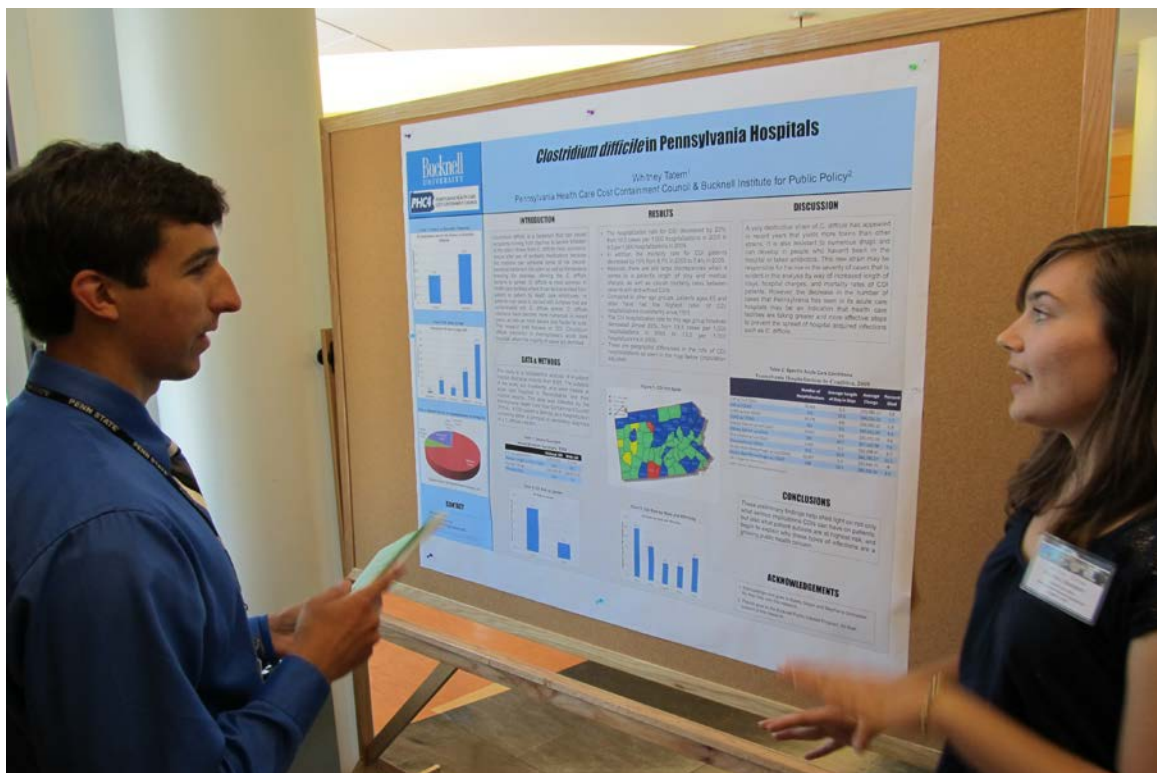


The Third Annual Susquehanna Valley Undergraduate Research Symposium



August 6, 2013
10 a.m. – 3:15 pm
Henry Hood Center for Health Research

Sponsored by Geisinger Health System, Bucknell University and Bloomsburg University

WELCOME

Welcome to the third annual Susquehanna Undergraduate Research Symposium. This symposium is sponsored jointly by Geisinger Health System (Research), Bloomsburg University and Bucknell University. It is a valuable opportunity for students in central Pennsylvania to showcase their research activities, to learn about other methods and disciplines and to gain the experience of presenting at a professional conference.

We are pleased to announce that for 2013, four institutions are participating in the symposium. This year Susquehanna University interns are joining those from Bloomsburg University, Bucknell University and Geisinger Health System. Since the first year of the symposium, the number of posters has grown from 20 posters in 2011 to 42 posters in 2012, to now 67 submissions in 2013.

This year, there are two major changes – oral presentations and prizes. There are three categories:

- Three \$100.00 awards for those selected to give oral presentations of their research.
- Three \$50.00 awards selected the day of the symposium from each of three disciplines:
 1. Social Sciences
 2. Natural and Mechanical Sciences
 3. Clinical/Translational Sciences
- Two \$50.00 awards for “Audience Favorite” for the morning and afternoon poster sessions.

Special thanks to Wenda Hartzell and Shawna Seger for assistance in organization and logistics.

We would appreciate any feedback you have to give us about the symposium this year. We will incorporate your suggestions in planning for next year’s event. Please send it to any of the following 2013 conference organizers (below).

Thank you for participating in this year’s symposium!

The Organizers:

Amy Wolaver, PhD, awolaver@bucknell.edu
Bucknell Institute for Public Policy

Heather Feldhaus, PhD, hfeldhau@bloomu.edu
Bloomsburg University

Janet Robishaw, PhD, jrobishaw@geisinger.edu
Weis Center for Research, Geisinger Health System

GEISINGER'S SUPPORT OF UNDERGRADUATE RESEARCH

Geisinger Health System has been offering undergraduate research experiences for almost 25 years. As part of that experience, interns receive outstanding guidance, mentoring and support from researchers who are conducting state of the art research or from physicians, engineers, and staff from across the institution who are changing the ways in which health care is managed and delivered.

In 2006, Geisinger formalized its internship program to help coordinate undergraduate and graduate placements for students in non-clinical areas throughout Geisinger Health System. Students have had placements in such diverse areas as Supply Chain, Human Resources, Finance, Geisinger Health Plan, Dietary Services, and Innovation. In addition to laboratory opportunities at the Weis Center for Research, interns also have the opportunity to participate in research at the Center for Health Research in the areas of public health, biostatistics, medicine, environmental studies, health care administration and social sciences. In addition, with the recent opening of the Geisinger-Bucknell Autism & Developmental Medicine Center in Lewisburg, Pennsylvania, new opportunities for research in genetics and developmental issues are being provided to local students.

Many of the students who have internships are from local universities including Bloomsburg, Bucknell and Susquehanna. Other interns go to schools outside of the area but have a family connection in the local area. A large proportion of the interns make career decisions based on their experience at Geisinger and some return to be employed at Geisinger or by other local employers. The interns, through the research and projects they conduct, also help to create important linkages between Geisinger researchers and clinicians and faculty at Bucknell, Bloomsburg and elsewhere, leading to collaborations and joint projects.

UNIVERSITY SUPPORT OF UNDERGRADUATE RESEARCH

Bloomsburg University

Bloomsburg University has increased its support for undergraduate research substantially in recent years. In line with the goals of the university strategic plan, many internal grants encourage faculty collaboration with student researchers, and students are offered support through research and travel funding. The establishment of the Susquehanna Valley Field School has added another dimension to undergraduate research at Bloomsburg by offering financial support for student researchers and a summer seminar series that helps student researchers and their mentors learn about research being conducted by regional peers. The Field School's Summer 2012 program has been supported by a Bloomsburg University Presidential Strategic Planning Grant, the College of Liberal Arts, the Office of Academic Affairs and the SOLVE Office. In addition to the Field School program, in 2012, Bloomsburg created the Undergraduate Research Scholarship and Creative Activity Program designed to offer students financial support that enables them to immerse themselves in an intensive summer research program and the Center for Community Research and Consulting which works to build relationships between university faculty and student research teams and community groups in need of research and consulting assistance.

Bucknell University

The Bucknell Institute for Public Policy, with the support of President John Bravman, Provost Mike Smyer and Dean George Shields, has organized more formally the efforts of faculty engaging undergraduate students in summer research projects in the Social Sciences. For the third year running, the Institute has sponsored a summer research program. The program includes a quantitative methods practicum week for student researchers, in which students gain both practical skills in using statistical software and learn about important aspects of good research practice. In addition, weekly Research Workshops are held with student, faculty and guest speaker presentations. The Institute has also partnered with the Pennsylvania Health Care Cost Containment Council (PHC4), an independent state agency responsible for addressing the problem of escalating health costs, ensuring quality of care, and increasing access for all citizens, to support research internships analyzing inpatient hospital records in Pennsylvania. Research support for student-faculty projects is also provided by individual departments, the Bucknell Public Interest Program and the Program for Undergraduate Research.

The Third Annual Susquehanna Valley Undergraduate Research Symposium

This symposium provides the opportunity for undergraduate and graduate interns to showcase their summer research or projects.

**Henry Hood Center for Health Research
August 6, 2013**

PROGRAM SCHEDULE

**10:00 – 11:00 a.m.
(Henry Hood Multipurpose
Rooms)**

Registration/Open for Poster Hanging

**11:00 – 11:30 a.m.
(In the Henry Hood
Auditorium)**

**Welcome – David H. Ledbetter, PhD,
Chief Scientific Officer,
Geisinger Health System**

**Mark Tapsak, PhD, Bloomsburg
University,
“From Machine Shops to Medical
Devices: My 20 year Journey in
20 Minutes”**

11:30 – 12:30 p.m.

First Poster Session

12:30 – 1:15 p.m.

Lunch

1:15 – 2:15 p.m.

Second Poster Session

**2:15 – 3:00 p.m.
(In the Henry Hood
Auditorium)**

Student Presentations:

Clinical/Translational:

- 1. Lilian McKinley**, Intern at Geisinger Health System, “Discovery of New Biomarkers and Drug Targets for Human Neocortical Epilepsy.”

Hard Sciences/Mechanical:

- 2. Charles Cole**, Intern at Bucknell University, “Using Machine Learning to Predict the Health of HIV-Infected Patients”

Social Sciences:

- 3. Becky Boucher**, Intern at Bucknell University, “Comprehension of Verbs and Motor Development in Infants”

3:00 – 3:15 p.m.

**Presentation of prizes by judges/
Closing remarks**

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Author: Abate, Sarah-Jane

Institution: Susquehanna University

Mentor: Toshiro Kubota, PhD

Co-Authors: N/A

Title: Effect of Enclosure on Size Perception

Abstract: In looking to gather data regarding size perception inaccuracy, we examined the effects of environment on perception of rooms and objects. After showing subjects a room and two tables, subjects were then split up into two groups and led to two different environments, one outside and one inside. These environments had replications of sample rooms and tables set up with bamboo poles, flags, and ribbon, with four different options for each object: Actual size, 10% larger, 20% larger, and 30% larger. Subjects were allowed to walk around and inside these “rooms” and “tables” and asked to pick which one of six options (A-D; Smaller than all options; larger than all options) they perceived to be the correct size of the room/table they had just seen. Then, the subjects went to whichever environment they had not yet been in, and performed the same task. At this conference, I will be presenting data from several angles of comparison. First, there will be data concerning the comparisons between the judgments done in indoor environments and those done in outdoor environments. Second, I will be presenting data concerning the degree of inaccuracy found between subjects’ perceptions of the “rooms” vs. their perception of the “tables.” Conclusions will be drawn concerning the effect of enclosure and environment on size perception, and how environment and size of the object perceived affects accuracy.

Author: Akhzary, Mahdi

Institution: Susquehanna University

Mentor: Toshiro Kubota, PhD

Co-Authors: N/A

Title: Video Surveillance with an IP Camera and OpenCV

Abstract: Due to the dramatic increase in security recordings, it is important to detect and analyze useful data in video streams in an efficient and cost effective manner. Two recent technological advances are relevant: IP camera and OpenCV (or Open Computer Vision). The former is a digital camera that is accessible in a LAN or WAN through its unique IP address and often equipped with night-vision and wireless capabilities. The latter is an open source project released under a BSD license and provides many state-of-the-art image processing and computer vision algorithms. In this work, we present a system level solution to the video surveillance problem using an IP camera and the OpenCV libraries. The system is capable of performing face detection, eye detection, edge detection, and face recognition, and provides various video and image filters for visualization. Our implementation combines OpenCV with the .NET framework, thus brings a rich array of modern software tools for databases, networks, graphical user interfaces, functional programming, and web development.

Author: Alston, Jalil

Institution: Geisinger Health System

Mentors: Robert Erdman; Kimberly Derr; Diane T. Smelser, PhD; Gerard Tromp, PhD; James R. Elmore, MD; David P. Franklin, MD; Helena Kuivaniemi, MD, PhD

Co-Authors: N/A

Title: Assessing the Relationship between the TGFR2 Gene and the Development of an Abdominal Aortic Aneurysm

Abstract: An abdominal aortic aneurysm (AAA) is a multifactorial condition which affects approximately 5-8% of men above 60 years of age. Women can also be affected, but the risk is significantly lower than in men. Accumulating evidence suggest that genetic risk factors are likely to contribute to AAA development. Transforming growth factor beta receptor II, also known as TGBR2, plays an important role in the stability of the extracellular matrix (ECM) located in the abdominal aorta. Since elastin and collagen of the ECM are the structural proteins providing the strength of the aortic wall, any genetic variations in the TGBR2 gene could potentially lead to degradation of the elastin and collagen which could lead to the development of an AAA. To test this hypothesis, we obtained DNA samples of AAA patients and control patients (patients without AAA) from the Geisinger Health System and genotyped these DNA samples using specific SNPs in the TGFR2 gene to determine if there was any correlation between the genetic variants and the presence of an AAA.

