The Department of Epidemiology Internship provides an opportunity for MPH students to apply the knowledge they have acquired in the classroom to professional work situations. Internships usually take place in state, county, federal, or international-level health departments, public health institutes/programs, hospitals, or within the University of Pittsburgh or international research groups.

Students are encouraged to choose an experience that will help them sharpen a skill set as well as explore a new area of research. Internship placement, goals, and responsibilities are developed in collaboration with the students’ faculty advisor and preceptor to individualize and maximize the learning experience.

Special thanks to the Internship Preceptors and Faculty Advisors for fostering these enriching educational opportunities. An exciting result of some of these unique partnerships has been the establishment of new research collaborations.

Enjoy viewing and discussing our students’ impressive work! Thank you for joining us!
Cost-effectiveness Analysis of Diagnostic Modalities for Endometrial Cancer in Postmenopausal Bleeding: Pipelle Sampling Curette Versus Dilatation & Curettage

**Background:** Endometrial cancer (EC) is the most common gynecologic cancer in US women. EC diagnosis usually requires a histological evaluation of an endometrial sample. The in-office usage of Pipelle endometrial biopsy has similar diagnostic accuracy for EC diagnosis and is cheaper than the traditional method-Dilatation & Curettage (D&C). However, the main drawback to Pipelle biopsy is its relatively higher sampling failure rate. The objective of this study was to explore the cost-effectiveness of Pipelle biopsy in comparison to D&C for diagnostics of EC in postmenopausal bleeding (PMB), adjusting for both, sampling procedure failure and diagnostic accuracy.

**Methods:** The decision analytic model was built to compare the cost effectiveness of Pipelle biopsy and D&C strategy in a hypothetical cohort of PMB women. The analysis was performed from the perspective of a public health care payer (Medicare, US). We used 2017 Medicare reimbursement data to estimate costs for procedures in the model. The effectiveness of these two diagnostic strategies (Pipelle and D&C) was measured by analyzing the remaining life expectancy. We compared the performance of the two procedures using the incremental cost and incremental effectiveness, and conducted one-way sensitivity analyses and Monte Carlo probabilistic sensitivity analysis to assess the effect of uncertainty on the result.

**Results:** The base case analysis suggested that the Pipelle biopsy strategy was not only equally effective (32.11 vs. 32.11 years of life) but also less costly ($1897.16 vs. $2998.62) in comparison to D&C strategy. In one-way sensitivity analyses and Monte Carlo probabilistic sensitivity analysis, the Pipelle biopsy remained the more cost-effective strategy considering the variables uncertainty.

**Conclusion:** The Pipelle biopsy is the more cost-effective sampling strategy for EC diagnosis in PMB women when compared to D&C. From a cost-effective perspective, the relatively higher sampling failure rate of Pipelle should not be regarded as a limitation in its clinical application.

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A Role of Leptin in Atherosclerotic Cardiovascular Outcomes in the Bypass Angioplasty Revascularization Investigation 2 Diabetes (BARI 2D) Trial Patients

**Background:** Previous studies have reported that leptin contributes to the pathogenesis of atherothrombosis and cardiovascular (CV) diseases. However, the role that leptin plays in the development of atherosclerosis and the risk of CV events is still unknown.

**Objective:** To identify the association between altered baseline leptin profile and baseline atherosclerosis measurements – the SYNTAX score and Myocardial Jeopardy Index (MJI) - in BARI 2D patients with type 2 diabetes mellitus (DM2) and to determine if the effect of baseline leptin on follow-up CV outcomes varies by SYNTAX and MJI scores.

**Methods:** BARI 2D was a clinical trial with 2X2 factorial design that simultaneously randomized 2368 participants into prompt or delayed revascularization and insulin sensitizing or insulin providing treatment. The associations between baseline leptin, and SYNTAX, MJI and other baseline characteristics were evaluated using chi-square tests, Wilcoxon tests, and linear regression models. To determine the effect of baseline leptin on subsequent CV events, we used Kaplan Meier estimates, log rank tests and Cox proportional hazard models.

