13 years. The maximum PSV was 626 centimeters per second (cm/s), while the minimum PSV was of 35.8 cm/s. The majority of the available arteries were on the left side (58.8%). Common comorbidities included hypertension (80.4%), hyperlipidemia (71.6%), and coronary artery disease (65.7%). Following ROC analysis we found a cut-off value of >280 cm/s to be most predictive of stenosis. The sensitivity and specificity for >50% and >70% stenosis was 63.6 and 96.8% and 61.5 and 73.5%, respectively.

**Conclusion:** A PSV of >280 cm/s was indicative of a degree of subclavian artery stenosis of more than 50%. However, the cut point of 280 cm/s did not distinguish between 50% and 70% stenosis. We plan to include more non-diseased arteries to improve accuracy and make further calibrations to the cut-off point.
Mitochondrial Dysfunction: A New Clinical Predictor of Disease Development in the Type 2 Diabetic Patient?

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Cardiac complications, including diabetic cardiomyopathy, are the leading cause of morbidity and mortality among diabetic patients. Approximately 347 million people worldwide are currently diagnosed with diabetes mellitus, with 90% of diabetic patients suffering from type 2 diabetes mellitus. The mitochondria within cardiomyocytes are implicated in the etiology of both type 1 and type 2 diabetes mellitus. Within the cardiomyocyte, two distinct mitochondrial subpopulations exist; the subsarcolemmal mitochondria (SSM), located directly beneath the sarcolemmal membrane, and the interfibrillar mitochondria (IFM), situated between the myofibrils. We have previously observed enhanced dysfunction to cardiac SSM in type 2 diabetic db/db mice. The goal of this study was to determine whether clinical indices of diabetes mellitus, such as hyperglycemia and hemoglobin A1c (HbA1c) level, correlate with the extent of SSM dysfunction observed in type 2 diabetic patients. Cardiac mitochondria were isolated from atrial appendage of both non-diabetic and diabetic patients. To assess correlative risk between hyperglycemia or HbA1c level and type 2 diabetes mellitus, we utilized linear spline models and determined that type 2 diabetic patients display dysfunctional state 3 respiration rate and ETC complex I activity in the SSM irrespective of the absolute blood glucose or HbA1c level. In addition, when comorbidities, such as coronary artery disease (CAD) and hypertension, were also present in the type 2 diabetic patients, we found that type 2 diabetic patients display SSM dysfunction that is not due to either CAD or hypertension independently. Further, we assessed the body mass index (BMI) of the patient to determine if it served as an effective predictor of mitochondrial dysfunction, since the majority of type 2 diabetic patients have a higher BMI. Using a scatter plot analysis of non-diabetic and type 2 diabetic patients’ BMIs versus mitochondrial functional analyses, we found that BMI is not effective predictor of cardiac mitochondrial dysfunction for the type 2 diabetic patient. Finally, we found that the degree of mitochondrial dysfunction in type 2 diabetic patients remains consistent despite the extent of elevated blood glucose or HbA1c level. These findings suggest that independent of comorbidities, cardiac SSM dysfunction is present in the type 2 diabetic patient heart and the degree of dysfunction is consistent independent of elevated blood glucose or HbA1c level. (Support: NIH DP2DK083095; NIH U54 GM104942)
Poster Number: 19
Oral Presentation: Session A, 9:20 am
Category: Early Stage Investigator

PEDIATRIC SECONDARY OVERTRIAGE IN A STATEWIDE RURAL TRAUMA SYSTEM: ARE THESE TRANSFERS NECESSARY?

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**Objectives:** Rural hospitals are often the initial receiving facility for pediatric trauma patients, yet their resources may be insufficient to optimally treat these patients. “Secondary overtriage” refers to patients who are discharged home shortly after being transferred to a “higher level of care”. An analysis of these occurrences is useful to determine the optimum use of resources for the statewide trauma system.

**Methods:** From the West Virginia statewide trauma registry, all trauma patients \(<18\) years old between 2003-2013 who were discharged within 48 hours from arrival and did not undergo a surgical procedure were identified. They were further divided into those: 1) treated at initial facility 2) transferred to second facility. Clinically important factors were analyzed using logistic regression. The 17 year old age group and the 7 am to 3 pm admission time were picked as reference.

**Results:** 4441 patients fit inclusion criteria of which 801 (18\%) arrived as transfers. Younger age groups were more likely to be transferred. Factors associated with being transferred are summarized in the table below. When creating a predictive model using the factors above, the patients \(<2\) years of age were transferred at a lower rate than expected by the model.

**Conclusions:** Secondary overtriage may result from a rural hospital’s limited access to certain pediatric specialists. Although it increases radiation exposure, CT scans may reduce the need for these unnecessary transfers. A particularly vulnerable population, non-verbal children may also be undertriaged.
Self-efficacy and subjective norms are associated with fruit and vegetable consumption in Appalachia

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Introduction: In rural Appalachia, dietary habits are influenced by poverty, food insecurity and culture. The Theory of Planned Behavior constructs, including attitudes (i.e., personal value of behavior change), subjective norms (i.e., perceived behavioral expectations of others), perceived behavioral control (PBC; perceived ability to change behavior) and intention (i.e., readiness to perform a behavior), provide a framework for assessment of strengths and barriers to dietary behavioral change. The aims of this study were to: 1) assess relationships among attitudes, subjective norms, PBC and intention of consuming fruits and vegetables by individuals living in rural Appalachia; and 2) compare these constructs to actual consumption of fruits and vegetables.