Author: Arndt, Diana

Institution: Bucknell University

Mentor: Molly M. McGuire, PhD

Co-Authors: N/A

Title: A New Digital Technique for Analyzing Smectite Swelling

Abstract: Understanding the swelling capabilities of clay minerals has the potential to benefit fields such as civil engineering, pollution control and the drilling industry. Smectites, the clay particles that have the ability to swell, have a layered crystalline structure with silicate sheets encompassing layers of cations. The space between these layers is not fixed; water can be absorbed into the structure, resulting in swelling. Currently, atomic force microscopy (AFM) is used to image these clay particles in situ as they swell. Previous comparison of AFM images taken before and after swelling has been established by taking profiles of the images, which are cross sections of the stacked layers in the particle. A dual profile is taken of images before and after swelling and the difference in z values on the resultant graph is interpreted as evidence that swelling has occurred, and to what extent. However, looking at profiles from different sections of a clay particle image shows discrepancies, suggesting that particles may not swell evenly across the surface. Thus, it is important to establish a way to look at how an entire plane in the particle reacts during swelling. In this study, a Plane Projection Process (PP) has been developed to image such a plane. By restricting the z-scale on both images, a specific z value can be isolated and the resultant plane is compared between two images. Subsequent differences between planes in the images are interpreted to represent any tilting in particle layers or other such abnormalities in swelling rate.

Author: Bair, Nathan

Institution: Susquehanna University

Mentor: Reichard-Brown, PhD

Co-Authors: N/A

Title: The Potential Risks of Male Exposure to Thalidomide

Abstract: During the late 1950's thalidomide came onto the market as an anti-emetic and sleep aid. It was heavily used by pregnant women to combat morning sickness. Exposure in the first trimester of pregnancy accounted for thousands of birth defects with the drug's removal from the market. Thalidomide returned in 1998 gaining approval from the FDA for treating leprosy, followed by use in treating other diseases such as multiple myeloma, and subsequently AIDS symptoms. The FDA outlined strict policies regulating administration of thalidomide to women of child-bearing age, but rules concerning male exposure are less stringent. Thalidomide can be found in semen following oral dosing. Earlier work in this laboratory demonstrated that developing sea urchin embryos are sensitive to thalidomide exposure in culture. The current experiments addressed the consequences of sperm exposure prior to fertilization. Aliquots of sperm were separated into three control groups and one treatment group. Prior to fertilization 125uL of sperm were incubated for one hour with either 2uL of sea water, DMSO, or a 25uM stock solution of thalidomide. After fertilization embryos were observed at blastula stage, 24 hours, gastrula stage, 48 hours, and pluteus stage 72 hours. At 72 hours the average malformation rate of the sea water control group was at 6%, compared with thalidomide treated group 51%. Malformations observed include gut abnormalities, coarse appearance, unusual cell masses, and lack of integral skeletal structure. Mechanisms of thalidomide action remain unknown and alkaline phosphatase staining indicated Wnt signaling pathways remained intact.

Author: Beck, Lauren

Institution: Susquehanna University

Mentor: Toshiro Kubota, PhD

Co-Authors: N/A

Title: Accuracy of Visual Depth Perception in an Open Field

Abstract: It was investigated how accurately humans estimate distances in an open space. Two sets of six randomly shaped markers were used to mark locations. One set was laid out on a flat open area of Smith lawn where few landmarks were present and all markers were fully visible from a reference point. The other set was laid out on a hill-covered area of the lawn where many landmarks (trees, a sidewalk, Cunningham, and a lamp post) were present and most markers had their lower portions occluded by the hill. Subjects stood at the reference point and estimated the distance to each of the twelve markers. Since the hills, trees, and buildings served as inherent depth cues, it was hypothesized that subjects' depth estimates taken in the hilly area of Smith would be more accurate than those on the flat area. Even though the distances between the markers were gradually increased and decreased, it was hypothesized that subjects would tend to see the markers as evenly spaced apart. It was also expected that as the distance between the subjects and markers increased, the estimates would become increasingly inaccurate.

Author: Besson, Ayanna

Institution: Geisinger Health System

Mentor: Diane T. Smelser, PhD

Co-Authors: N/A

Title: Family History as a Risk Factor for Abdominal Aortic Aneurysms

Abstract: An abdominal aortic aneurysm (AAA) occurs when the abdominal aorta balloons to ≥ 3 cm in diameter. When the aorta reaches ≥ 5 cm, surgery is needed to prevent it from rupturing. AAA is more prevalent in Caucasian males above the age of 55 with a smoking history. We hypothesized that family history is a significant risk factor for AAA in the Geisinger patient population. Unfortunately, family history of AAA is not available in the system-wide electronic record. For this reason a questionnaire was designed to gather this information for AAA patients and controls seen at the Department of Vascular Surgery, Geisinger Medical Center. The questionnaire also collected information on smoking habits as well as personal health and the health of first degree relatives including data on other diseases such as hypertension, high blood cholesterol, atherosclerosis, and connective tissue disorders. The answers were checked against the original data sheets. The concordances of answers to questions on the same topic were analyzed. We used SAS statistical software v.9.3 for analyses to determine if family history contributes to the development of an AAA. Patients with a positive family history are at increased risk of developing an AAA and should be referred for screening. The Summer Internship Program is funded by a grant entitled - "Utility of genomic data in population screening for abdominal aortic aneurysm" from The Commonwealth Universal Research Enhancement (CURE) program of the Commonwealth of Pennsylvania; Geisinger Clinic Funding, grant #TRA053 "Genetic basis of abdominal aortic aneurysms – Family-based exome sequencing pilot" (PI: JR Elmore).

Author: Boucher, Becky

Institution Bucknell University

Mentor: Ruth Tincoff, PhD

Co-Authors: Emily Blum, Robyn Roogow

Title: Comprehension of Verbs and Motor Development in Infants

Abstract: Past research has shown that there are distinct milestones in both language and motor development that are thought to influence each other. Motor development during the first 18 months of life dramatically impacts how an infant reacts to and communicates with their environment, implying goal-oriented actions (Iverson, 2010). The question we ask is if these new motor developments change an infant's ability to comprehend the words that label the motor actions. In this study, we explore verbs that subjects can produce in a seated position and verbs that can be produced in an upright position. Our hypothesis is that an infant must be capable of completing an action to comprehend the corresponding verb. We test our hypothesis by presenting young infants (9-14 months) and older infants (15-20 months) with a split screen video showing two events side-by-side. Simultaneously, a hidden loudspeaker plays one of the verbs for the infant to hear. We measured comprehension that an infant comprehends the verb if the infant looks longer at the action video that matches the verb being played. Results suggest that there is a weak significance between the match and non-match looking times of older babies for seated verbs. On average, older infants watched the match video longer than they watched non-match video. From these data, we conclude that older infants show a possible comprehension for seated verbs. Additional analyses suggest that parental usage of test words has some influence on infant's comprehension of action verbs.

Author: Bradley, Scott

Institution Geisinger Health System

Mentors: Christa L. Martin, PhD; Erin Riggs

Co-Authors: N/A

Title: Developing a Genome Dosage Map to Aid in the Clinical Interpretation of Genomic Variation

Abstract: Whole genome copy number and sequencing analyses are rapidly becoming part of clinical medicine. To aid in this integration, the International Consortium for Clinical Genomics (ICCG) is developing a Genome Dosage Map, an online, public database to aid in the clinical interpretation of genomic variation. Deletions and duplications of individual genes and genomic regions are evaluated for their dosage sensitivity and whether or not they are associated with a phenotype. The ICCG developed an evidence-based review process citing evidence from the literature or public databases using a scoring system based on a 0 to 3 scale. Genes with a score of 3 are pathogenic and associated with disease while genes with a score of 0 have no evidence for pathogenicity. Each review is conducted by a primary and secondary reviewer then submitted to a committee for final review and consensus approval. The genes currently being reviewed with high priority are genes suspected to be associated with developmental delay. Pathogenic variations in these genes cause conditions such as intellectual disability, autism spectrum disorders, and congenital anomalies. Currently working as a primary reviewer, a comprehensive review of current research is being conducted to identify evidence linked to particular genes. To date, there are 480 completed reviews of genes in the ICCG Genome Dosage Map, of which our group has completed 26. Overall, this project will aid in the clinical interpretation of genomic variation as the practicality and use of whole-genome analysis becomes more integrated in the clinical setting.

Author: Buckley, Lauren

Institution: Bucknell University

Mentor: Ruth Tincoff, PhD

Co-Authors: N/A

Title: The Influence of Older Siblings on Infants' Ability to Comprehend Words

Abstract: Infants learn words through social interactions. One important group of social partners is older siblings. While older siblings can create competition for parents' attention, they also expose infants to more language models. In support of the competition hypothesis, research shows that younger siblings receive less direct language input from parents (Wellen, 1985). Alternatively, in support of the richer environment hypothesis, other research shows that infants participate actively in parent-infant-sibling triads and are very aware of the conversations around them (Barton & Tomasello, 1991). The present study examines the effect of having an older sibling on infants' comprehension of daily routine phrases. We seek to test the hypothesis that infants with older siblings demonstrate greater comprehension of such phrases since they hear them not only from their parents but also frequently from their siblings. We tested 11.5- to 18.5-month-olds, half with 3- to 5-year-old siblings and half without siblings. We measured comprehension using the preferential looking procedure. Infants viewed split screen videos while hearing phrases that matched one of the videos. Comprehension was defined as looking longer to the video that matched the phrase being presented than to the nonmatching video. Preliminary results for the subjects tested and analyzed thus far show that infants with siblings ($N = 9$) looked longer to the match video than to the nonmatch video. Infants without siblings ($N = 9$) also looked longer to the match video than the nonmatch video but showed a smaller mean difference score between match and nonmatch looking.

Author: Busada, Elisa

Institution: Bloomsburg University

Mentor: Jennifer Venditti, PhD

Co-Authors: N/A

Title: Investigating the Cytotoxic Effects and Morphological Changes in Human Cervical Cancer Cells Treated with Novel Compounds

Abstract: The human population is rapidly increasing, in part due to unintended pregnancies. Unintended pregnancies are those reported as unplanned or unwanted. One way to potentially reduce the number of unintended pregnancies is through the development of novel spermicides. Currently available over-the-counter spermicides are effective; however, there are recent safety concerns with their common ingredient nonoxynol-9 (N9). N9 is a nonionic surfactant that acts as an effective spermicide, but has been shown to damage the female reproductive tract. A 2007 ruling by the FDA required all over-the-counter vaginal spermicides containing N9 to have new warning labels indicating that N9 does not protect against HIV or STD's, can increase the risk of getting HIV, and can irritate the vagina and rectum. The goal of this research project was to investigate the cytotoxic effects of novel, non-ionic compounds that have been documented to have spermicidal properties. HeLa cells were grown in culture and exposed to various concentrations of N9, F13, and F17. Cell morphology and viability were microscopically evaluated before and after treatment, with Trypan blue used as a vital stain. Results revealed that treatment with F13 and F17 caused minor morphological changes and had minimal cytotoxic effects on HeLa cells grown in culture. Although additional experiments are necessary, these preliminary findings support the notion that our novel compounds could be used as spermicides that are less harmful to the female reproductive tract.

Author: Calvo, Jose

Institution: Bloomsburg University

Mentors: Jennifer Johnson, PhD; Susanne Furman

Co-Authors: N/A

Title: Cyber Security

Abstract: The types of transactions completed over the internet are increasing, as are the devices used to conduct these transactions. With these come increased risks from a variety of cyber threats. In order to better arm users against these threats it is important to understand users' perceptions of cyber security. In this study we were specifically interested in examining users' perceptions of cyber-security for personal computers compared to mobile devices. To do this, students from Bloomsburg University were asked to optionally submit pieces of personal information on either a personal computer or a simulated mobile device. Upon submitting their personal information they were shown a warning message and were timed to see how long it took to either agree to submit or not submit those pieces of information. The types of personal information entered and the length of time taken to submit the information after receiving the warning message were compared in the personal computer and simulated mobile device groups. Participants then completed a questionnaire and answered a series of follow-up questions in order to better understand their beliefs of cyber-security. Preliminary results show that people trust mobile devices slightly more than personal computers. Also, we expect to find that participants' cyber-security beliefs will contradict the actions they take when actually using these devices. By examining people's misconceptions about cyber-security we may be better able to inform them of the precautions that should be taken when utilizing either personal computers or mobile devices.