**Results:** BMI was significantly higher among those with lower leptin levels. In adjusted linear regression models, there were significant associations between baseline leptin quartiles and both atherosclerosis measurements-SYNTAX and MJI scores; however, these associations were highly confounded by BMI. Unadjusted analyses indicated that the risk of CV events was greatest for patients with low leptin levels. In adjusted Cox models stratified by obesity status (BMI≥30), leptin levels were inversely related to the risk of myocardial infarction in obese participants, and had a non-linear relationship with cardiac death, myocardial infarction, and their composite outcome in non-obese patients. The effect of leptin on CV events did not significantly differ by SYNTAX and MJI scores.

**Conclusion:** The current study presents evidence that obese people with low level of plasma leptin could be at an increased risk of developing adverse CV outcomes. A differential relationship between leptin and CV events depending on BMI needs further exploration.
Comparison of Fungal DNA Extraction Methodologies for Mycobiome Analysis

**Background:** The human is a host for a complex and diverse microbial ecosystem, the microbiome, that has a significant impact on health and disease. Although research has primarily focused on the bacterial community, recognition of the potential role of the fungal community, the mycobiome, is increasing. Extraction of fungal DNA presents a challenge and there is not consensus on effective methods. Research shows that use of different extraction methods accounts for significant variability in the microbial species identified by sequence analysis. The objective of this project was to identify an extraction protocol that will allow for the most accurate survey of the mycobiome.

**Methods:** 3 commercially available DNA extraction kits (PowerSoil DNA Isolation (PSDNA), MasterPure Yeast Purification (MPY), the AllPrep Fungal DNA/RNA/Protein (APF)) were used to extract DNA from pure culture of Saccharomyces cerevisiae (ATCC 9763) and Candida albicans (ATCC 18804). PSDNA and APF extractions were performed using stool samples from the Genomic Research in Alpha-1 Antitrypsin Deficiency and Sarcoidosis (GRADS) study. DNA was quantified using fluorometry. PCR was performed using primers targeting the ITS2 regions. Genomic DNA and PCR products were examined using gel electrophoresis.

**Results:** Concentrations of DNA quantified from pure culture extractions were significantly different between the 3 kits on both pure culture samples (S. cerevisiae p=0.0089, C. albicans p=0.0006). The PSDNA provided higher concentrations of DNA than MPY on both pure culture samples (S. cerevisiae, p=0.00286, C. albicans p=0.0020) and higher concentrations of S. cerevisiae than APF (p=0.0413). PSDNA extractions from GRADS stool samples had a higher concentration of DNA than APF extractions (p=0.03211). On gel electrophoresis, amplification of DNA from MPY was not present.

**Conclusion:** Effective DNA extraction from fungi is essential to accurate characterization of the mycobiome. Our data suggest that a kit that includes both temperature mediated and mechanical lysis steps, such as PSDNA, may provide higher concentrations of DNA, allowing for a more precise survey of the mycobiome.

The Association between Telomere Length and Risk of Breast Cancer in Singapore Chinese Health Study

**Background:** Telomeres are long repeated sequences located at the distal ends of linear chromosomes, which play a critical role in maintaining chromosomes’ integrity and cell replication. Although numerous epidemiological studies have examined the association between telomere length (TL) and risk of breast cancer, the results are conflicting. In this study, we evaluated the association between TL and risk of breast cancer using the data from the Singapore Chinese Health Study, a prospective, population-based study.

**Methods:** Study subjects were 14,306 women aged 45-74 years at enrollment in the Singapore Chinese Health Study. The subjects’ information of demographics, lifestyle, and reproductive history was collected at enrollment and blood sample collection. TL was measured using qPCR method. T-test and $\chi^2$-test were used to compare the distributions of selected variables in continuous and discrete values, respectively, between breast cancer cases and non-cases of the entire cohort. Analysis of covariance (ANCOVA) was used to examine the effect of age, body mass index (BMI) and other selected variables on TL. Persons-years were calculated from the date of blood sample collection to the date of breast cancer diagnosis, death or 31 December 2008, whichever occurred first. Hazard ratios (HRs) and 95% confidence intervals (95% CIs) for risk of breast cancer associated with TL in quintiles were calculated using Cox proportional hazard regression, with adjustment for age at blood collection, level of education, BMI, number of live births (0, 1-2, 3-4, 5+) and age at first live birth (nulliparous, <20, 21-25, 26-30, 31+).