Methods: Volunteers (N=148) were recruited from six rural Appalachian counties to participate in a nutritional skills intervention. Participants completed the BLOCK Fruit/Vegetable Screener and Theory of Planned Behavior questionnaire during the baseline assessment. Correlation and regression were used to assess aims.

Results: Attitude scores were correlated with subjective norms (r=.22), PBC (r=.41), and intention (r=.39; all p-values<.01). PBC scores were correlated with intention (r=.54; p<.0001). The significant predictors of consumption of fruits and vegetables were age (standardized beta=.26, p=.0008) and intention (standardized beta=0.27, p=.004). The overall regression model was significant (F=6.6, p<.0001) and the R2 value was 0.23.

Conclusion: Perceptions of self-efficacy (i.e., attitudes, perceived behavioral control) and expectations of others influence intention to consume fresh fruits and vegetables. Intention predicts actual consumption of fruits and vegetables. Strategies to increase fruit and vegetable consumption should enhance self-efficacy and include family members and/or significant others.
Predictors of Contrast Induced Nephropathy in Trauma Patients

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Introduction: Contrast-induced nephropathy (CIN) is an adverse event caused by the administration of contrast dye prior to a computed tomography scan. Literature investigating predictors of CIN in trauma is limited. This study aims to identify predictors of CIN in this patient population.

Methods: This is a retrospective study of patients admitted to a level I trauma center between 2007 and 2011. A total of 426 patients with a diagnosis of AKI who received at least one dose of contrast dye were included and divided into two groups. The CIN-positive group had an increase in serum creatinine .0.5 mg/dL or .25% of baseline within 48-72±6 hours post contrast administration and CIN-negative group failed to meet this criteria.

Results: Ninety-five patients (22.3%) were found to be CIN-positive. These patients were significantly older with a lower revised trauma score (RTS). Base deficit(BD)>-2, history of heart failure, use of angiotensin antagonists, lack of fluid bolus (FB) administration prior to contrast, multiple contrast exposures, volume of contrast received, the percentage of patients exposed to concomitant nephrotoxic drugs; genitourinary (GU), gastrointestinal, and arterial injuries were all significantly associated with CIN. Logistic regression showed GU injuries to be the strongest predictor of CIN (OR=2.84, 95CI=1.27-6.36, p=0.01) followed by BD>-2, age, RTS, and no administration of FB prior to contrast exposure.

Conclusions: This data highlights characteristics of trauma patients who are more likely to develop CIN. Practitioners should insure that intravenous fluid therapy is maximized and contrast exposure is limited in patients presenting with these characteristics.
Predictors of Intra-abdominal Infections Following Penetrating Trauma: A Comprehensive Evaluation

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Introduction: Post-operative infections are estimated to occur in 18-26% of penetrating abdominal traumas and carry a 30% mortality rate. There is limited data evaluating predictors of intra-abdominal infection in this patient population. The aim of this study is to conduct a comprehensive evaluation of predictors for post-operative intra-abdominal infections after penetrating abdominal trauma.

Methods: A retrospective cohort study was conducted in a level I trauma center between 2005 and 2014 in patients with penetrating abdominal trauma who underwent exploratory surgery and received prophylactic antibiotics. Data were obtained from the institution’s trauma registry and chart review.

Results: Twenty-eight of 162 patients developed a post-operative intra-abdominal infection. Patients with intra-abdominal infections had significantly higher Injury Severity Score, Penetrating Abdominal Trauma Index (PATI), incidence of hollow viscus organ injury (HVOI), high energy trauma, and 24-hour fluid resuscitation totals. Area under the curve and Youden’s Index analyses showed an association with intra-abdominal infection when PATI was >15. PATI >15 was a strong predictor of intra-abdominal infection (OR=14.5, 95%CI=3.8-54.4, p=0.000). Twenty-five of the 28 intra-abdominal infection patients had HVOI. Patients with HVOI who did not receive gram negative and anaerobic coverage through the intra-operative period were 2.8 times more likely to develop post-operative intra-abdominal infection(s) (95%CI=1.1-7.5, p=0.036).

Conclusions: Patients presenting with possible penetrating abdominal injuries to hollow viscera should receive gram negative and anaerobic coverage prior to, or within the intra-operative period. Intra-operative findings yielding a PATI >15 highlight a population who is at an extremely high risk of developing a post-operative intra-abdominal infection.
Appalachian Rural Dental Education Partnership (ARDEP)

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\textbf{Background:} Oral health disparities with adverse economic outcomes across the lifespan are well documented in Kentucky’s rural Appalachian counties. Children, adults and seniors have very poor oral health and oral health literacy, with indicators near or at the lowest in the nation. A comprehensive, long-term development strategy is needed to improve health, education and economic outcomes for the region.