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Mentor: David Evans, PhD

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Title: Developing Online Assessment Tools to Aid in Large-scale Testing of Rare Genetic Syndromes

Abstract: Standard phenotypic assessments of neurodevelopmental disorders have traditionally been administered through face-to face or with paper-and-pencil formats. Such evaluations are time-consuming and cost ineffective. This traditional method is especially problematic when conducting research on rare genetic syndromes with low prevalence rates, with probands distributed across a wide geographic region. Our goal is to provide an alternative, convenient, more efficient phenotypic assessment battery by adapting traditional, standardized assessment tools into a user-friendly, online format. This format will allow for remote testing of rare genetic syndromes, unencumbered by geographic location thereby increasing sample size and statistical power. Traditional behavioral assessments often include measures such as the Social Responsiveness Scale, the Child Behavior Checklist and the Adaptive Behavior Assessment Survey. Here we adapted these measures into the online survey platform Qualtrics. Standard scoring procedures for these measures were used to generate immediate online scoring rubrics. Validation will include comparison of norms of online and traditional formats, as well as test-re-test reliability comparing these different administration formats on the same subjects. Our preliminary results indicate that assessment batteries can be easily adapted for administration in an online format. Online formatting provides an assessment for behavioral phenotyping that will greatly reduce costs and increase statistical power in studies of rare syndromes. Future directions include further validation of online tools and expanding the number of available online assessments thereby providing more thorough phenotyping evaluations in a wider variety of rare genetic syndromes.

Author: Cole, Charles

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Mentor: Brian R. King, PhD

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Title: Using Machine Learning to Predict the Health of HIV-Infected Patients

Abstract: HIV is a complex retrovirus that gradually destroys the body's immune system, making it difficult for the individual to fight infections. The worst prognosis for an infected individual is AIDS; however, this does not occur with every infection, nor does every HIV infection evolve in the same way. Our aim was to develop a method that can predict the disease prognosis of human HIV infections based on HIV genomic and proteomic sequence data. We collected over 40,000 HIV genomic sequences and over 1,000 protein sequences to induce classifiers that can predict the human disease phenotype. Using the random forest classification method with cross validation, we obtained over 91% accuracy over four different disease levels. We also developed a novel method of partitioning the protein sequence into overlapping regions of equal length, where each partition has a vector representing the basic amino acid composition of that partition. We applied this method to five of the nine genes in HIV. We found that the rev gene had the highest predictive performance for disease level. Moreover, using a decision tree, we were able to output rules that contained specific variants in the protein that can suggest disease outcomes. This information may help researchers understand underlying variants of the gene that have different patient outcomes. Moreover, this knowledge can improve the selection of appropriate treatment methods depending on the predicted infection level, and also improve drug targeting.

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Co-Authors: N/A

Title: Genetic Variation in the Low-density Lipoprotein Receptor-related Protein 5 (LRP5) Gene and Abdominal Aortic Aneurysms

Abstract: Abdominal aortic aneurysm (AAA) is a multifactorial disease characterized by a progressive dilation of the aortic wall that can lead to rupture. This disease has a strong genetic and environmental component. The disease takes the lives of 15,000 individuals in the United States each year. The majority of these patients are asymptomatic prior to the rupture. The disease primarily affects males with a 6:1 male to female ratio. According to genome wide association and candidate gene studies, single nucleotide polymorphisms (SNPs) in multiple genes are associated with AAA (e.g. IL6R, LRP5, TGFB2, ACE, MMP13, SORT1, DAP2IP, and LRP1). We chose low-density lipoprotein receptor-related protein 5 gene (LRP5) for further study to determine whether it is associated to AAA in the Geisinger population. In this study, two SNPs for LRP5, rs3781590 and rs4988300, were genotyped in AAA cases and controls and tested for an association with the presence of an AAA. The Summer Internship Program is funded as part of a grant entitled "Utility of genomic data in population screening for abdominal aortic aneurysm" from The Commonwealth Universal Research Enhancement (CURE) program of the Commonwealth of Pennsylvania.

Author: Danchik, Greg

Institution: Bucknell University

Mentor: Eric Kennedy, PhD

Co-Authors: N/A

Title: The Effect of Surface Variation on the Risk of Head Injuries on a Playground

Abstract: Playground injuries account for 200,000 emergency room visits every year, and 70% of playground injuries come from falls onto the surface. Although laboratory studies have assessed the impact attenuation of playground surfaces, little research exists to assess real world surface variation and performance. The purpose of this study is to assess the variation in surface depth that occurs across a playground and quantify the risk of a closed head injury. Since 75% of all non-fatal injuries occur on public playgrounds, a municipal playground with mulch ground cover was assessed in accordance to ASTM 1292. At the playground, 22 test locations were assessed with 3 impacts at each location. At each test location, an instrumented impactor was dropped from 1.5 meters to measure impact severity. Test areas were selected from high and low traffic areas of the playground and were found to have surface depths of 15cm (10 locations), 12.5cm (2), 10cm (2), 7.5cm (3), 2.5cm (1), bare soil (4). The bare soil surfaces under the swings were found to be the highest risk areas with greater than 300g impact potential and greater than 90% head injury risk. Low traffic areas with limited mulch erosion yielded sub-100g impact potential and less than 5% head injury risk. From bare soil, a trend was observed that the head injury score was cut in half with the addition of 2.5cm of mulch. This value was cut in half again going from 2.5cm to 7.5cm, and cut in half again from 7.5cm to 15cm.

Author: Daniels, Shawn

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Title: Onboarding: Increasing Organizational Performance.

Abstract: As the twenty-first century advances, it is becoming progressively clear that the effective management of an organization's human capital is a foremost source of its competitive advantage. To some, it may even be the single most important determinant of an organization's performance. Organizations have begun to realize that their success is resulting from their ability to attract, develop, and retain talented employees as well as build long term employee relationships. Onboarding is the key process an organization uses to provide a new employee with the information, knowledge, skills and tools they require to quickly become an integrated and effective part of the company. Onboarding is crucial to establishing a bond between the organization, managers and employees quickly and effectively during the first months of employment. Organizations which utilize onboarding effectively enjoy quicker return on investment, better long term commitment to the organization and more motivated employees as well as reap the financial benefits from a reduced amount of turnover and training costs.

Author: de Hann, Herman

Institution: Susquehanna University

Mentor: Toshiro Kubota, PhD

Co-Authors: N/A

Title: The Effect of Convexity and Scale on our Perceptual Grouping.

Abstract: There are many variables which play into how easily we group fragments of a given shape to perceive the whole. The purpose of this study is to examine the effect of convexity and scale on our perceptual grouping. In the first experiment, subjects were asked to detect an illusory contour induced by pac-man like shapes as the contrast of the stimulus is enhanced gradually. In the second experiment, subjects were asked to detect a closed contour induced by bean like shapes as the contrast of the stimulus is enhanced gradually. In both experiments, each shape was presented in both convex and concave versions and at two scales. We used the recorded difference in contrast between the inducers and the background to measure the degree of difficulty for subjects to perceive the whole shape.

Author: Dincer, Aylin

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Mentors: Donna M. Ebenstein, PhD; Eric A. Kennedy, PhD

Co-Authors: Sarah Denning, Richie Pisano

Title: Correlation of Micro-indentation to Other Factors Indicative of Bone Quality

Abstract: There are over 280,000 hip fractures annually in the United States among people ages 65 and older. Incidence of hip fracture increases with age and is correlated with a decrease in bone quality. Bone quality and risk of fracture are commonly assessed using bone mineral density (BMD) measurements. Typically, DEXA scans are performed clinically to obtain BMD measurements, but this technique does not have the ability of determining localized measurements. The goal for this study was to investigate a mechanical test to quantify local bone quality during hip fixation surgery. Localized bone quality was investigated using a micro-indentation technique, where a small tip is pressed into the bone tissue to measure local mechanical properties. Trabecular bone (also known as cancellous or spongy bone) samples from the hip and knee regions of three bovine and six porcine bones were tested using micro-indentation. Mechanical properties, such as unloading slope (stiffness), indentation distance increase (a measure of fracture resistance), and creep indentation distance (measure of material displacement under constant load), were determined for each indent, and averages were computed for each bone sample. Within each animal, no significant differences were found in any micro-indentation properties between the hip and knee trabecular bone samples. However, bovine bone samples had significantly lower fracture resistance and creep indentation distance and higher stiffness than porcine bone. The differences in bone quality between species will be further investigated by looking for correlations between mechanical parameters and the results of compositional analysis techniques such as chemical spectroscopy and ashing.

Author: Dugan, Gemma

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Mentor: Chris Martine, PhD

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Title: Sex-differential Insect Herbivory in Dioecious Australian Nightshades

Abstract: Phytochemical impact on herbivory is often difficult to quantify due to the abundance of confounding environmental and circumstantial variables. In dioecious species, sex may also come into play. Studies have shown that sex-differential herbivory in dioecious species can lead to higher rates of damage to either sex. Male plants are most often cited as being more susceptible to herbivory due to a diversion of resources away from defense and into faster growth. However, there is evidence that individuals with primary male function are more prone to herbivory, irrespective of how fast they grow. To begin to look for correlations between plant sex and insect choice in spiny solanums, we collected samples of a functionally dioecious species, *Solanum asymmetriphyllum*, from Kakadu National Park, Northern Territory, Australia. Data profiles were compiled based on percentage of leaf lost to herbivory, soil quality and pH, sex, location and other environmental data. By developing this framework we were able to look more closely at the impact of plant gender on insect choice whilst accounting for other variables. No statistically significant correlation between sex and herbivory were found in field. Sex and lobing are correlated, as is sex and armature on newer stems. Herbivory is correlated with both leaf colour and leaf size. It has been suggested that lobing is sometimes an adaptation to herbivory. Continuing research on *S. asymmetriphyllum* is ongoing.

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Mentor: Judith Grisel, PhD

Co-Authors: Stephanie Schneider, Annie Hand

Title: EtOH Induced Conditioned Place Preference in C57BL/6J Mice after a Single Exposure to the Drug

Abstract: Background: Our lab's interest lies in understanding varying degrees of susceptibility to alcoholism. The present studies investigated the reinforcing effect of alcohol (EtOH) in C57BL/6J mice in a conditioned place preference (CPP) model of drug reward. Extant studies of CPP employ multiple exposures of EtOH and are therefore more likely to be studying adaptation than innate sensitivity. Our hypothesis was that EtOH-mediated CPP would be highest in stressed animals since EtOH acts as a negative reinforcer for anxiety. Methods: Female mice were randomly assigned to a "handled" or "naïve" group. The handled group was injected with saline multiple times before the CPP protocol while the unhandled group was left undisturbed in their home cages. On the first conditioning day the mice received an injection of 1.5 g/kg EtOH (i.p.) or the equivalent volume of saline then were placed on either a circle or square tile floor for 30 minutes. On the second conditioning day they received the alternate treatment on the other floor context so that each animal received one of each injection. On the test day total crossings, first entrance and total time spent on each floor were measured. Results: The data indicate substantial CPP in the unhandled group but none in the handled mice. It is evident that handling decreased the effects of EtOH on place preference. Conclusion: Our data are the first to demonstrate conditioned place preference after only a single exposure to alcohol. This protocol will contribute to future advances in understanding the liability for alcoholism.

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Title: The Effects of Poetic Line Breaks and Related Visual Cues on the Parsing of Ambiguous Sentences

Abstract: Reading poems, like reading any text, usually involves sentence-level processing on the part of the reader. Though some evidence suggests that readers process poetry and prose differently, few studies have examined the differences between end-stopped and enjambed lines in poetry (lines that end at syntactic boundaries and lines that do not end at syntactic boundaries, respectively). Fewer still have focused on poetic line breaks' effects on parsing, or the assignment of thematic roles to syntactic constituents, which can lead to correct or incorrect interpretations of ambiguous sentences. Results from the present study indicated that enjambment did indeed influence readers' parsings and interpretations of ambiguous sentences; specifically, readers made the lowest percentage of comprehension errors when reading sentences in the "facilitatory enjambment" condition, wherein line breaks promoted the correct parsing by occurring directly before the head noun of the ambiguous phrase ("While Anna dressed / the baby played in the crib"). Further, readers made the highest percentage of comprehension errors when reading sentences in the "non-facilitatory enjambment" condition, wherein line breaks promoted the incorrect parsing by occurring directly after the head noun of the ambiguous phrase ("While Anna dressed the baby / played in the crib"). The effects of enjambment and related visual cues, such as slashes and spaces, were examined on syntactically and lexically ambiguous items. Taken together, these results suggest that readers are influenced by poetic line breaks when parsing ambiguous sentences, and point to the role of non-syntactic elements in the parsing process generally.

