

## RURAL STUDENT/RESIDENT RESEARCH GRANTS

**Project:** *Mobile Medical Outreach to the Homeless*

**Student:** Caleb Huff, MS IV and Matt Curry, MS IV

**Mentor:** Charles Clements, MD

The Marshall Medical Outreach began with the goal of bringing healthcare to those who often fall between the cracks of society, i.e. the homeless. These individuals are often unable to get proper medical treatment or are unaware of which services are available. The hypothesis is that the homeless have many obstacles to attaining quality healthcare, such as lacking transportation, and being unaware of the services available to them. We decided that bringing healthcare and social services to the people where they live will improve access to healthcare and improve the likelihood of the homeless getting plugged into the system. The study will consist of a base-line survey and assessment involving a questionnaire that will inquire into the participant's previous experiences with healthcare, education level, previous medical history, etc. We will use local social workers to meet with each participant and assess their individual eligibility for which services are available to them. Positive outcomes include picking up a prescription, establishing with a primary care physician outside of the medical outreach, returning for another visit to our medical outreach, following up with a specialist, following up for psychiatric needs, or establishing with a counselor. The milestones for this project are to see if the work we are doing at the Huntington riverfront with the homeless is making a difference in terms of increasing patient compliance and likelihood of following-up.

**Project:** *An evaluation of the impact, need and effectiveness of free mobile eye health screenings of a homeless population in an Appalachian community.*

**Student:** Daniel R. Richardson, MS IV and Sarah Slocum, MS II

**Mentor:** Russell Fry, II, MD

In any population, diseases of the eye are both debilitating and common problems concomitant with other general medical conditions. Prior studies have demonstrated that in a homeless population diseases of the eye are exacerbated, suppositionally due to substandard medical care. By facilitating a solid physician-patient relationship, initial treatment, and follow-up care in a homeless population in Huntington, West Virginia, we propose to evaluate several things. First, what is the motivation for the patients to receive care? Second, how do these follow-up rates compare to national Medicaid and Medicare rates? We also intend to evaluate specific ophthalmoscopic techniques for screening of ophthalmic pathology. To examine these questions, we are developing a survey to assess both retrospective and prospective ophthalmic care and follow-up. To date, we have seen approximately 60 patients in our eye screening clinic for the homeless in conjunction with the Marshall Medical Outreach. Several patients have already been evaluated further for glaucoma risk and refractive errors. We hypothesize that the care relationship we develop and the ease of access to care will result in better prospective follow-up and an increase in follow-up beyond typical Medicaid and Medicare rates.

**Project: *Level of Buprenorphine Measured in Samples of Cord Blood as an Independent Risk Factor for Neonatal Abstinence Syndrome.***

**Resident: Allison Hamilton, MD, PGY-2**

**Mentor: Ryan Stone, MD**

Research Objectives/Specific Aims: The purpose of this project is to determine if the level of buprenorphine measured in samples of cord blood and tissue are an independent risk factor for neonatal abstinence syndrome in infants born to opiate dependant mothers.

Brief Background and Preliminary Data: Recent data published in the New England Journal of Medicine suggests that maintenance therapy with buprenorphine results in neonates spending less time in the neonatal intensive care unit and experience milder withdrawal symptoms. (2) Because buprenorphine is increasingly being used in our community to treat our overwhelming amount of opiate addicted mothers in West Virginia, more knowledge of the level of buprenorphine's impact on neonatal abstinence syndrome is needed.

Study Design, Methodology and Outcomes: Sample collection of cord blood and umbilical cord tissue will be performed following delivery with no risk associated with the collection to either mother or infant. The samples will be stored with plan for bulk analysis for buprenorphine and metabolites. GC-MS will be utilized to quantify the level of buprenorphine in conjunction with National Drug Testing Laboratories. Correlation with NAS scores will be performed following sample collection.

Project Milestones

1. November 2012 through April 2013 (6 months) - Ongoing sample collection
2. May 2013 through June 2013 (2 months) - Data collection
3. July 2013 through September 2013 (2 months) - Data analysis

Describe How The Pilot Grant Could Facilitate A Future External Grant: The current rate of NAS nationally has been estimated at 3.8 per 1000 live births. (4) Projected rates at Cabell Huntington Hospital are expected to exceed 84 per 1000 live births this year alone. Because of this, we believe that data concerning buprenorphine and NAS may shed some light on this desperate situation which will lead to further funding both from NIH but more likely from the NICHD.