\textbf{Objectives:} Develop a strategic partnership between Morehead State University and the University Of Kentucky College Of Dentistry under the auspices of the Kentucky Oral Health Network, which leverages the strengths of each university and also public health, community health and other non-profit organizations in this region of Appalachia.

\textbf{Methods:} The Appalachian Rural Dental Education Partnership (ARDEP) was established in 2013 to increase opportunities for Kentuckians from Appalachian counties to pursue dental education and practice as a career choice, improve the numbers and distribution of dentists practicing in Kentucky’s Appalachian counties, improve oral health literacy and demand for care, and develop financially sound oral health models to benefit the economic base and societal improvements in Appalachia.

\textbf{Results:} By 2015 the innovative ARDEP has established a variety of sustainable projects. These consist of a strong in-region K-12 early dental pipeline program, an MSU Campus Dental Pipeline Program including for credit online oral health courses, and a regional oral health literacy and dental services program with university and community partners.

\textbf{Conclusion:} The MSU/UK ARDEP partnership is providing important new models to guide infrastructure development that helps improve oral health and workforce capacity in Appalachia.
Appalachian Research Day: Come Sit on the Porch

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\textbf{Introduction:} Rural Appalachian communities in eastern Kentucky suffer from some of the Nation’s most concerning health disparities. Community-based research can be an effective way to address health disparities by identifying problems and sharing workable solutions. However, challenges exist in recruiting and retaining research participants in rural populations that can often be difficult to reach. Partnerships between researchers and communities are essential to the success of the research process, particularly translation of findings back into the community.

\textbf{Methods:} Appalachian Research Day is a one-day annual event that offers a unique forum for university-based researchers to disseminate health disparities research findings directly into the community where the research was conducted. Research participants, healthcare providers and community stakeholders attend the event to learn the outcomes of community-based studies focused on diabetes, stroke, heart disease and cancer.

\textbf{Conclusion:} Appalachian Research Day demonstrates that successful community based research:

. Begins at the local level.

. Is built upon the foundation of relationships among individuals, neighbors, and groups who have common questions and concerns.

. Benefits from partnerships between communities and researchers

. Requires strategies for successful recruitment and retention of special populations that can be difficult to reach.

. Offers opportunities for local research dissemination and implementation.
Dialing in the Correct Range of Motion: Smartphone Assessment of Knee Flexion Compared to Radiographic Standards

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Introduction This study establishes a standardized method for utilization of smartphone accelerometer measurements knee flexion and compares it to standard radiographic measurements.

Methods Two cadavers were attached to a custom device that positioned the knee at fixed flexion angles. With a calibrated smartphone fifty-four angle measurements were performed in triplicate by five orthopaedic surgeons to determine the highest agreement based on the location of the smartphone on the femur and tibia. Using the optimized technique, nineteen orthopaedic surgeons made visual, smartphone and long-arm goniometer measurements for flexion angles on two legs of different girths. Observations were compared to radiographic flexion measurements recorded by a blinded observer. Measurements were compared using absolute mean-deviation, regression ANOVA, Tukey HSD and ICC, a p< 0.05 was significant.

Results Calculating the absolute mean deviation from the radiographs demonstrated the highest agreement among observers with the smartphone placed on the distal aspect of the femur and proximal aspect of the tibia. One-way ANOVA blocked for flexion angle and observer experience indicated that there was a difference among measurement techniques (p< 0.001) with smartphone measurement having the lowest deviation. Overall, we observed a high level of consistency within measurement techniques (Intraclass correlation, ICC= 0.95; 95% CI: 0.93-0.96). We found no statistical support to demonstrate an experience effect between surgeons or a change in accuracy with extremities of different girth.