**Results:** Breast cancer risk was increased significantly in association with longer TL. Women with the highest quintile of TL had 47% higher risk of breast cancer (HR=1.47, 95% CI=0.90-2.38) compared with the lowest quintile. The association is apparent in overweight/obesity women (BMI ≥24 kg/m2) (HR = 2.40, for 5th quintile vs. 1st quintile, P for trend = 0.02) and was not observed in healthy weight/underweight women (HR = 1.03, for 5th quintile vs. 1st quintile, P for trend = 0.42).

**Conclusion:** Longer TL is associated with increased risk of breast cancer in overweight/obesity women.

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**Presenter:** Noel Britton  
**Faculty Advisor:** Evelyn O. Talbott DrPH, MPH  
**Internship Preceptor:** Alison Morris, MD, MS

**Presenter:** Xiaoshuang Xun  
**Faculty Advisor:** Jian-Min Yuan, MD, PhD  
**Internship Preceptor:** Renwei Wang, MD, MS
Experiences Working a Clinical Trial for Heart Failure Patients

**Background:** Heart failure (HF) is a progressive condition in which the heart does not effectively pump blood throughout the body. Because HF affects older adults, its prevalence has gradually increased as the older population continues to grow. Fatigability is one of the major effects of heart failure in older adults, specifically heart failure with preserved ejection fraction (HFpEF). Drug trials have addressed HFpEF before, but few have focused much on fatigability. “Nitrite Benefits to Mediate Fatigability in Older HFpEF Patients,” is a randomized, double-blinded clinical trial evaluating the effect of an FDA-approved sodium nitrite drug on fatigability, physical function, and bioenergetics in older adults (ages ≥70). The objective of my internship was to learn more about the clinical trial research process and gain experience working with research data.

**Methods:** The study’s goal was to randomize N=18 subjects to receive drug or placebo. A range of physical function, fatigability, and bioenergetics data were collected over the course of 9 study visits, assessing the patient before and after treatment. Visits 1 and 2 measured the patient’s physical activity, physical function, and fatigability. They completed questionnaires to further assess cognition, fatigability, and self-perceived quality of life. Visits 3A and 3B captured bioenergetics and blood gases data through magnetic resonance imaging (MRI) and a right heart catheterization, respectively. During Visit 4, a muscle biopsy was performed for genetic and molecular analyses of muscle cells. The previously stated tests were all considered “pre-drug assessments.” Identical tests were performed during Visits 5 through 7 for “post-drug assessments.”

**Results:** I observed all 9 of the study visits and interacted with 4 study participants. I assisted in data collection by helping exercise physiologists with the physical function tests. I also completed data entry for all participants enrolled at the time (N=5), and helped build an Access database for additional data entry. Since participant recruitment is ongoing, data will not be available until 2018.

**Conclusion:** My internship experience gave me the opportunity to work with an FDA-regulated clinical trial and learn more about how HFpEF affects older adults. In particular, I learned of the importance of precise data collection and the complexity of data management for a study with many assessments.

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Differential CSF Cytokine Profile of Patients with Post-Traumatic Hydrocephalus

**Background:** Post-traumatic hydrocephalus (PTH) is a secondary neurological insult ensuing moderate to severe traumatic brain injury (sTBI) characterized by the derangement of cerebrospinal fluid (CSF) dynamics and ventriculomegaly. Given the high risk of clinical deterioration and documented worse outcomes, the identification of biomarkers indicative of PTH is imperative to allow early clinical detection and improve neurological outcomes in afflicted patients. The aim of this study was to compare the immune response of sTBI patients who developed PTH to sTBI patients who didn’t develop PTH.

**Methods:** We conducted a matched case-control study on 50 patients who sustained a sTBI at a level 1 Trauma facility from 2002-2015. All patients were treated with five days of continuous CSF drainage via an extraventricular drain. CSF cultures, cell count, glucose and protein were monitored daily. CSF research samples was collected on post-trauma days 1, 3 and 5 for future analyses. Patients who incurred CNS infection or died within 6 months were excluded. 25 patients who developed PTH were matched by age, sex, and initial Glasgow Coma Scale with 25 patients who did not develop PTH. The CSF concentrations of 36 different inflammatory markers were analyzed via Luminex Array. We used a repeated measures linear regression mixed model to assess the association of each cytokine and the onset of PTH.