**Project: *An Analysis of the Accuracy of Remote Evaluation of Digital Retinal Images of a Rural Diabetic Population.***

**Student: Zubair Ansari, MS III and Josh Hendrix MS III**

**Mentor: Russell Fry, II, MD**

Research Objectives/Specific Aims: We intend to prospectively evaluate the accuracy of diagnoses of eye disease based on remote evaluation of digital retinal photographs of patients with diabetes mellitus in a rural population.

Brief Background and Preliminary Data: Previous retrospective analysis of retinal image telemedicine has shown that ophthalmic disease is quite prevalent in a rural West Virginia community, and that retinal telemedicine is a cost effective measure. We have not yet quantified the accuracy of those diagnoses.

Study Design, Methodology and Outcomes: We plan to conduct a prospective study utilizing a rural health clinic in Chapmanville, WV. Patient selection will be limited to patients of that clinic with diabetes mellitus. Digital retinal photographs will be obtained and transmitted to be evaluated by a

board certified Ophthalmologist. We will then have those same patients evaluated by an Ophthalmologist. A statistician will analyze the data in order to quantify the accuracy.

Project Milestones: The number of patients enrolled, as well as the number of patients that present for evaluation at the University clinic will be reviewed quarterly. Successful enrollment and completion of 25, 50, 75, and 100 patients will be significant.

Describe How the Pilot Grant Could Facilitate a Future External Grant: We could transition to longitudinal study of a larger number of patients over a longer period of time. Additionally, this would propose the value of using similar techniques to evaluate other conditions.

**Project: *Improving Rural Bone Health and Minimizing Fracture Risk in West Virginia: The World Health Organization FRAX® Assessment Tool***

**Student: Kelly Scott MS II**

**Mentor: Franklin D. Shuler MD, PhD**

This research project is aimed to help minimize barriers to effective osteoporosis screening and treatment for rural WV seniors.

Key points for management of the WV osteoporosis epidemic are as follows:

- WV ranks second nationally in percentage of its population that is  $\geq 65$  years of age (the older the person, the greater the risk of fracture);
- 77% of WV women 50 and older have osteoporosis or low bone mass;
- The annual risk of osteoporotic related fracture in women is greater than the combined risk of breast cancer, stroke and heart attack.

*Detecting individuals at greatest risk for fracture is the goal.*

By using FRAX®, the internationally validated fracture prediction tool from World Health Organization, we will complete a twelve question / 3 minute phone screening protocol that was modeled after the best practice standard of Kaiser Permanente (Dr. Richard Dell). Using our Allscripts EMR, we will identify patients “at risk” for fracture and then complete FRAX screening by phone. Those at risk for fracture above treatment thresholds will be directed for local medical management with possible referral to CHH/MU physicians for additional testing if requested by the local PCP.

This protocol is novel and uses FRAX as a phone screening tool. Once effectiveness of screening is established, Phase II ensures that treatment is rendered for those most at risk. Validation of Phase I and II of this research study will allow for expansion to minimize health care disparities through extramural funding applications.