Conclusion This study demonstrates a standard technique for utilization of a smartphone goniometer. The smartphone goniometer measurements were better than standard measurements when compared to radiographic standards.
Cardiovascular disease is the leading cause of death in the U.S. and W.V., and, despite advances in treatment modalities, the increasing prevalence of risk factors, particularly lifestyle-based risk factors, has led to a concern for future increased societal burden of cardiovascular disease. In W.V. in 2010, the cost of CVD-related hospitalizations alone exceeded $1-billion. This has highlighted the need for an emphasis on population approaches to the promotion and support of cardiovascular health. To this end, the American Heart Association recently developed a comprehensive cardiovascular health index (CVHI) incorporating behavioral and biological factors. OBJECTIVE: The objective of the current study was to assess CVHI in a large cohort of children and adults and assess how CVHI changes with increasing age and between genders and then compare the distribution of cardiovascular health in the population to the magnitude of cardiovascular disease risk, using the ACC/AHA cardiovascular risk calculator. METHODS: We used data from the C8 Health Project to perform a secondary data analysis consisting of a final sample of 51,652 adults (=20 years old) and 9624 children (<19 years of age) after exclusions and incomplete data. The CVHI as developed by the AHA was adapted to fit the data and questions available in this cohort. Most notably, dietary quality was excluded and so the final score has a denominator of 6 (vs. 7 as originally published by the AHA). The ACC/AHA risk score was also adapted and calculated for each individual to determine the 10-year risk score for heart disease or stroke. RESULTS: Overall, 40.6% of children and 9.8% of adults had ideal cardiovascular health. In this cohort, both children and adults were least likely to have ideal exercise (<15% for both), and most likely to have ideal tobacco use, blood pressure, and blood glucose. Significant gender-based differences were observed: for all component scores except exercise, girls/women were more likely to be classified as ideal compared to boys/men. For overall classification, girls and boys were similar (40.5% ideal vs. 40.8% ideal) but women had better overall CVHI compared to men (11.8% ideal vs. 7.2% ideal). In evaluating CVHI by 10-year age groupings, a steady age-related decay in CVHI was observed: 42.2% of 10-19 year olds had ideal cardiovascular health compared to 20.3% of 20-year olds, 13.0% of 30-year olds, and down to 2.7% in 80+ year olds. Significant gender- and SES-related differences in this age-related decay were observed, with women showing steeper declines in CVHI after age 50 and lower SES showing both a lower baseline and a steeper decline in CVHI (p<0.05 for both). Similar patterns in disparities and differences were observed for the ACC/AHA risk score. However, risk scores remained relatively low until middle age, especially for women. CONCLUSIONS: Despite very low cardiovascular health in this population, clinical use of only the ACC/AHA risk score would substantially delay prioritization of patients based on risk profile. Delay in primordial prevention conflicts what is known about risk factor treatment efficacy and the ability to return an individual to “health”, which has significant implications for population health.
AMPET: a brain initiative planning project to design a wearable, microdose PET imager.

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Brain imaging has been limited by the motion intolerance of big, bolted-to-the-floor imagers like MRI, PET and MEG and by low resolution, surface-only imaging of EEG and Near Infrared Imaging. In this project, we are designing a wearable imager that will enable high resolution imaging of both deep and surface brain, all while the subject is upright and moving. Our initial simulation results have shown a more than 400% increase in sensitivity by the helmet scanner over the conventional whole-body PET scanner. With further improvements in time-of-flight (TOF) and depth of interaction information, we expect the injected radioligand dose can be very low. Pilot data results show that it will be better than 1/10th of the standard dose. Our team has investigated potential uses in the neuroscience and clinical worlds. Applications include those enabled by freedom of movement and different uses of radioligands such as neurotransmitter and microglia targets. Novel areas of study may include balance, physical therapies, natural social interactions, virtual reality as well as disorders like stroke, Alzheimer’s, Parkinson’s, multiple sclerosis and traumatic brain injury (e.g. testing effects of exercise on brain recovery). By helping future users of the imager understand the different design optimizations necessary to account for sensitivity, resolution, brain coverage and weight of detector (freedom of movement), we can discover the best uses for our imager and focus on creating the best prototype designs.
Factors Influencing Adoption of a Primary Prevention Violence Program in Kentucky High Schools

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The ineffectiveness of individual-level strategies to reduce intimate partner and sexual violence demands a renewed focus on multiple levels of the environment. Green Dot is a primary prevention bystander program that uses the power of peer and cultural influence to reduce violence. A recent cluster randomized controlled trial carried out in 26 Kentucky high schools demonstrated reduced rates of unwanted sex, sexual harassment, dating violence and reproductive coercion (both victimization and perpetration) four years after program implementation. After broad and targeted dissemination of these positive research findings, schools involved in the trial were given the opportunity to adopt Green Dot free of cost; at present, 75% of intervention schools and fewer than half of controls schools have adopted the program. End users’ decisions not to adopt programs with proven effectiveness represents a critically important issue in translational science. The purpose of the current study was to examine factors influencing adoption of Green Dot in these high schools. This qualitative study involved semi-structured, open-ended interviews with rape crisis center educators (n = 10) responsible for delivering Green Dot. Data will be analyzed using conventional content analysis to determine barriers and facilitators for program adoption and implementation. This research will provide new insights into adopters’ perspectives of program importance and feasibility. The long-term goal of this project will be to identify methods to increase adoption and implementation of Green Dot and facilitate the development and testing of strategies for targeted dissemination of this and other bystander programs for violence.
Measuring Appalachian Undergraduate Student Participation, Motivation and Interest in Oral Health and Dental Careers

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Background: The Appalachian Regional Dental Education Partnership (ARDEP) pipeline program at MSU was designed to increase opportunities for Kentuckians from the Appalachian counties to pursue dental education and practice as a career choice. By 2015, two courses within the pipeline had been implemented, Introduction to Oral Health and Introduction to Dental Careers.

Objectives: To describe the course impact and student perceptions, intentions and motivation following “for credit” academic on-line oral health courses within the UK/MSU ARDEP program.

Methods: Undergraduate students who had completed one or both pipeline courses were recruited via email to participate in an anonymous online survey utilizing Qualtrics. The survey collected demographic and student participation, motivation, interest and intentions data.