Author: Fox, Nathan

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Title: A Quantum Agnostic's Approach to Quantum Mechanics

Abstract: Quantum Mechanics (QM) is a field that still (after 100 years) poses a number of paradoxes and interpretations seeking to resolve those paradoxes. Although some are more supported than others there is no universally accepted interpretation. Quantum Mechanics is a field that is objectively fascinating, and although the average person may not be able to handle the math, discussion of the interpretations and paradoxes requires no former mathematical knowledge. Quantum Mechanics is one the most fundamental discoveries of twentieth century physics. Quantum Mechanics pertains to the mechanics of really small systems. The phenomena observed in QM are very difficult to reconcile with classical mechanics. As such there are a number of interpretations that attempt to explain the observations of Quantum Mechanical systems. We investigate these approaches in detail and attempt to illustrate why, through application of Occam's razor, certain interpretations do not have sufficient evidence to exist. Additionally (time permitting) we explore discoveries in mathematics, in which it is exposed mathematics that certain questions are outside of answerable mathematics, and posit that the advent of QM is the first occurrence of something that is unanswerable or inexplicable within the current realm of physics.

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Title: Antp Regulates Segment-specific Survival and Morphology in the Postembryonic Ventral Nervous System

Abstract: Across the animal kingdom, Hox genes provide positional information for developing structures along the anterior-posterior axis. In the fruit fly *Drosophila*, the Hox proteins determine segment-specific structures such as antennae (head) and legs (thorax). In particular, Antennapedia (Antp) is highly expressed in the anterior thoracic segments, whereas Ultrabithorax (Ubx) is highly expressed in the posterior thoracic and anterior abdominal segments. These two genes are expressed in overlapping domains, but generally not in the same cells. In the postembryonic ventral nervous system (the fly's "spinal cord"), 25 different types of neural stem cells, called neuroblasts, give rise to lineages of specific progeny neurons. These neurons have been observed to exhibit segment-specific survival and morphology. Our previous study showed that Ubx is expressed in a segment-, lineage-, and hemilineage-specific manner in the thoracic and anterior abdominal segments and confers positional identity on the neurons that express it. Our current study is focused on Antp. We have characterized the expression pattern of Antp in the 25 lineages and performed gain and loss of function experiments to define the role of this gene in anteroposterior patterning in the ventral nervous system. We have found that overexpression of Antp results in posterior transformations of certain lineages in more anterior segments, such as lineages 1 and 12. Likewise we have found anterior transformation and survival patterns for some lineages in posterior segments, such as lineages 10 and 12. These results shed light on the role of Antp in the sculpting of the ventral nervous system.

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Title: Determining the Economic Impact of Fracking

Abstract: In this paper, we focus on the economic impact of fracking. Fracking is a technique used to fracture rock layers to extract natural gas. In the past decade, fracking has become widespread in the United States. Similarly, in the past few years, there have been over a dozen studies released to the public examining the economic impact of fracking. While the general guidelines on how to conduct economic impact studies should be well known, the estimates for the economic impact of fracking vary significantly across studies. We will summarize the economic impact studies done on fracking in the United States and critically examine the assumptions made in these various studies. We'll also review some of the idiosyncrasies researchers may run into when estimating the economic impact of fracking that aren't problems when estimating the economic impact of other entities. We also provide our recommendations for best practices to follow when conducting an economic impact study on fracking. Our paper should be important both to researchers and policymakers

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Mentor: David Matlaga, PhD

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Title: Examining the Influence of Disturbance on the Relative Success of Sexual and Clonal Recruitment of Japanese Knotweed (*Fallopia Japonica*)

Abstract: Japanese knotweed (*Fallopia japonica*) is an herbaceous invasive plant in North American and Europe. *F. japonica* alters riparian habitats by forming monodominant stands that deeply shade the forest floor. It is known that *F. japonica* can recruit new individuals via both sexual reproduction (seed production) and asexual reproduction by rhizome and stem fragments. Riparian forests experience regular disturbance by flooding. It is important to understand how disturbance impacts sexual and asexual recruitment of this riparian invader as it will provide valuable information for land managers wanting to limit the establishment of *F. japonica*. We addressed this topic using an experimental approach to observe the recruitment via the three reproductive modes. Reproductive propagules (rhizome fragments, stem fragments, and seeds) were planted in both disturbed and non-disturbed plots at three sites along the Susquehanna River in Snyder County, PA. Both canopy openness and propagule height will be censused every four weeks for the next 5 months. Preliminary results indicate that the disturbance treatment increased canopy openness by 15.7%. Disturbed plots experienced an overall increase in establishment for all three propagule types compared to undisturbed plots. Regardless of treatment, rhizome fragments have a higher probability of establishing (72.5%) than seeds (2.5%) or stem fragments (2.5%). Thus, new recruits of *F. japonica* are more likely occur in disturbed areas and due to the presence of rhizome fragments, than seed or stem fragments.

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Title: Identification and Recruitment of Patients with 17q12 Deletion Syndrome via Genotype-first Approach: Preliminary Steps toward Building a Neurobehavioral Phenotype

Abstract: Studies aimed at elucidating the genetic underpinnings of neurodevelopmental disorders (NDs) have shown that genetic anomalies including sequence mutations, microdeletions, and microduplications play a large role in their etiology – particularly recurrent copy number variants (CNVs). Among all deletion and duplication CNVs, a recurrent 1.4 Mb deletion in chromosome 17q12 is among the 10 most frequent pathogenic genomic imbalances among individuals with a range of NDs including intellectual disabilities, schizophrenia, epilepsy, and autism spectrum disorders. Similar to other contiguous gene syndromes, the deletion is associated with variable expressivity and is manifested in a wide range of seemingly unrelated phenotypes including macrocephaly, characteristic facial features, renal cysts, diabetes, and neurocognitive impairments. A dual-strategy of two complementary approaches – genotype-first and phenotype-first – is used to identify a large cohort of subjects with this rare CNV syndrome. Cases with confirmed or smaller, nested deletions within the 17q12 interval were identified from 3 sources: the International Standards for Cytogenomic Arrays (ISCA) consortium, the Simons Simplex Collection (SSC), and the Autism Genetic Resource Exchange (AGRE) database. While no cases were identified from AGRE, 3 from the SSC database have been identified, including 2 de novo and 1 inherited case. A preliminary search from ISCA yielded an estimated 39, and lab requests will be submitted to patients' physicians for phenotyping. Similar recruitment efforts will be conducted with UNIQUE, a UK-based organization of rare chromosome disorders that holds 18 potential cases. Data will be analyzed to generate a profile of the physical and neurobehavioral phenotype of the 17q12 syndrome.

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Mentor: L. Don Duke

Co-Authors: Ryan Murphy

Title: Floods on the Susquehanna: A Comparative Analysis of Flood Mitigation Policies in Ten River Towns of the Susquehanna River Heartland

Abstract: This research investigates flood control policies of ten selected municipalities in the central Susquehanna River basin, Pennsylvania. The objectives are: to identify approaches and specific instruments implemented by each municipality; to evaluate advantages and disadvantages of various approaches and instruments for each municipality's circumstances; and to determine institutional driving forces and barriers to improved flood mitigation. Findings demonstrate that flood policies differ widely among these closely-spaced municipalities. Constructed systems have evolved. In the 1950s, federal funding was used for massive channel rebuilding and construction of walls and levees. Recent approaches apply federal, state, local, and private funding to build smaller, targeted structures, leaving some floodplains unprotected and relocating sensitive land uses. Meanwhile, increased vigilance to levee operation and maintenance (required by federal agencies) has increased safety - and - costs of those systems. Non-structural approaches, used in walled and un-walled towns alike, include promotion of open spaces in flood plains and use of building codes for "flood-proofing" (elevating and strengthening homes, raising utilities, etc.). Municipalities have limited authority for these options; building permits are not required for all structures. Property rehabilitation and "buy-out" under FEMA and its predecessors is not universally popular, exacerbating shrinkage of population and economic activity. The research acquired sought information from websites and documents of local towns as well as Federal and state agencies, and visited all ten towns to interview personnel of borough and County agencies. These preliminary findings, results of only one summer's work, can be extended by future research.

Author: Kansal, Nalin

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Mentor: Kim Chaundy

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Title: My Experience at Geisinger

Abstract: Geisinger supports the adoption and effective development of integrated electronic systems and centralized innovation and quality support that would be difficult, if not impossible, for many freestanding physician practices and small independent hospitals. Geisinger is both a health care delivery system and an insurer. It engages patients as partners in care through direct access to electronic health information and provides tools to help consumers manage their care. It is an honor to have the opportunity to demonstrate high levels of communication, interpersonal and interpretive skills in such a prestigious organization. My first project was to integrate data from multiple source systems: Healthcare Provider Directory (HPD) along with the S&I Provider Directory data model, together known as HPD Plus. The HPD formatted list based on HISP submissions emerged as an internationally accepted format that is used globally. HPD Plus is a healthcare provider directory capable of facilitating transactions between individual DIRECT addresses and entity-level DIRECT addresses, supporting multiple Direct addresses for any given healthcare provider and relationships with any number of organizations and endpoints. My second project was to enhance the Radio Benefit Management (RBD) program. I am working as a part of the Geisinger testing team responsible to install a test environment, that will be capable to demonstrate image access in the HIE preventing unnecessary duplication of images and giving the physicians images during the time of care irrespective of where the images had been generated in the HIE. This project has been approved by the ISO with great appreciation.

Author: Keller, Aleksander

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Title: Identifying a Linkage between Circadian Rhythm Genes, Obesity, and Type 2 Diabetes

Abstract: Disruption of the circadian rhythm may contribute to numerous metabolic diseases. Every cell in the body contains an internal clock encoded by a specific set of genes. Several factors (light, eating habits) align this internal clock. By extending or reversing natural wake-sleep cycles, people living in industrialized societies suffer from a chronic misalignment between these two processes that have been linked to both obesity and associated metabolic disorders. Although the consequences of this misalignment are becoming clear, the molecular mechanisms are still poorly understood. Like every other cell in the body, adipocytes contain an internal clock and secrete hormones that follow a circadian rhythm. In this study, we tested the hypothesis that altered expression of circadian rhythm genes may contribute to the development of metabolic dysfunction including insulin resistance and type 2 Diabetes. Visceral adipose samples obtained from obese female non-diabetics and type 2 diabetics were analyzed using a Qiagen Circadian Rhythm PCR array. Patients were grouped according to body mass index (BMI), age, and medication used (if diabetic) into control and test samples. Differentially expressed genes from the array were further analyzed using quantitative PCR (qPCR) to validate array findings and to compare expression at other BMI levels. Several genes (BHLHE41, CCRN4L, EGR1, EGR3, HTR7, NFIL3, OPN3, POU2F1, PRKACB, PRKAR2B, PRKCB, and SCL9A3) were differentially expressed between type 2 diabetics and non-diabetics, requiring further validation in the form of in vivo testing to test the causality of these findings.

Author: Kenny, Tim

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Title: Impact of Z0011 on the Surgical Management of the Axilla in Patients with Breast Cancer

Abstract: Background: The American College of Surgeons Oncology Group Z0011 trial redefined the standard of care for breast cancer patients with positive sentinel lymph nodes (SLN). Z0011 illustrated that complete axillary lymph node dissections (ALND) are not necessary for patients with T1-2 tumors and 1-2 positive SLNs without extracapsular extension. This study aims to evaluate the changes and trends in the surgical management of breast cancer as a result of Z0011 at a tertiary care center. Methods: Patients who met Z0011 criteria were identified and sorted into pre- and post-Z0011 cohorts (Feb. 2011). Demographic and clinicopathologic data were collected on 151 surgically treated breast cancer patients, excluding those receiving neoadjuvant treatment and ipsilateral tumor recurrences. Of these, 73 were in the pre-Z0011 cohort and 78 were in the post-Z0011 cohort. Results: Of the 73 patients in the pre-Z0011 cohort, 44 patients underwent breast conservation surgery (BCS). Of these, 31 had clinical stage T1-2 tumors; thirty received a sentinel lymph node dissection (SLND). Four patients had 1 to 2 positive SLNs, none of which had extracapsular extension. Two of these patients received ALNDs. In the post-Z0011 cohort, 55 of the 78 patients received BCS. Of these, 47 had clinical stage T1-2 tumors; 46 received SLND. Eight of these patients had 1 to 2 positive SLNs, 2 of which had extracapsular extension. ALND was performed on 5 patients. Data collection is ongoing. Conclusion: We hypothesize that the results of this study will highlight changes in the management of the axilla in breast cancer patients.