**Project: *Urban and Rural Differences in Prenatal Exposure to Metals and Polycyclic Aromatic Hydrocarbons.***

**Resident: Jesse Cottrell, MD PGY-1**

**Mentors:** Brenda Dawley, MD and Monica Valentovic, PhD

Children born in regions of high mining activity have higher incidences of birth defects involving the central nervous system, musculoskeletal, urogenital, circulatory, and respiratory problems compared to the rest of the population. The reason for the higher birth defects is not known. Individuals in mining communities are exposed to many environmental chemicals such as metals and organic compounds that could contribute to the higher incidence of birth defects. Polycyclic aromatic hydrocarbons (PAH) are a component of cigarette smoke but are also products of incomplete combustion of coal, diesel fuel or gasoline. **The overall hypothesis of this Pilot Project is that newborns from rural areas are exposed to higher levels of metals and PAH than their urban counterparts.** The hypothesis for this study will be tested through the two Specific Aims. The first aim of this study is to evaluate whether newborns are exposed to more metals and at higher levels if they reside in rural compared to urban areas. The second aim is to evaluate whether exposure to higher levels of PAH occurs in babies residing in rural compared to urban areas. PAH exposure will be quantitated using PAH-DNA adducts isolated from white blood cells contained in umbilical cord blood. Heavy metals will be analyzed in umbilical cord blood and categorized based on zip code of home address. This project has considerable significance as there have been no studies conducted to examine changes in metals and PAH exposure in umbilical cord blood differentiating between urban and rural individuals.

**Project Title: *The relationship between DDAH/ADMA serum levels and hemodynamic studies in pregnant hypertensive women.***

**Student: Bethany Bush, MS III**

**Mentors:** Ryan Stone, MD and Anne Silvis, PhD

**Research Objectives:** It is hypothesized that normotensive mothers will have a higher level of DDAH (dimethylargininedimethylaminohydrolase, a vasodilator) in their blood and DDAH mRNA in their placental biopsies as compared to hypertensive mothers and conversely lower levels of ADMA (asymmetrical dimethylarginine, a vasoconstrictor) and ADMA mRNA. Functionally this will be manifested as differences in flow mediated dilation. In addition, it is anticipated that there will be differences in the ADMA/DDAH in hypertensive patients with differing hemodynamic parameters.

**Brief Background:** Nitrous oxide is a compound produced by endothelial cells that subsequently acts on endothelial cells to cause vasodilatation. Two substances, ADMA and DDAH, influence the level of NO produced by endothelial cells. ADMA is a competitive inhibitor of L-arginine conversion to NO, and thus lowers NO production. DDAH inhibits the formation of ADMA, and thus increases NO production. Hypertensive patients also exhibit a variety of hemodynamic profiles ranging from vasoconstricted to hyperdynamic (high cardiac output) with differing effects on pregnancy outcome.

**Study Design:** This project will study DDAH/ADMA levels in chronic hypertensive mothers and compare them to levels in normotensive mothers, following study subjects to the completion of their pregnancies. Degree of flow mediated dilation will be used to assess the functional levels of endothelium derived NO. In addition, this study will stratify chronic hypertensive mothers by their

hemodynamic profiles and look for a correlation between these three different classifications (hyperdynamic, vasoconstricted and normotensive) and DDAH/ADMA levels. The blood levels of these two compounds at three different points in pregnancy will also be compared to the levels of DDAH/ADMA mRNA molecules in placental biopsies taken postpartum in the all the study subjects.

**Project: *Placental ADRB1 mRNA as a Potential Predictor of Outcomes and Possible Therapeutic Target in High Risk Pregnancies.***

**Resident: Jared Brownfield, MD, PGY-1**

**Mentors: Ryan Stone, MD and Anne Silvis, PhD**

Research objectives and specific aims: Preeclampsia refers to the rapid development of proteinuria and hypertension in pregnancy after 20 weeks gestation. The objective of this study is to demonstrate that differences exist in the level of beta-1 adrenergic receptor (ADRB1) mRNA in placental tissue among women with a diagnosis of preeclampsia as compared to those without such diagnosis while also exploring the effect of beta-blocker therapy on the disease.

Brief background and preliminary data: Risk factors for developing preeclampsia include chronic hypertension, diabetes mellitus, high BMI, and a prior history. It has been established that those with gestational diabetes and gestational hypertension demonstrate a significant increase in ADRB1 mRNA expression in their placental tissue. The use of beta blockade for the treatment of patients in early pregnancy who have hypertension can reduce subsequent rates of preeclampsia. The underlying mechanism for this finding is not well understood, and one explanation could be associated with increased levels of beta receptors in the placenta.

Study design, methodology, and outcomes: A random sample of 10 subjects from four groups will be used. Placental tissues will be collected from (1) a normal control, (2) preeclamptic patients, (3) preeclamptic patients with beta-blocker therapy, and (4) chronic hypertensives with beta-blocker therapy.

Project Milestones: Four month milestones will include sample collection, followed by data collection, and finally data analysis.