Results: 15% of students completed the survey after finishing one course. Participants were equally male and female and were Caucasian. 100% of respondents indicated high participation and high interest in learning more about oral health. 50% were motivated to pursue educational opportunities leading to an oral health career. For those who had completed both courses, 71% participated. 60% of the respondents were female, Caucasian and would like to study more about oral health and explore dental careers.

Conclusion: The majority of respondents’ participation, motivation and interest levels in oral health and dental careers were high. Significantly, 40% of respondents who completed both pipeline courses had intentions to declare a dental careers major. These results indicate that students participating in the ARDEP pipeline program were more likely to be interested in oral health and pursuing dental careers.
Developing the West Virginia/Kentucky Health Data Learning Network

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West Virginia (WV) and Kentucky (KY) rank 46th and 45th, respectively, in overall health status and are home to many counties with some of the most severe health disparities in the nation. Collaboration across state organizations, institutions, networks, and funded efforts is essential to address these challenges and achieve the Triple Aim of enhanced patient care, improved population health outcomes, and lower health care cost. Electronic health record (EHR) data-driven efforts hold great promise to achieve the Triple Aim, but the questions and challenges surrounding EHR data integrity, quality, and access by multiple stakeholders remain. To address these challenges, a WV/KY health data learning network was formed with funding support from the University of Kentucky Center for Clinical and Translational Science and the WV Clinical and Translational Science Institute. This network is comprised of partners with a shared vision to advance practice transformation and practice-based research for improved health outcomes. The Informatics for Integrating Biology and the Bedside (i2b2) system, part of a national informatics infrastructure, serves as the basis for transforming EHR data into knowledge informing practice transformation, quality of care improvement, action-oriented research, thereby helping to close the research to translation gap. De-identified data from the Robert C. Byrd Clinic at the WV School of Osteopathic Medicine (Lewisburg, WV) and St. Claire Regional Medical Center (Morehead, KY) are being melded in i2b2 to better address health priorities on individual patient, provider-panel, clinic, and ultimately regional levels in a learning network of primary care, academic, and public health partners.
Navigating high-risk in-client clients using a lay-health worker model in Eastern Kentucky (Bridges to Home at St. Claire Regional Medical Center)

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University of Kentucky

Roughly 20% of all Medicare fee-for-service clients are readmitted within 30 days of hospital discharge, resulting in $17 billion annually. It is estimated that 75% of these readmissions are avoidable. Research has demonstrated that a broad range of socioeconomic and personal factors impact readmission rates. This study seeks to address such factors through a hospital-based Lay Health Worker (LHW) model for transition of care.

This study utilizes a pre/post design that assess the impact of implementing a LHW model on 30-day hospital readmission by assisting high-risk clients with their post-discharge social needs. To determine the effectiveness of this LHW model, outcome measures for the 4-6 months prior to study’s program implementation and for 6-months after the study intervention are compared. Both traditional statistical methods and quality improvement evaluation methods, including Statistical Process Control, will be performed.

Funding for this project ($75,000) is provided through Passport Kentucky. The start date for this project began November 1, 2014 and ends October 31, 2015.
Poster Number: 32
Category: Senior Investigator

Central Appalachia Inter-Professional Pain Education Collaborative (CAIPEC)

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CAIPEC is a multi-faceted CE approach targeted at health professionals in Kentucky and West Virginia (areas that suffer from opioid overuse and inappropriate prescribing practices). CAIPEC brings state organizations, academic institutions, and targeted stakeholders together to deliver evidence-based chronic pain education and delivery interventions. This project reaches across a spectrum of interdisciplinary and inter-professional audiences. CE activities (with culminating resources available at participating AHECs) include webcasts, live round-table community meetings, web-based enduring material, and a “Chronic Pain Practice Toolkit”. CAIPEC also partnered to present at the state-required interprofessional chronic pain CME conferences in both KY and WV hosted by the KY/WV Academies of Family Physicians. CAIPEC effectiveness will be evidenced by measured changes in practitioner knowledge and attitudes plus impact on implementation and practice performance will be evaluated in a controlled study of (patient-level) pain evaluation and (population-level) opioid prescriptions rates.

Funding for this project ($350,000) is provided by the Pfizer Consortium. The start date for this project was December 2014, and will conclude in March 2016.
Poster Number: 33
Category: Senior Investigator

Barriers to Primary Care Smoking Cessation Efforts in Rural Appalachia: Mental Health Problems, Other Substance Use, Chronic Pain, and Disability

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Background: Tobacco smoking contributes to poor health outcomes yet is highly prevalent in rural Appalachia. Primary care providers routinely recommend cessation and provide assistance to their patients who smoke, however, these efforts are more successful with some patients than others, and may be linked to smoking comorbidities.

Objective: To identify factors that predict lack of smoking cessation success in primary care in rural Appalachia, with particular attention to known comorbidities of smoking.

Methods: Participants were 578 primary care patients (56% male, 89% Caucasian, 53% government/no medical insurance, average age 39 years), 73 (12.6%) who were recent quitters, and 505 who continued to smoke. Medical charts were reviewed for current medical diagnoses.