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Mentor: Mark Wojtowicz

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Title: QOPI - The Quality Oncology Practice Initiative

Abstract: Introduction: The Quality Oncology Practice Initiative (QOPI) aims to assess quality and promote improvement in cancer care. Geisinger Cancer Service Line voluntarily participates in this national quality program. Geisinger Wyoming Valley (GWV) has submitted data and is eligible to participate in QOPI Certification. To receive Certification the practice must submit an application, provide supporting documentation of compliance to chemotherapy safety standards, and participate in an on-site QOPI review. Objective: The objective of this project is to prepare and submit the application for Geisinger Wyoming Valley's QOPI Certification. Methods: A gap assessment was conducted in order to clarify what documentation was necessary and who should be contacted in order to collect it. To complete the assessment for GWV a comprehensive understanding of the safety standards and the QOPI Acceptable Documentation Guide was necessary. Meetings with the Director of Operations, Operations Manager, and Pharmacist from the Cancer Center took place to modify policies, and gather all required documentation. Outcomes/Discussion: QOPI focuses on processes that are determined to cultivate the best patient outcomes. In examining Geisinger's policies it was found that many best practice policies and procedures were practiced at GWV but weren't being documented in properly. Updating documentation to include QOPI requirements prompted administration at GWV to review procedures with Cancer Center staff and improve communication of best practice. Not only does QOPI certification benefit GWV's practice by standardizing procedures, but voluntarily participating in a certification program such as QOPI validates Geisinger's commitment to and accountability for quality care.

Author: Klein, Lexi

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Title: Development of a Model for Nanomechanical Characterization of Viscoelastic Biomaterials

Abstract: Nanoindentation has proven to be a useful tool in mechanical analysis of biomaterials. However, adhesion between the tip and sample leads to overestimation of elastic modulus values when testing soft biomaterials. For elastic moduli, previous studies have corrected for adhesion using analysis methods based on the Johnson-Kendall-Roberts (JKR) adhesion model. However, the effects of adhesion on nanoindentation measurement of viscoelastic parameters have not yet been assessed. The primary goal of this project was to develop and test a model for analyzing viscoelastic biomaterials using nanoindentation that accounts for adhesion. In this study, three elastomer samples were tested in air (with high tip-sample adhesion) and in a surfactant (which eliminates tip-sample adhesion). Instantaneous and equilibrium moduli were calculated based on a curve fit to the hold period of each dataset, using a JKR equation to correct for adhesion. The preliminary results of the study clearly demonstrate overestimation of both instantaneous (E_0) and equilibrium (E_{inf}) moduli when adhesion is not taken into account, with errors increasing with decreasing sample modulus. Errors in E_0 ranged from 4.74% to 14.10% (based on comparison to the surfactant results). Similarly, errors in E_{inf} ranged from 8.11% to 13.77%. When the JKR correction was utilized, the values approach those in surfactant, with modulus errors ranging from 1.34% to 9.28%. These results indicate that the modulus overestimation that occurs due to adhesion can be significantly reduced using JKR analysis methods. Future work will investigate other factors that may contribute to inaccurate modulus calculation in the presence of adhesion.

Author: Kosak, Zachary

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Co-Authors: N/A

Title: The Role of Fibroblast Growth Factors 19 and 21 in Type 2 Diabetes

Abstract: We recently showed (Diabetes Care) that fibroblast growth factor 19 (FGF19) is significantly lower in type 2 diabetes mellitus (T2D) patients when compared to nondiabetic patients, that bile acids (BA) were higher in patients with T2D when compared to nondiabetics, and that the FGF19-CYP7A1-BA pathway was strongly implicated in the remission of T2D by many patients that undergo Roux-en-Y gastric bypass (RYGB). We have now expanded on these findings by further analyzing hepatic gene expression in 32 liver biopsies taken from patients undergoing RYGB surgery. CYP7A1, FGF21, FXR, GS, HNF4 α , and SHP all were statistically significant ($p \leq 0.05$) in comparisons between diabetics and nondiabetics, remitters and nonremitters, remitters and nondiabetics, and/or nonremitters and nondiabetics. In addition, FGF21, which is another FGF in the pathogenesis of T2D, was significantly elevated in patients with T2D when compared to nondiabetic patients ($p = 0.009$). These results indicated that FGF21 is upregulated in much the same way as CYP7A1, which is also upregulated in the diabetic liver. Interestingly, FGF21 has been proposed to be regulated by FGF19. Hence, we sequenced the minimal promoter region of FGF21. Preliminary findings indicate that variations in the FGF21 promoter region may be present between nondiabetic, remission, and nonremission groups, but further testing is required in order to confirm these findings. We hypothesize that the enterohepatic FGF19-BA-FGF21 pathway may be dysregulated in patients with T2D.

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Mentor: Heidi Lorimor, PhD

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Title: How Delaying the Verb Changes the Nature of Subject-Verb Agreement "Errors"

Abstract: In subject-verb agreement, speakers are balancing two tasks: remembering what the subject noun is, and keeping track of the message they want to communicate, as subject-verb agreement is influenced by both (Bock et al., 2001). If grammatical properties of the subject noun conflict with notional information in the message, a singular or plural verb may be chosen. In “the gang on the motorcycles” the grammatical information leads to a singular verb, but the notional properties might lead instead to a plural verb (Humphreys & Bock, 2005). The present study investigates whether the distance between the subject and the verb influences the relative influence of notional and grammatical information on agreement. Greater distance between the subject and verb might lessen the grammatical influence of the nouns, allowing the message to play a larger role, or alternatively, speakers might keep track of the nouns, with a decrease in notional effects. In our study, participants were prompted to form sentences using a given preamble (“the gang on the motorcycles”) and adverb (“generally”), followed by their own sentence completion. One group of participants produced the given adverb directly after a prompted phrase, thus delaying the verb, while the other group produced the adverb later in the sentence. We found that the participants who used the verb earlier in the sentence showed a smaller notional effect than those who used the verb after the adverb. This suggests that the participants’ memory of the words fades, but that they retain the overall message.

Author: Long, Jason

Institution: Susquehanna University

Mentor: Margaret Peeler, PhD

Co-Authors: N/A

Title: The Role of JNK in the Development of Sea Urchin Embryos

Abstract: The planar cell polarity (PCP) pathway triggers important events that result in the formation of mature embryos in many animal organisms. A key component of this pathway is the c-jun N terminal kinase (JNK). JNK activity has been shown to be required for triggering cell movements during embryonic development in species such as fruit flies, frogs, and mammals. Our lab has been characterizing the role of JNK in sea urchin development. The following experiment analyzes the role of JNK during gastrulation in *Lytechinus pictus* through loss-of-function experiments using the JNK specific inhibitor SP600125. Results show that invagination of the archenteron does not occur in inhibited embryos, suggesting that JNK is required for this cell movement. However, differentiation of gut cells does still occur, as confirmed with alkaline phosphatase staining, even though morphogenesis of the gut has been disrupted. Other cell movements are not strongly affected by JNK inhibition. Immunofluorescent staining confirmed that primary mesenchyme cells (PMC), which produce the skeletal structure, are mostly unaffected during ingression and early patterning, but very few skeletal structures form. Normal numbers of pigment cells, derived from secondary mesenchyme cells, also are present in the inhibited embryos. These results demonstrate a role for JNK during gastrulation, specifically in triggering the invagination of the archenteron, but that differentiation of the archenteron is independent of JNK and the PCP pathway.

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Institution: Geisinger Health System

Mentors: David Evans, PhD; Christa Martin, PhD; Brenda Finucane, MS, CGC

Co-Authors: Scott Bradley

Title: Identifying Patients with 17q12 Deletion Syndrome: a Phenotype-First Approach

Abstract: Previous research implicates a 1.4 Mb deletion of chromosome 17q12 as a risk factor for a number of neurodevelopmental (ND) and neuropsychiatric (NP) disorders, including autism spectrum disorder and schizophrenia. These disorders have also shown to aggregate with certain categories of other disease entities, namely renal- and endocrine-related diseases. Using a “phenotype-first” approach, we investigated patients diagnosed with one or more (renal or endocrine) of these disorders in an effort to identify individuals who may possess the 17q12 deletion. Accurate identification of a genetic syndrome like 17q12 -- one with a particularly varied behavioral phenotype, would provide clinicians and their patients with an effective screener, serve as a warning for predicting other potential health problems, and advise clinical decision-making. We hypothesize that the presence of these particular phenotypic features will prove to be a valuable diagnostic tool for 17q12. We performed a review of the medical records for a select population of patients having some combination of ND and PP disorders, renal, and endocrine disorders, identifying cases in which the causes of their conditions are not evident. After compiling a list of candidates for the 17q12 deletion, we will request consent from the patient(s) to perform genetic testing and confirm cases where 17q12 is involved. Not only would this project’s success provide participants with a more specific diagnosis, but also suggest an effective tool for clinicians to identify the 17q12 deletion from phenotypic factors. Future implications of such a diagnosis could involve treatment and possibly the cure of genetic factors contributing to these phenotypes.

Author: McGowan, Michael

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Mentor: Amy Wolaver, PhD

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Title: Variance in Effective Care, Preference-Sensitive Care amongst Pennsylvania Counties

Abstract: Amongst the 67 Pennsylvania counties there is bound to be variance amid the healthcare provided. Using GIS mapping techniques, the goal of the study is to try to identify variation in healthcare use amongst the counties. Effective care includes treatments in which the benefits of the treatment far outweigh the side effects. Preference-Sensitive care includes treatments that are not necessarily better or worse than another, but can differ in outcome and side effects for which the preference can come from the patients. Patient discharge data amongst Pennsylvania hospitals from 2009 provided by PHC4 were used in STATA to generate age and gender-adjusted admission and procedure rates used to map the counties in ArcGIS. Diabetes is an example of a measure of ineffective care. Multiple procedures like: Lumpectomy, Mastectomy, Prostatectomy, Disc Surgery, Spinal Fusion, Knee Removal, and Hip Removal are examples of Preference –Sensitive care. The Effective care maps will help identify areas in Pennsylvania that are more likely to lack effective care needed for diabetes patients. The Preference-Sensitive maps could help show consumer or physician patterns on various treatments that are used for certain diseases. Moving forward with this research, future efforts will be made to try to identify the factors associated with the variation in each type of care.

Author: McKinley, Lilian

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Mentor: Janet Robishaw, PhD

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Title: Discovery of New Biomarkers and Drug Targets for Human Neocortical Epilepsy

Abstract: Epilepsy affects ~50 million people world-wide. Despite pharmacological treatment, ~30% of patients experience continued seizures accompanied by impaired cognitive function and increased morbidity. For some, surgical resection of the abnormal brain region offers the only effective treatment. The “epileptic” region is identified by attaching a grid to the surface of the cortex and monitoring electrical activity over several days. The success of the surgery is directly related to the accurate identification of the “epileptic” focus. A key question is how much tissue should be removed to achieve resolution of seizures while minimizing neurological deficit. Addressing this question, we employed RNA Sequence analysis, which identified highly expressed genes in the “epileptically” active region of the brain compared to those in the inactive, silent tissue. The gene expression of these tissues was further compared to geographically-matched tissues from autopsy subjects. Several genes were validated by quantitative polymerase chain reaction (qPCR) analysis. Functional annotation of these differentially expressed genes revealed induction of the PTF1A pathway in both “epileptic” regions. PTF1A has never before been linked to human epilepsy. The up-regulation of this pathway in the active seizure zone suggests one or more of these genes may drive the “epileptogenic” process. Additionally, the finding that the silent zone already shows gene expression changes distinct from matched control tissue indicates that tissue is already abnormal although it has not progressed to showing abnormal electrical activity. Validation of the causality of these findings in mouse models will identify new biomarkers and drug targets for combating this disease.

Author: Meyers, Caleb

Institution: Bloomsburg University

Mentors: Heather Feldhaus, PhD; Neal Slone, PhD

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Title: Data Driven Community Development Project: The Development of a Revitalization Plan for One Struggling Rural Community

Abstract: The goal of this project is to use multiple methodologies to develop a plan for the revitalization of a struggling community in rural Pennsylvania. In 2008, the Columbia County Housing and Redevelopment Authority started the Blueprint Community Project in the LaSalle Street Neighborhood in Berwick, PA. This Blueprint Community was designed to revitalize the community through homeowner rehabilitation assistance, neighborhood crime prevention, beautification, and redevelopment opportunities. Community leaders and law enforcement report a reduction in crime and community members' satisfaction as a result of this work. The success of the Blueprint Community in the LaSalle Street Neighborhood laid the groundwork for its expansion to the Elm Street Community in 2013. In order to assess the needs of this specific community we used a survey of residents that targeted community members' perceptions of the current state of the community. We also hosted an informational meeting for residents and officials to discuss current strengths, weaknesses, and solutions of the community. I also canvassed and catalogued the physical space by taking pictures of and notes of various areas within the Elm Street Community that need attention. To successfully complete the goal of this project, improvements need to be made in the area of environmental design (specifically crime prevention through environmental design), community cohesion through social interactions, and communication with the residents.