How the pilot grant could facilitate an external grant: Results from this study could lead to the development of gene-based therapy or medication for hypertensive or preeclamptic patients.

**Project: *Perceptions of End of Life Care Among Patients in a Resident Clinic***

**Resident: Andrea Lauffer, MD PGY-3 and Marion Huff, MD PGY-3**

**Mentor: William A. Nitardy**

**Background:** One of the tenets of patient care is patient autonomy. In today's medical landscape the ability for a patient to determine the extent of his or her care is unquestioned. For decades whenever an individual becomes acutely ill to the point of death and is in the hospital a "Code" is called and appropriately trained individuals arrive at the bedside to assess the situation and resuscitate the individual. Many times this involves intubations, chest compressions, administration of drugs, and perhaps cardioversion. The outcomes of in hospital arrests are still poor. Given the poor outcomes coupled with poor prognosis prior to the arrest, the medical community has established "Do Not Resuscitate" orders for patients. Ideally the discussion of End of Life Care would occur with outpatients with their subspecialists or primary care physicians who know the patients and their disease progression the best. However, it is theorized that these discussions do not often take place putting additional burden on the patient and families as well as

house staff at the time of admission to the hospital. This burden can create miscommunication and increased stressors for families.

**Goal:** Determine the understanding of Code Status and Do Not Resuscitate Orders among the Internal Medicine Resident Clinic patient population at an academic hospital in West Virginia. This data will be compared to a survey completed by the Internal Medicine Residents of the academic facility. It is postulated that opportunities for further education of patients and staff will be found for future studies or education. Additional goals include increased awareness of these issues by residents as well.

**Methods:** To evaluate the perceptions of both patients and residents a survey for each group was created. The patient population of the Internal Medicine Resident Clinic at a University Hospital in West Virginia will be used. The patient surveys will be distributed as they wait to be seen by their physicians over a four week time period. Each patient that is seen during that time period will receive a survey. The residents will later complete a survey as well. The surveys will be compared to determine if disparities exist between the two populations.

**Project:** *Knowledge and Attitudes of Rural Uninsured Individuals Regarding the Affordable Care Act*

**Student:** Matt Christensen, MS IV

**Mentor:** Stephen M. Petrany, MD and Jon Bowen, MD

This project would survey uninsured patients in a rural community health center (Chapmanville) regarding their knowledge and understanding of the Affordable Care Act (ACA) that will affect them in 2014. They will be surveyed with a brief questionnaire and then view a short (10 minute) educational video describing potential pertinent aspects of the ACA for them and their families. They will then be re-surveyed regarding their knowledge and attitude regarding the ACA. This study may assist in plans to provide support and education directly to this population as the ACA is fully instituted. Also, comparison will be made to results from a similar study completed at an inner city free clinic.

**Project:** *Impact of a Longitudinal Training Experience in a Free Clinic on Practice and Academic Outcomes of Graduates of a Family Medicine Residency*

**Resident:** Daniel Poole, MD PGY-1

**Mentor:** Stephen M. Petrany, M.D. and Todd Gress, M.D

This project would compare the practice choices of graduates from a family medicine residency program (Marshall University) who chose to participate in a longitudinal ambulatory care experience in a local free clinic as part of their family medicine residency training experience, with those who did not participate. The project would look to see if participating in such a learning experience was associated with greater likelihood of practicing in an underserved area, at a community health center, or in a rural area. It would also attempt to assess if participating had any impact on academic progress and board certification of graduates.

**Project:** *Reconnect McDowell County*

**Resident:** Kane Meyers, MD, PGY-2 and Kimberly Becher, MD, PGY-2

**Mentor:** Stephen M. Petrany, MD

This ambitious project would study the efficacy of technology-based calorie monitoring systems in reducing obesity in elementary school children in McDowell County. Investigators will work with the local school system in their “Reconnect McDowell County” efforts (as defined by state legislation) to engage students to use the technology as a means of monitoring their diet and improved their understanding of how and what they eat. Given the present young generation’s attraction to and comfort with video games and computer technologies, it is hypothesized that utilizing similar technology to educate students regarding their dietary habits may be more effective than traditional education methods.