Results: Successful quitters differed from continued smokers, with significantly lower rates of depression (19.2% vs 38.0%, p=.002), major psychiatric disorder (6.8% vs 11.5%, p=.081), alcohol dependence (8.2% vs 16.8%, p=.083), illicit drug dependence (1.4% vs 6.4%, p=.045), chronic pain diagnosis (32.9% vs 50.0%, p=.006), and being disabled and unable to work (9.6% vs 24.2%, p=.005). Depression (OR=1.95, CI:1.03-3.68) and disability status (OR=2.39, CI:1.04-5.50) were the strongest predictors of continuing to smoke in logistic regression models. In addition, of those with at least one risk factor, only 8.6% had quit smoking, compared to 22.5% of those with none of the risk factors (2=21.0, p<.001).

Conclusions: Mental health, other substance use, pain conditions, and disability status are associated with continued smoking in rural Appalachia, and should be considered and addressed in efforts to successfully intervene with smokers in primary care settings.
EVALUATION OF PHYSICIAN USE OF THE 5 A’S TO ADDRESS PREGNANCY SMOKING: WHAT DO PATIENTS PERCEIVE AND DESIRE?

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Objective: Prenatal providers are expected to assess and intervene with pregnant smokers, however, in regions with high rates of pregnancy smoking, many providers do not effectively engage in these efforts. The goal was to evaluate pregnant smokers’ assessment of their health care providers’ efforts to address their smoking. Methods: 408 pregnant smokers from South-Central Appalachia completed a third-trimester open-ended questionnaire about how smoking was addressed during their prenatal care.

Results: 81% of women said their provider talked about smoking. Most felt either positively (40%) or neutral (48%) about the discussion, with only 12% feeling negatively. 75% said advice offered was helpful, including the dangers of smoking/benefits of quitting (54%), specific tips/assistance with behavior change (27%), and just the concern of a health care professional (19%). When asked what was unhelpful, themes included being lectured/judged (23%), not receiving enough information (18%), and having no intention of quitting so it was a waste of time (18%). When asked what else the provider could do to help them quit, 40% wanted more information about the dangers of pregnancy smoking, 35% said nothing as a person had to decide to quit themselves, and only 8% wanted additional assistance with behavior change.

Conclusions: Despite clinical recommendations to focus on positive messaging and provision of specific assistance, women from a region with low health literacy and high smoking acceptance desired and found most helpful information about health risks of pregnancy smoking. Few reacted negatively to smoking discussions, and many needed increased motivation to quit smoking.
Genetic Variations in GPSM3 Associated with Protection from Rheumatoid Arthritis Affect its Transcript Abundance

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G protein signaling modulator 3 (GPSM3) is a regulator of G protein-coupled receptor signaling, with restricted expression to leukocytes and lymphoid organs in humans and mice. GPSM3 plays a role in the chemotactic behavior of leukocytes towards pro-inflammatory chemokine gradients. Previous genome-wide association studies have highlighted single-nucleotide polymorphisms in a region upstream of the GPSM3 transcription start site as being inversely correlated to the incidence of rheumatoid arthritis (RA) -- this association is consistent with protection from inflammatory arthritis upon Gpsm3 deletion in a mouse model of RA. In this study, we assessed the functional consequences of these polymorphisms. We recruited 200 volunteers to collect whole blood samples, identified individuals homozygous for the minor, ‘RA-protective’ alleles of GPSM3, and demonstrated their decreased GPSM3 transcript abundance relative to individuals homozygous for the more prevalent allele.
Kruppel-like factors in resistance to HER2-targeted therapy

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Pluripotency factors such as the Kruppel-like transcription factors KLF4 and KLF5 can reprogram somatic cells to enhance their developmental potential. KLF4 is enriched in mammary cancer stem-like cells (MaCSCs) and is coexpressed and positively correlated with KLF5 in breast cancer. The longterm goal of this proposal is to better understand how these factors contribute to therapeutic resistance and to patient prognosis, and to develop improved targeted therapies for patients with more aggressive tumors. One of the most intrinsically aggressive forms of breast cancer is the HER2+ subtype. These tumors contain gene amplification of the receptor tyrosine kinase (RTK) HER2. HER2+ tumors have a 5 year recurrence rate of approximately 20%, or approximately one-half of the 5 year recurrence rate prior to anti-HER2 therapies. These include Herceptin and Pertuzumab monoclonal antodies, and lapatinib or neratinib small molecule RTK inhibitors. Currently, the lack of suitable prognostic factors prevents physicians from tailoring patient-specific therapy. Consequently some HER2+ patients are overtreated, and others are undertreated until clinical recurrence is already apparent. Recent progress identifies KLF4 and KLF5 (i.e., KLF4/5) mRNA as prognostic markers that identify a high-risk subset of HER2+ patients (hazard ratio 2.4). Using clinically relevant immunostaining assays Specific Aim 1 will determine whether the protein level and/or the subcellular pattern of expression of KLF4/5 identifies aggressive HER2+ tumors. Aim 2 will develop patient-derived xenograft models of HER2+ breast cancer, and test for KLF induction of reprogramming events following lapatinib therapy. These studies will facilitate patient selection for more or less aggressive chemothrapy.
Peripheral viral challenge dysregulates glutamate homeostasis in the hippocampus leading to seizure hypersusceptibility