Author: Moon, Zachary

Institution: Bucknell University

Mentors: Brandn Green and Carl Milofsky, PhD

Co-Authors: Matt McAnear

Title: The Effect of Social Capital on Health Status in the Central Susquehanna Region

Abstract: Working with the Central Columbia School District and Bloomsburg University, our research is focused around a health assessment of the Central Columbia School District. Using quantitative methods and two health and needs based surveys, the Columbia County Needs Assessment of 2006 and the Action Health Survey of 2009, we have begun to provide information on the health status of the school district in order to better measure the impact of a new turf football field and rubberized track on the surrounding community. In conjunction with this project, we have also been researching social capital and its effects on health and well-being. We defined a working definition of social capital based on the previous work of authors such as Putnam, Portes, Kawachi, and Kennedy and developed a working social capital indicator using the 2009 Action Health Survey. Based on this social capital index, we conducted a latent variable analysis to estimate the effects of social capital on self-rated health status, controlling for factors such as age, education, and income. We expect to find that social capital is positively associated with improved health status. However, these results should be interpreted in the context of our survey, which has a disproportionate number of retirees and elderly respondents.

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Mentor: Elizabeth Durden, PhD

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Title: Mexican Migration and Health

Abstract: Previous research has explored the intersection of immigration and health demonstrating that the longer foreign-born people reside in the U.S. the worse their health outcomes. The purpose of this research is to examine the relationship between the length of residence and English proficiency on health outcomes of Mexican migrants. Data from the Mexican Migration Project (MMP) is used and cross-tabulations and logistic regressions are run to analyze the main relationships.

Author: Nowalski, Lauren

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Mentor: Toshiro Kubota, PhD

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Title: Dot Grouping by Proximity and Continuity: Perceptual and Algorithmic Studies

Abstract: Edge grouping is an important problem in computer vision and image analysis. An edge marks color discontinuity in an image and has location and orientation attributes. Various edge grouping algorithms respect Gestalt principles of proximity and continuity and use the location and orientation attributes to measure the proximity and continuity. A more general and difficult problem is to group spatial points without orientation attribute. The problem is associated with not only the edge grouping but also with 3D reconstruction and motion tracking. A possible approach to the problem is to derive the orientation attribute by preliminary grouping using the proximity measure. However, the approach implicitly assumes that the proximity measure has a higher precedence than the continuity measure in the Gestalt principles. In this study, we verify the assumption through psycho-visual study of grouping points on a non-uniform grid, and propose a computational algorithm that employs the above two-step approach.

Author: Ondek, Katelynn

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Mentor: Erin Keen-Rhinehart, PhD

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Title: Effects of Maternal Nutrient Availability on Offspring Hypothalamic Appetite Regulatory Neuropeptides

Abstract: Hypothalamic neuropeptide release governs ingestive behaviors and maintains energy homeostasis. Neuropeptide Y (NPY) and agouti-related protein (AgRP) are orexigenic peptides that increase ingestive behaviors, whereas the anorexigenic peptide alpha-melanocyte stimulating hormone (α -MSH) suppresses hunger. In rodents, the circuits regulating this homeostasis develop during a critical period late in gestation and shortly post-nascence. Factors affecting development during this period, such as intrauterine growth restriction, can have permanent effects on the neuroendocrinology and feeding behaviors of the offspring. By varying the nutritional quality of the mother's diet during the latter two thirds of pregnancy, we can observe the phenotypic and behavioral results on the offspring and explore the hypothalamic mechanisms behind them. Limited availability of nutrients in utero can cause gestational programming in the fetuses, which produces a significant impact on neuropeptide levels in the hypothalamus. We observed that offspring of mothers with reduced nutrient availability exhibit metabolic syndrome, an imbalance in energy homeostasis. We measured NPY, AgRP, and proopiomelanocortin (POMC, the mRNA precursor to α -MSH) mRNA expression using quantitative real-time PCR (QPCR) in the hypothalamus to determine if there are significant differences between low birth weight rodents and control offspring. Because offspring of mothers with impaired access to nutrition typically exhibit hyperphagia and excess body fat, we expect low birth weight offspring to have increased NPY and AgRP and decreased POMC mRNA expression compared with control offspring. These data will provide clues as to how maternal energy availability has long-term impacts on offspring brain function and behavior.

Author: Otto, Michael

Institution: Bloomsburg University

Mentor: Heather Feldhaus, PhD

Co-Authors: Brandon Harman

Title: Longitudinal Economic Impact Assessment for Regional Event Planning

Abstract: This economic impact assessment of one regional event lays the foundation for a longitudinal study of the economic impact of community events throughout the Susquehanna valley. The goal of our project is to establish and refine a methodology that can be used for longitudinal analysis of regional events. The results are useful for developing targeted marketing and event planning and comparing the economic impact of different events and strategies over time. We assessed the impact of this year's annual Danville Spring Fling using survey questions based on a review of economic impact literature and input from the event organizers. We administered surveys to event participants, event vendors, and downtown businesses with the help of a team of trained student researchers. We also used aerial photography to develop a crowd estimate. We conducted an analysis of the survey data and prepared a report for the event organizers. We also used this analysis to refine our methodology in preparation for future projects. The next phase of our project occurs in September when we will evaluate the Bloomsburg Fair. In preparation for this event we have reviewed previous fair data and begun survey design. This event produces new challenges because it is much larger, spans one week, and hosts several large events. / We have requests from multiple other regional event coordinators for economic impact studies over the next two years and will pass our methodology on to other research team members so that the assessments can provide ongoing feedback to the regional community.

Author: Palframan, Kristen

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Mentor: Kevin Myers, PhD

Co-Authors: Hallie Wald

Title: Diet-Induced Obesity, Recognition Memory, and Reward Comparison Learning in Rats

Abstract: The goal of this experiment is to investigate the effect of diet-induced obesity on a high fat, high sugar diet on several behavioral learning tasks in rats. Whereas previous studies have primarily focused on effects of obesity on hippocampal-mediated tasks, this experiment investigated a reward comparison task and an object recognition task, which each use non-hippocampal regions of the brain. The reward comparison task, negative anticipatory contrast, involves learning to suppress intake of a moderate-value reward (saccharin) in anticipation of an upcoming high-value reward (sucrose). The novel object recognition task involves a rat's ability to remember a recently encountered object and discriminate it from a novel object. Sixty Sprague-Dawley rats were used in this study, of which forty rats making up the High Fat High Sugar diet (HFHS) group received ad libitum lard, maltodextrin solution, and rat chow, while twenty control rats received only chow. After six weeks on the HFHS diet, we found no evidence of impaired object recognition memory. However, preliminary data on negative anticipatory contrast show an increased contrast effect in the HFHS group, suggesting that a HFHS diet may increase the reward value of sucrose.

Author: Pisano, Richard

Institution: Bucknell University

Mentors: Thomas Bowen, MD; Donna Ebenstein, PhD; Eric Kennedy; PhD

Co-Authors: Sarah Denning, Aylin Dincer

Title: Correlation of Pullout Force of Kirschner (K-) Wire to Other Factors Indicative of Bone Quality

Abstract: Human hip fixation surgery is conducted by utilizing a Kirschner (K-) wire as a guide for a permanent screw. Anecdotal surgical evidence suggests that K-wire extraction force may be correlated to bone health at the site of repair, however the correlation of this force to local bone quality has not been explored. The most common measure of bone quality is Bone Mineral Density, BMD, but BMD serves as a holistic reporting of the entire skeleton and not local bone quality. Therefore a person's BMD may not represent the bone quality at the location of fracture. This study seeks to form a correlation between the force of removing the K-wire to the local bone quality of the hip. In order to determine proper methods and repeatability before testing on human samples, tests were completed on porcine and bovine bones. Screw pullout tests were performed on trabecular bone from the femoral head and the medial knee condyle. Testing included preparing the bone for K-wire insertion in five locations to measure the force for screw pullout. For both porcine and bovine specimens, the peak screw pullout values were recorded for all five locations along with the average and standard deviation. Data suggests an observable difference between screw pullout force of the knee condyle and femoral head in animal samples, although with high variability within a specimen. Further testing with representative human samples will confirm the diagnostic abilities of this measurement.

Author: Pontolillo, Taryn

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Mentor: Amy Wolaver, PhD

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Title: Factors Contributing to Rising Cesarean Delivery Rates

Abstract: The differentiation of cesarean section rates within the United States represent not only an important social problem, but an issue in the overuse of medical procedures that has long term effects on the state of the economy. Working under the Pennsylvania Health Care Cost Containment Council (PHC4), and funded by the Bucknell Institute for Public Policy, the objective is to examine birthing trends within the state of Pennsylvania in order to identify specific factors contributing to higher C-section delivery rates. Discharge data from hospitals within Pennsylvania from 2009 was analyzed in order to determine rates of primary and repeat cesarean delivery. Possible factors for cesarean delivery were included in order to determine group comparisons as well as their impact

on the likelihood of a cesarean birth. The cesarean delivery rate for Pennsylvania is 32.4%, which is just under the national rate of 32.8%. Of the factors, increasing maternal age, and type of insurance seem to be most significant contributing to the cesarean delivery rate with Blue Cross and Commercial having the highest rates. Maternal race does not play a large role. While primary cesarean births accounted for the majority of the overall rate, indicators of cesarean delivery are more important to determine real comparisons in obstetrics. Further analysis will be performed to differentiate between C-sections with some clinical indicators for need versus those with no clinical marker for necessary C-section.

Author: Pritzlaff, Amanda

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Mentors: Christopher Hallen, PhD; Cynthia Venn, PhD

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Title: Annual Snapshot #5: Susquehanna River Water Chemistry at Danville, Watsontown, and Shady Nook, Pennsylvania

Abstract: On May 29th and June 29th, 2013, water samples were collected across transects of the Susquehanna River at Danville (North Branch), Watsontown (West Branch), and Shady Nook (below their confluence). In situ measurements included conductivity, dissolved oxygen, pH, and temperature. Turbidity of each sample was measured immediately upon return to shore. Each sample was then divided into the following sets of subsamples: 1) triplicate non-filtered, acidified to a pH <2; 2) triplicate filtered, acidified to a pH <2; 3) triplicate filtered, non-acidified; and 4) triplicate filtered, analyzed immediately for alkalinity and acidity. Acidified samples were analyzed for metals using ICP-OES. Non-acidified filtered samples were analyzed for simple anions and cations using ion chromatography. Cadmium, Nickel, Copper, or Lead were below detectable limits. Barium, Arsenic, and Iron were found in trace amounts (under 0.1 ppm) at all sites. Arsenic was slightly higher at Danville and remained so past the confluence with North Branch water. Total Iron concentration at Danville was almost twice as high as it was at most other sites. Higher amounts of both dissolved Zinc and dissolved Iron on the site nearest the Western shore of the Watsontown transect indicate a possible point source of these metals upstream. Trends of acidity, alkalinity, and pH were comparable to those of previous years.

Author: Qi, Li

Institution: Geisinger Health System

Mentors: Xiaowei (Sherry) Yan, PhD; Xiaoqin (Amy) Tang, PhD

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Title: The Impact of Bundle Implementation on the Medical Cost of Diabetes: A Four-year Longitudinal Study

Abstract: Background: Type 2 diabetes is one of the nation's most prevalent chronic diseases. In 2006 a diabetes system of care using a nine component all-or-none bundle (diabetes bundle) of measures was introduced to Geisinger primary care physicians (PCP). We evaluated how the diabetes bundle impacted the medical cost of diabetes. Data: A cohort of diabetes patients between 2005 and 2008 was extracted from Geisinger Health Plan (GHP) claims. After applying inclusion and exclusion criteria, 2189 patients in Bundle group and 3554 patients in non-Bundle control group were used for analysis. Methods: Generalized linear models were applied to determine the associate between cost and Bundle/control groups, adjusting for comorbidities and patients' characteristics. The estimations of cost attributed to Bundle year by year were performed using difference-in-difference method. Separate analysis of outpatient cost and inpatient cost were also performed. Marginal effect for each comorbidities and characteristics was estimated by recycled prediction. Results: After adjusting for age, sex, and comorbidities, the average costs attributed to Bundle were -\$1569, \$20 and \$589 dollars for Medicare beneficiaries from 2006 to 2008 (positive means cost reduction, i.e. saving money). Bundle reduces cost for patients with comorbidities, especially for diabetes-related complications, for example, patients with chronic kidney disease (CKD) saved \$427 more than those without CKD in 2008. Reduction of inpatient cost accounted for most of saving, the average inpatient costs attributed to Bundle were \$131, \$338 and \$716 from 2006 to 2008. Conclusion: Patients under diabetes bundle management were beneficial in term of cost, especially for the long term cost, the benefit could be observed as early as 2 years after bundle implementation, and the reduction of inpatient cost account for most of reduced cost.