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Peripheral infections increase the propensity and severity of seizures in susceptible populations. However, the underlying mechanisms have not been defined. In a quest to elucidate these mechanisms, we have developed a preclinical model in which intraperitoneal injection of a viral mimic, polyinosinic-polycytidylic acid (PIC), elicits a protracted hypersusceptibility of mice to kainic acid (KA)-induced seizures. In a study supported by the WVCTSI, we have demonstrated that PIC challenge triggers an extensive genomic reprogramming as seen from dysregulated expression of 625 genes in the hippocampus, the ictal region of KA-induced seizures. We also found temporal upregulation of the complement pathway genes to be commensurate with seizure hypersusceptibility. This is an important finding because the complement mediates synaptic modifications, and consequently, alters the excitability of neuronal circuits. Therefore, activation of the complement pathway by PIC challenge is likely to be involved in the induction of hippocampal hyperexcitability resulting in seizure hypersusceptibility. The present follow-up study was undertaken to characterize mechanisms of the hippocampal hyperexcitability. Briefly, eight-week old female C57BL/6 mice were intraperitoneally injected with PIC and after 24 hours, glutamate homeostasis in the hippocampus was assessed using the microelectrode arrays technique. The study revealed increased glutamate release and hampered glutamate uptake resulting in a several-fold increase of extracellular glutamate level in PIC-challenged vs. control mice. Electrophysiological examination of hippocampal slices showed a profoundly augmented postsynaptic transmission with no significant effect on presynaptic activity in PIC-challenged vs. control mice. Altogether, these results implicate a dysregulation of astrocytic glutamate metabolism as the underlying mechanism for seizure hypersusceptibility induced by peripheral PIC challenge.
Potassium and Calcium Voltage-gated Ion Channel Modulators on Proliferation of Human Breast Cancer Cells

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Voltage-gated ion channels have been directly implicated in the initiation, proliferation, and metastasis of breast cancer. In this study, the role of voltage-gated potassium and calcium ion channel modulation was explored in two invasive ductal human carcinoma cell lines, MDA-MB-231 (triple-negative) and MCF7 (estrogen-receptor-positive).

Increasing extracellular K+ concentration to 50mM depolarized membrane potential and greatly increased cell growth. Tetraethylammonium (TEA), a non-specific blocker of voltage-gated potassium channels, stimulated growth of MCF7 cells (control group grew by 201%, 1mM TEA group grew 376%).

Depolarization-induced Ca²⁺ influx was hypothesized as a requirement for growth of human breast cancer. Removing Ca²⁺ from culture medium stopped growth of MDA and MCF7 cells leading to cell death after one week. Verapamil, a blocker of voltage-gated calcium channel clinically used in treating hypertension and coronary disease, inhibited growth of MDA cells at low concentration (10⁻²₀mM) by 73% and 92% after 1 day and 2 days, respectively. At high concentration (100mM), verapamil killed >90% of MDA and MCF7 cells after one day.

Immunoblotting experiments demonstrated an increased expression of a key protein in apoptosis signaling, caspase-3, positively correlated with verapamil concentration in MDA cells. In MCF7, caspase-3 is not present.

Our results support our hypotheses that membrane depolarization and depolarization-induced calcium influx stimulate proliferation of human breast cancer cells, independently of subtypes. The underlying mechanism of verapamil-induced cell death may involve but does not require caspase-3. These data suggest that voltage-gated potassium and calcium channels may be putative targets for pharmaceutical remediation in human invasive ductal carcinoma.
Care coordination as part of the discharge plan to support community reintegration of individuals with stroke living in Appalachian rural communities

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Title: Care coordination as part of the discharge plan to support community reintegration of individuals with stroke living in Appalachian rural communities.

Purpose: Studies indicate a high incidence of readmission within the first 12 months post-discharge home following stroke and indicate the need for follow-up care. Isolation from the healthcare system can result in limited awareness of services in rural communities, decreased support, and lack of access to information. This previous work, in addition to work conducted by our group, supports the need for navigation during community reintegration for survivors of stroke. The purposes of this study were to 1) determine the effectiveness of providing community health navigation to facilitate continued communications with healthcare providers and linkages to services and community resources and 2) determine the barriers to and opportunities for improving long-term support for survivors of stroke in Appalachian rural communities.

Subjects: 15 individuals discharged from acute rehabilitation following stroke and their caregivers.

Methods: The stroke navigator coordinated supported patient transitions and linkages with healthcare and community resources. Quality of life was assessed using the stroke impact scale, caregiver burden scale and semi-structured interviews.

Results: Required care coordination included: 1) communication between the patient and healthcare providers, 2) insurance support, 3) follow-up education, and 4) connecting with community resources. Overall there was an improvement in participant and caregiver QoL. In addition, there were no stroke-related 30 day emergency department or hospital readmissions.

Conclusions: Results indicate the need for: 1) support navigating the insurance process following discharge to home, 2) integration of therapy and navigation discharge planning processes to improve home/community transition, 3) follow-up education, and 4) support in accessing DME.
MM-398 accumulates in metastatic lesions and prolongs survival in an experimental model of brain metastases of human triple negative breast cancer

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**Background:** 10-16% of women with advanced breast cancer will develop symptomatic brain metastases, the survival rate of which is less than 2 years. Due to the presence of the highly regulated Blood Brain Barrier (BBB), permeation of chemotherapy such as irinotecan is limited into these tumors, resulting in low survival rate. Conventional irinotecan has poor brain distribution in brain metastases; therefore, we hypothesized, MM-398, a liposomal irinotecan formulation will enhance irinotecan and its active metabolite SN38 exposure in brain metastases leading to increased cytotoxicity in brain tumors, which in turn increases the survival.

**Methods:** Female nude mice were intracardially injected with human brain seeking breast cancer cells (MDA-MB-231Br) and allowed it to metastasize. After confirming the metastases, the animals were administered with vehicle, irinotecan (50mg/kg), or MM-398 low and high doses (10mg/kg, 50mg/kg respectively) intravenously from day 21. Drug accumulation, tumor burden and survival were evaluated in the treated mice.

**Results:** MM-398 penetrates the blood-tumor barrier and accumulates in brain metastases. Treatment with MM-398 extended median survival time from 35 days in conventional irinotecan group to 51 days in MM-398 high group. Normalized BLI on day 43 showed significant reduction in tumor burden in both MM-398 groups when compared with both vehicle and conventional irinotecan group.

**Conclusions:** The liposomal formulation MM-398 penetrates and accumulates in the brain tumors and acts as depot for continuous and prolonged release of irinotecan and SN38. This elevated and prolonged tumor SN38 exposure after MM-398 administration appears responsible for increased survival in preclinical brain metastasis of breast cancer model.
Utility of an Integrated Tool for Patients with Stages 4 and 5 Chronic Kidney Disease (CKD)

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Dialysis, the kidney replacement therapy that sustains life when the kidneys fail, has grown exponentially in use since the 1972 legislation that deemed it a Medicare entitlement to patients with end stage renal disease (ESRD); this is a particularly important concern in West Virginia because the state leads the nation in per capita rates of dialysis starts. The reasons for this are in large part due to the high prevalence of diabetes in West Virginia relative to the nation (13 vs. 7 percent) with diabetes being the single leading cause of ESRD nationwide (45% of all new patients starting dialysis in the country). A testament to the societal impact of ESRD, the financial costs of providing therapy for this subset of Medicare beneficiaries are formidable ($30+ billion per year). Despite the individual patient challenges associated with accepting dialysis to extend life - both physiologic and psychosocial - which are costly and life-consuming, dialysis has become the default option for most patients with advanced chronic kidney disease (CKD). An evolving literature supports the recognition that for elderly patients and those with certain poor prognostic factors, dialysis may not confer a survival benefit. Thus, options for some patients with advanced CKD should include active medical management without dialysis, a choice which is difficult to make but which might be made easier if considered in the context of validated prognosis information and the understanding that dialysis may prolong suffering, but not provide quality of life. This is particularly key, given the comorbid conditions that plague this patient population (cardiovascular disease, diabetes, and hypertension) are costly, from a financial as well as physiologic, emotional and socioeconomic standpoint. The goal of this project is to develop a prognostic tool for use in shared decision making with patients with progressing advanced CKD in the position to pursue or forego dialysis. This collaborative project will expand an established collaboration between national experts from WVU and Baystate Medical Center, engaging clinician scientists at WVU and the WV School of Osteopathic Medicine and their West Virginia patients with advanced CKD who are at high risk for kidney failure. Results from this study will lead to a new discovery, the development of a validated integrated prognostic model for the advanced CKD patient population, and facilitate the adoption of a best practice in West Virginia and across the country of counseling patients on their prognosis prior to making a decision about starting dialysis. This study will also provide outcome data regarding the importance of appetite, nutritional state, comorbid illnesses, functional ability, and response to the evidence-based surprise question (SQ)-Would I be surprised if this patient died in the next year?—that can be extrapolated to other chronic illnesses for future study across other disciplines regionally and nationwide. This project builds on a robust validated model for patients who are already on dialysis in which Dr. Moss, a WVU co-investigator on this proposal, has previously collaborated with Drs. Cohen and Germain at Baystate Medical Center. This model is in widespread use throughout the world and is accessible online, http://touchcalc.com/calculators/sq. This project addresses all three arms of the Triple Aim Berwick by focusing on the importance of using patient prognosis to individualize patient care, address a key concern in a population of patients, and prevent financial costs associated with the dialysis by default 4 approach, especially in patients who can be predicted to be unlikely to benefit from it. Indeed, a top-listed priority to enhance patient-centeredness of the ESRD program is to enhance efforts to help patients and families
better understand the expected course of their kidney disease by "developing robust prognostic models to provide patients with advanced CKD with realistic expectations in terms of life expectancy, illness trajectory, and future treatment decisions." O'Hare.