Author: Rollando, Alyssa

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Mentors: James Baish, PhD; Daniel Cavanagh, PhD; Mohsen Shabahang, MD, PhD

Co-Authors: Patience Osei

Title: A Flexibly Configured Surgical Simulator

Abstract: A need exists for cost-effective, low-fidelity, open-abdominal, surgical simulators as opposed to common laparoscopic trainers. In 2012, a simulator was designed for Geisinger surgical resident education. It contained three exercises: bowel anastomosis, bile duct exploration, and knot-tying. After one year of use, three main areas of improvement were identified to enhance those exercises: instrumentation, flexibility, and refinement. The knot-tying exercise has been instrumented using a force transducer and a custom graphical user interface (GUI) that gives the instructor control over the resident's evaluation. The GUI records and displays the elapsed time and the forces applied to the transducer during the exercise. The resident receives feedback by lights and sounds when they exceed a threshold. This GUI will allow the surgery team to track their resident's progress through their education and increase difficulty by changing the thresholds, position of the transducer and time allowed for completion. The next goal was to provide enhanced flexibility in using the simulator. The opaque plastic walls have been replaced with interchangeable walls made of either steel, to which magnetic fixtures may be attached to give the instructor unlimited positioning of the internal components or clear acrylic walls through which instructors can view resident performance. The refinement portion of this project included adding trans-anal access, reconfiguring the bowel attachment, and redesigning the foam lids to better mimic adipose tissue. In summary, the various enhancements to the surgery simulator promise to offer new possibilities for training of surgical residents at modest cost.

Author: Schneider, Erin

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Mentor: Donna Laroya

Co-Authors: Connor Gmehlin, Megan Stauffer, and Ida Sudol

Title: Geisinger Collaborative Education Program

Abstract: Geisinger Medical Center's Collaborative Education Program (GCEP) connects Danville High School Transition students with job training and employment opportunities with the goal of fortifying their job skills prior to entering the work force. The DHS Transition students have developmental disabilities and require extra one-on-one training before starting an independent job. Each student's needs are assessed and optimal placement is found for them in a work environment that will best help them to not only strengthen the skills they have already learned in school, but also to introduce them to more skill sets necessary for the work place. The students are each paired with college students who work as job coaches that help them in their new work environments by prompting the students, rewarding good work ethic, and correcting behaviors that are not acceptable in the workplace. The ultimate goal of the job coaches is to gradually allow more independence for the students with task performance, if it is appropriate for the student at the time. A regular debriefing is done by the job coaches, mentors of the GCEP, and coordinators of the DHS Transition Program to evaluate the students' current performance and placement, and what can be done to reach goals more efficiently. The final aim of the Geisinger Collaborative Education Program is to provide a supportive environment for Transition students to grow as workers that will ultimately contribute to society while having rewarding work experience.

Author: Sharp, Christine

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Mentors: Nicole Woll, PhD, MEd; Mohsen Shabahang, MD, PhD; Andrea Plank

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Title: The Correlation of Different Application Variables and the Global Rating Score of Applicants to a General Surgery Residency

Abstract: Background: Selecting medical students to interview for a residency position is an elaborate process, and requires an extensive amount of time and administrative efforts in order to ultimately recruit superior candidates. The objective of this study is to correlate different application variables to the applicant global score at a moderately sized surgical residency program. Design: This is a retrospective cohort study of 189 General Surgery residency applicants over three interview seasons from 2010 to 2013. All data was collected from the Electronic Residency Application Service (ERAS). Subjective factors including letters of recommendation, personal statements, and volunteer work were blindly rated by multiple evaluators using a literature- based method of evaluation. Univariate and multivariate analysis was conducted to determine variables that significantly affected applicant global score. Results: We found that applicants were most frequently male (55.0%), of white descent (52.0%), had a median age of 27, received degrees from LCME-accredited medical schools (61.9%), and had a median USMLE Step 1 score of 218. The majority of our applicants have published research (63.5%), have performed volunteer work (74.0%), and have not received prior residency training (78.3%). Analysis to identify correlations between variables and global score is currently ongoing. Conclusions: The results of this study may provide insight as to which application variables correlate strongly with the global score. This will ideally provide a basis for future investigation of resident selection in order to make the process more efficient and empirically structured.

Author: Snider, Laura

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Mentor: Heidi Lorimor, PhD

Co-Authors: N/A

Title: Notional and Grammatical Conflicts in Verb Tense

Abstract: Psycholinguistic research supports the idea that subject-verb agreement is affected by the overall message the speaker is communicating (Humphreys & Bock 2005). This means that notional (conceptual) information can conflict with grammatical information, leading to errors such as “the bowl of chocolates are on the table.” Like agreement, verb tense is also influenced by both the grammatical requirements of the sentence and the speaker’s idea of whether something is in the past or in the present. We investigated whether it would be possible to elicit verb tense errors by inducing a conflict between notional information and grammatical requirements. To do this, we played participants statements that were notionally in the past tense (e.g., “Isabelle spoke to all her fans”), then showed them a sentence starter (e.g., “He heard her...”) that requires a non-finite verb (“speak”). Participants then repeated the sentence starter and finished the sentence, using the statement they had heard. An error such as “*He heard her spoke to all her fans,” would demonstrate a conflict between notional and grammatical information, with the error resulting from an incorrect resolution of this conflict. Preliminary analysis shows that participants are making errors when there is a conflict between grammatical requirements and notional information. This suggests that verb tense, like subject-verb agreement, is computed using information from both grammatical requirements and the notional properties of the speaker’s message.

Author: Steinhubl, Gavin

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Mentors: Seth Hostetler, Kevin Capatch, Deb Templeton

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Title: Helping Give Nurses Their Time Back

Abstract: At Geisinger Medical Center, studies show that almost 20% of a nurse's time is spent doing logistics activities, such as gathering or ordering supplies, equipment, and medications. These tasks represent both an underutilization of the RN skill set and an interruption to patient care. The Supply Chain Services department believes that by decreasing the time nursing spends on logistics activities, patient care will improve. The Healthcare Enabled Logistics Program (HELP) goal is to remove nursing from logistics tasks, while creating effective and efficient support services, which work cooperatively. As part of Project HELP, we are developing a new position on the nursing unit, known as the Care Support Assistant (CSA) who will handle those logistics activities. The CSA will be cross-trained on many, if not all, of the logistics activities performed on the nursing unit. The CSA also aims to provide a single point of contact for nursing's logistics needs. We have worked to develop a Bill of Activities, which documents the tasks that the CSA will perform, the expected time to perform, frequency, and task priority. We are also creating Bill of Resources for nursing procedures. These will help the CSA know what resources are needed and prepare these for nursing ahead of time. Additionally, Project HELP is improving delivery methods, redesigning the supply rooms, and designing new point of use storage systems closer to the patient room. These steps will ensure that Project HELP improves the quality of patient care that Geisinger is already known for.

Author: Swatski, Matthew

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Mentor: Wannian Yang, PhD

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Title: Inhibition of COX-2 Down-Regulates Kinetochore/Centromere Proteins in Prostate Cancer Cells

Abstract: Cyclooxygenase-2 (COX-2) overexpression in prostate cancer cells facilitates tumor growth. However, the mechanisms by which COX-2 promote prostate cancer growth remain elusive. COX-2 is an intracellular enzyme which converts arachidonic acid into prostaglandin E2 (PGE2). PGE2 binds to one of four heterotrimeric G-protein-coupled receptors (GPCR; EP1-4) that are thought to activate a signaling pathway resulting in cell division. Here we have demonstrated using MTT Assay that the inhibition of COX-2 by Celebrex and CAY10404, two COX-2 inhibitors, led to the reduction of proliferation in both LNCaP and 22Rv1 human prostate cancer cell lines. We also observed that the inhibition of COX-2 arrested cell cycle progression. To determine the molecular mechanism underlying the cell cycle arrest, we examined the effects of COX-2 inhibitors on the expression of kinetochore/centromere proteins in prostate cancer cells. Immunoblotting, qPCR and immunofluorescent staining found that inhibition of COX-2 in LNCaP cells significantly down-regulates the mRNA and protein levels of kinetochore/centromere proteins, such as ZWINT, Ndc80, Cdc20 and Mitosin. To delineate the signaling pathway that mediates the effect of COX-2, we treated the cells with PGE2 receptor (EP1-4) antagonists, and found that the EP1 antagonist, SC51322, produced similar effects to that of COX-2 inhibitors, while the EP2-EP4 antagonists had no effects on the prostate cancer cell proliferation. This suggests that COX-2 facilitates prostate cancer cell proliferation through activation of EP1. This study provides further insight into the role of COX-2 in regulation of prostate cancer cell growth.

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Mentor: Eric C. Martin, PhD

Co-Authors: N/A

Title: The 4Cs of Disaster Partnering: International Assistance in Haiti

Abstract: In complex humanitarian emergencies and disasters, organizations work together to provide aid to affected communities. Solutions call for partnerships between organizations. Critics of assistance efforts often blame limited success on poor interorganizational dynamics within the international community and between those providers and the host country nationals they assist. Partnerships require communication, cooperation, coordination, and collaboration (4 Cs). This manuscript surveys disaster responders in Haiti and examines emails to a Shelter Cluster listserv to understand more about the specific content of exchanges between partners. What exactly do they do with each other? We then code those activities using the "4Cs."

Author: Waddell, John

Institution: Geisinger Health System

Mentors: Kristopher Heimbach, Kevin Capatch, Deb Templeton

Co-Authors: N/A

Title: Purchasing Automation at the Geisinger Health System

Abstract: Effective healthcare organizations rely on integrated clinical and non-clinical teams. When communication among these teams exists in the form of different means, opportunity exists for improvement. On average, the purchasing department automatically places 623 purchase orders daily for Geisinger Health System, but still places on average 178 manual orders as well. Process mapping was used to track and understand the current paper-based flow from the origination by the requestor to its multiple pathways to a buyer. A SIPOC diagram highlighted areas to increase value and non-value processing time as it moved through the process. A future-state process map indicated that 50% of the non-value processing time could be eliminated if the paper form was originated electronically. The Lawson system had an online requesting feature that shows early promise as a replacement for the paper form. Once fully implemented, the purchasing department can reallocate up to 22% time from a buyer's day and eliminate up to 50% of the time a requisition spends in queue waiting to be placed. With recent hospital acquisitions and no additions to the GSS-SCS purchasing staff; this will allow the department to do more with less. It is our expectation that this waste reduction will effectively buffer the increased volume expected with these acquisitions and changes in responsibility. On top of the improved workflow from this study, we can expect to see improvements in environmental sustainability. We expect a decrease in printing and faxing due to automating the paper requisition process.

Author: Wagner, Audrey

Institution: Bucknell University

Mentor: Paula Kazi, PhD

Co-Authors: N/A

Title: Home and Asset Ownership and Federal Benefit Usage among Mexican Immigrants: Evidence from the Mexican Migration Project

Abstract: Mexican immigrants comprise of the largest immigrant group in the United States and also account for the majority of undocumented immigrants in the U.S. For this project, we draw on data from the Mexican Migration Project, which allows us to utilize detailed migration histories for household heads as well as their immediate and extended family members. The data is uniquely rich in identifying undocumented immigrants. The primary focus of this project is to explore the demographic and socio-economic factors influencing the ownership of housing and non-housing assets among Mexican immigrants to the United States. Immigrants cannot own a house in the United States until they become permanent residents. And often times, immigrants also accumulate housing and non-housing assets in their country of origin. We look into property accumulation by immigrants both in their native country and in the United States. In addition to the various socio-economic factors, we explore how family composition as well as the timing of arrival and length of stay in the United States potentially influences those outcomes. It is often debated that immigrants, and particularly the undocumented ones, rely heavily on government subsidized federal benefits. In an attempt to explore the extent of this phenomenon, the study also examines the determinants of federal benefits usage, such as, welfare benefits like AFDC or WIC, food stamps, and unemployment insurance, among Mexican immigrants. In addition, we examine the source of financing for health care expenses associated with doctor and hospital visits.

Author: Watters, Noelle

Institution: Bucknell University

Mentor: Amy Wolaver, PhD

Co-Authors: N/A

Title: Comparing Supply Sensitive Health Care Utilization in Pennsylvania Counties

Abstract: Supply sensitive health care is a form of health care utilization that includes the frequency with which everyday medical care is used in treating patients with acute and chronic illnesses. This study explored variations in utilization of this type of care by Pennsylvania county. One example of supply sensitive care is age-gender adjusted admission rates for ambulatory care sensitive (ACS) conditions, conditions for which hospitalization is preventable given good outpatient care. Multivariate regression analysis using STATA was used to test whether medical supply, including hospital beds and primary care providers, was correlated to admission rates. We used hospital discharge data from the Pennsylvania Health Care Cost Containment Council (PHC4) to calculate county hospital admission rates. For measures of general medical supply, we used the Area Resource File from the Health Resources and Services Administration. For other county socioeconomic factors, we used data from the Robert Wood Johnson Foundation County Health Rankings Program. Preliminary results indicate slight or no statistically significant correlations between supply and ACS admission rates in Pennsylvania counties.

Author: West, Kimberly

Institution: Bloomsburg University

Mentor: Stephanie Schlitz, PhD

Co-Authors: N/A

Title: Pennsylvania Dialects Project

Abstract: The Pennsylvania Dialects Project set out this summer as a pilot project, one that would begin to identify and document language patterns that are being used currently, as the most recent documentation is dated by more than thirty years, and no longer reflects the current population of the state. Another purpose is to aid English/Language Arts teachers in switching from a correctionist to a contrastive approach by creating contrastive analysis charts similar to those developed by Dr. Rebecca Wheeler. Research proves that current practices simply do not work. In sum, majority of this summer pilot has been unintentionally focused around a certain age group, the 20-25 year olds; young adults who have graduated high school (though this was not the target). The information that they have provided is crucial, and will be applied to a new generation of learners going through regional education, learning inappropriate versus appropriate language usage and how to code-switch between formal English and their informal dialects of American English. This summer's research has confirmed what we were already certain of: speakers of regional dialects have been degraded and embarrassed for their use of the language that comes naturally to them, rather than celebrated for maintaining the multicultural foundation that this country was built on. In future exploration of PDP, researchers will place emphasis on the restoration of pride in one's identity by reviving and encouraging the use of dialect. Failure to praise usage will result in the loss of language that has bonded communities and cultures.

Author: Wilson, Aaron

Institution: Geisinger Health System

Mentors: Julie Petrin, Terri Faust

Co-Authors: N/A

Title: Working with the Community to Identify Needs for Students with Disabilities Working in the Community

Abstract: The purpose of this project is to help the Danville Area School District enhance and offer job opportunities for children with disabilities within the community. Many of these children are a part of the Danville Transitions program, which is located primarily at the Hackey House, in Danville, PA. The Hackey House is a place where young adults learn basic life skills and how to transition from childhood to adulthood. The Transition program aims to promote future employment after education by teaching interpersonal skills, interview skills, and the overall application process that is involved with many jobs. One of the ways that the students can learn these concepts the best is by actually going out into the community and working in/for local businesses. However, not many businesses offer these students opportunities to do so, for various reasons. A majority of the Danville community has a false depiction of the Hackey House students. Unfortunately this misunderstanding results in the lack of available job opportunities for the students. I hoped to improve the amount of job opportunities for the Hackey House students in the Danville community. In order to accomplish this goal, I interviewed local Danville businesses that have given job opportunities to Hackey House students and find out their rationale for doing so. I would then use this data to try to persuade businesses that have not given job opportunities to do so.

Author: Witcoski, Bradley

Institution: Geisinger Health System

Mentors: Aaron Homiak, Kevin Capatch, Deb Templeton

Co-Authors: N/A

Title: Mailroom Process Improvement

Abstract: In the Supply Chain Department, part of our corporate responsibility is to reduce unnecessary steps and other waste in each process related to the movement and replenishment of resources throughout the health system. This project focused on working closely with my project leader to improve the process and layout of the Mailroom at Geisinger Medical Center. The goal was to redesign the layout and process flow within the Mailroom to improve the effectiveness, efficiency, and ergonomics of the department. To ensure the best restructuring of the processes, we used various process improvement techniques and methods to accomplish this task. The previous layout of the Mailroom was unorganized and non-standardized. This created various workarounds and extended travel times for Mailroom and Courier staff. It also limited productivity and throughput causing increased wait times for mail delivery. The lack of working space and crowding within the sorting areas also needed to be addressed. After three weeks of hands-on improvement efforts, the new Mailroom boasts a much improved layout allowing the staff to be more productive. By using simple visual controls, we now have an organized and standardized system for each stage of the mail sorting process. The remodeled design also has eliminated over-crowding and significantly increased the amount of working space available. Moving forward, we are developing a plan to integrate separate deliveries done by the Mailroom and Storeroom. This integration will consolidate deliveries thereby, reducing the total number of trips required as these deliveries go to many common areas.

Author: Xie, Wenhui

Institution: Bucknell University

Mentors: Brandn Green, Carl Milofsky, PhD

Co-Authors: Hayden Yancey

Title: Health Assessment of Central Columbia School District

Abstract: Commissioned by the Central Columbia School District, my partner Hayden Yancy and I conducted a qualitative health assessment to understand perceptions of health in the community before the renovation of the school athletic was completed. We did this in collaboration with fellow Bucknell students and with the direction of Professors Brandn Green and Carl Milofsky. Over the course of a few months we interviewed community and business leaders who have participated in the project. Each interview was recorded and field notes were completed to identify the themes of the research. Our interviews were open-ended and included structured questions on the health concerns of the area, the impact of the project on health problems and the impact of the project on community cohesion. We noticed the reappearing themes of aging, obesity, especially childhood obesity, inactivity, diet, smoking has been decreasing while heart disease and cancer are still prevalent. One question we sought to answer is how individuals in district perceive exercise opportunities. Before we started the research, we had certain expectations about interviewee's reactions and knowledge about health in the region. However, there is a mix of opinion on both the status of health in the region and the relative impact the football field redevelopment project can have on improving the health of district members. We will complete our interviews in mid-August with a total of 30 interviewees. In our poster, we present a preliminary analysis of the themes which have emerged in our project.

Author: Yang, Meng

Institution: Bucknell University

Mentor: Amy Wolaver, PhD

Co-Authors: N/A

Title: Non-Environmental Health Impacts of Marcellus Shale Development

Abstract: The recent exploration of natural gas in Marcellus Shale has brought benefits to the community as well as potential negative impacts. The main focus of the research is the drilling impact on motor vehicle accidents. The statistical comparison between drilling-areas and non-drilling areas with respect to traffic crash will be an effective approach in explaining the potential negative impacts of Marcellus Shale. The data resources are PHC4 inpatient hospital discharges (2009), Pennsylvania Crash Facts and Statistics from Department of Transportation (1993-2012), unconventional drilled wells (1999-2012), Socioeconomics factors from PA Abstract (1993-2012). In the statistical regression model, we treat the change of traffic crashes by county as the response variable, the change of wells by county and years as explanatory variables, and other socioeconomic factors as control variables. There's strong evidence that the drilling increased the traffic accident, especially the fatal traffic crash. Another purpose of the research is to test if the trend shown in the models will match up with the medical records for further research. The trend of fatal crash in the PA traffic report highly matched up with the trend of hospital discharge with a correlation of 0.89.

Author: Zahoroiko, Cody

Institution: Susquehanna University

Mentor: Toshiro Kubota, PhD

Co-Authors: Herman de Haan

Title: Introductory Robotics using Arduino

Abstract: The goal of our study is to design a wireless control robot with Arduino microcontrollers. The low cost and versatility of Arduino microcontrollers make them an ideal tool for introducing basic robotics and programming to a wide range of audiences, especially to K-12 students. The boards synergize well with a variety of different outputs and inputs, including ultrasonic sensors, motors, and Xbee wireless communication modules. Programming Arduino boards is also relatively easy and requires a computer with the Arduino compiler to write code enabling the board to respond to stimuli, and an X-CTU program to configure Xbee modules so that they can send and receive messages. This study resulted in a robotic vehicle comprised of one Arduino Uno microcontroller, one Xbee wireless module, a Makershed 4WD Arduino Compatible Mobile Platform, and three sonar sensors. It is capable of responding to serial input received over the wireless link (sent from a second Arduino Uno transmitting analog data from a joystick) and avoiding obstacles via its sonar sensors.

Author: Zickgraf, Connor

Institution: Geisinger Health System

Mentor: Courtney Gorgone

Co-Authors: N/A

Title: Optimizing Communication in an OR Setting

Abstract: Ineffective communication in surgical services is often the root cause of delays in patient care, interrupting flow and increasing tension in the OR and surrounding units. Because a single OR minute has an estimated worth upwards of \$200, optimizing OR time is crucial to both hospital operations and patient satisfaction. This study set out to identify trends in communication mishaps in Geisinger's pre-operative (PACU and Same-Day Surgery), CSR, and OR units with an ultimate aim of increasing efficacy. Through a series of interviews with Operations Managers, POD Coordinators, and CSR managers, common communication inefficiencies were located. One of the most pressing concerns was the process of calling for patients—from both in-house floors and Same-Day Surgery Check-In—into pre-op service units. In order to develop an optimal flow, first the process was understood through extensive observation in the PACU and Same-Day Surgery units, which transport patients to pre-op. The pre-existing flow was mapped out, tracking phone calls made by the OR room, OR control desk, Same-Day Surgery, and PACU for each type of Geisinger patient (Inpatient, ZPO, etc.). From this data, an optimal flow could be discerned and mapped out, eliminating unnecessary calls that can spur disruption and delay. The same process was repeated for Blood Requests received from the OR. Proposals of optimal flows in surgical service units hope to make communication more efficient, therefore increasing productivity and reducing tension.

SYMPOSIUM ORGANIZERS

Heather Feldhaus, PhD, is the Director of the Bloomsburg University Center for Community Research and Consulting, the Co-Director of the Susquehanna Valley Field School, and Interim Assistant Dean for the College of Liberal Arts.

Dr. Feldhaus earned her PhD in Sociology at Southern Illinois University, Carbondale, in 2002. She has taught at Bloomsburg University for 11 years and just completed her 5th year as Department Chairperson for the Department of Sociology, Social Work and Criminal Justice. Her teaching and research focus on the ways that communities define and approach social problems. Her most recent work focuses on the community impact of Marcellus Shale development as well as the challenges of effectively measuring, tracking and combating rural homelessness.

Amy Wolaver, PhD, is the Co-Director for the Bucknell Institute for Public Policy, Bucknell, University. She has been in that role since 2011. Dr. Wolaver is an expert in health insurance policy and the economics of health behaviors.

Dr. Wolaver received her Ph.D. in Economics from the University of Wisconsin-Madison in 1998 and joined the Economics department faculty at Bucknell University in the fall of the same year. She is a Robert Wood Johnson grantee for work on the effect of peer substance use on individual student use and is currently collaborating with Dr. Jove Graham (Geisinger Health System) on a Bucknell-Geisinger Research Initiative grant to examine the non-environmental health impacts of Marcellus Shale Development. She has published papers in numerous scholarly journals and is a Councilor in the Social Science Division of the Council for Undergraduate Research. She has taught extensively in the Economics department core and electives in healthcare policy and Health Economics.

Janet Robishaw, PhD, is the Associate Director at the Weis Center for Research and a Senior Scientist at the Weis Center for Research, Geisinger Health System.

Dr. Robishaw received her PhD degree in Cellular and Molecular Physiology from the Pennsylvania State College of Medicine. Subsequently, working under the direction of Dr. Alfred Goodman Gilman, she was responsible for the cloning and functional characterization of the stimulatory G-protein whose dysfunction contributes to several disease states. Her work was acknowledged in the 1994 Nobel Prize in Physiology and Medicine jointly awarded to Drs. Gilman and Rodbell. Following her recruitment as a founding scientist of the Weis Center for Research, she has continued to study how genetic variations in various G-proteins contribute or can be manipulated to alter the course of several human disorders, including obesity, epilepsy, and cardiovascular disease. She is the author of >80 peer-reviewed publications along with several reviews and book chapters.

She is an Established Investigator of the American Heart Association; CEO of Signalplex; and inventor on three patents. In addition, she has served several terms as a reviewer for the American Cancer Society, American Heart Association, and the National Institutes of Health. In addition to her research accomplishments, Dr. Robishaw has a passion for educating future generations of scientists, including serving as Director of Undergraduate Research Intern Program for the past 25 years and establishing a K-12 summer camp experience.

JUDGES FOR THE PRIZES

Heather Feldhaus, PhD, is the Director of the Bloomsburg University Center for Community Research and Consulting, the Co-Director of the Susquehanna Valley Field School, and Interim Assistant Dean for the College of Liberal Arts.

Amy Wolaver, PhD, is the Co-Director for the Bucknell Institute for Public Policy, Bucknell University. She has been in that role since 2011. Dr. Wolaver is an expert in health insurance policy and the economics of health behaviors.

Janet Robishaw, PhD, is the Associate Director at the Weis Center for Research and a Senior Scientist at the Weis Center for Research, Geisinger Health System. Her research focus is Cellular Regulation, Signal Transduction, G protein-Coupled Receptor Signaling, Neurosciences, and Epilepsy.

Tooraj Morshai, PhD, is a Staff Scientist at the Weis Center for Research, Geisinger Health System. His research focus is Signal Transduction, Cellular Regulation, Neurosciences, and Cardiovascular Sciences.

John M. Hranitz, PhD, is a Professor of Biological & Allied Health Sciences at Bloomsburg University. His research interests are integrative and comparative studies of animals using molecular ecology and physiological ecology approaches.

Dan Cavanagh, PhD, is an Associate professor in Bucknell's Biomedical and Chemical Engineering Program. He is also the Director of the Biomedical Engineering program at Bucknell University. His research interests include the following: Biomedical fluid dynamics; Therapeutic uses of surfactants; Intravascular gas embolism and Hemodialysis.

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