**Results:** There were no differences detected between the groups in CSF RBC, WBC, or protein. Across all time points, IL-15, IL-5, IL-9, and CX3CL1 were significantly lower among PTH patients. CCL4 was significantly higher in the PTH group. IL-2 levels increased at a significantly slower rate in patients with PTH.

**Conclusion:** Our data suggests PTH patients experience a differential immune response that may contribute to the onset of PTH. Specifically, PTH patients demonstrated a more pro-inflammatory innate response, and a delayed adaptive immune response compared to sTBI patients who didn’t develop PTH. This immune response may impede the clearing of ventricular debris, induce hypercoagulation, and disrupt ependymal cell function.
Presenter: Kelly Carey  
Faculty Advisor: Gale A. Richardson, PhD  
Internship Preceptor: Elizabeth Rodgers, PhD, MPH

An Analysis of Act 92: How Inpatient Admission versus Observation Status Affects Cost of Care and Health Outcomes

Background: Dual-eligible Medicare-Medicaid beneficiaries account for a disproportionate average cost per person for both Medicare and Medicaid – twice the cost compared to any other Medical Assistance recipients. In Pennsylvania, there are over 350,000 dual-eligible beneficiaries. Pennsylvania enacted Act 92 in 2016, creating set fees for observation services in acute care hospitals, aimed at controlling hospitalization costs. The overall objective of this study was to examine the effect of Act 92 on hospitalization costs of dual Medicare-Medicaid beneficiaries.

Methods: The study population consisted of Gateway Health members who reported to the hospital with a claims data diagnosis code of ‘chronic obstructive pulmonary disease and bronchiectasis’ or ‘nonspecific chest pain’ between July 1, 2015-January 28, 2016 (prior to Act 92) and between July 1, 2016-January 28, 2017 (after Act 92). Linear regression models assessed the significance of the association between time period and index hospitalization costs, and logistic regression models were used to evaluate the association of time period with the probability of inpatient admission.

Results: Non-parametric Wilcoxon test had a significant difference in mean index payments between beneficiaries hospitalized prior to Act 92 compared to after Act 92 (p<0.0001). Generalized linear regression model results showed reporting to the hospital prior to Act 92 compared to after did not have a statistically significant association with cost of hospitalization (β=255.09, p=0.2003) when adjusting for covariates. After adjusting for covariates, a logistic regression model showed reporting to the hospital after Act 92 was associated with a statistically significant reduction in inpatient admission (OR=0.672, P=0.0472).

Conclusion: Act 92 had no direct impact on total cost of an index hospitalization, but reporting to the hospital after the enactment of Act 92 was associated with a statistically significant decrease in likelihood of being admitted as an inpatient compared to before Act 92. This topic is worth further studies with larger populations, more diagnosis codes, and longer follow-up times for readmission. The public health significance of Act 92 is reduced spending for health insurance companies, which can trickle-down to reduce burdensome healthcare costs for observation hospital stays for special needs population of beneficiaries.

Presenter: Emily Wasson  
Faculty Advisor: Andrea L. Rosso, PhD, MPH  
Internship Preceptor: Nancy W. Glynn, PhD

Identification of Neural Correlates of Fatigability in Older Adults by 7T Magnetic Resonance Imaging (MRI)

Background: There is increasing evidence to support that fatigueability, a term for feelings of fatigue anchored to a defined activity at a fixed intensity and duration, may have neurobiological origins. The identification of brain regions associated with fatigueability may illuminate vulnerable structural neuronal networks related to the disablement pathway. This work will examine whether structural brain MRI metrics are associated with physical and mental fatigueability in older adults.

Methods: Cross-sectional data collected at the baseline visit for the Lifestyle Interventions and Independence for Elders Study was used to conduct analyses. The analytic sample included participants with complete data for brain MRI metrics and the Pittsburgh Fatigability Scale. Grey matter volumes (GMV) for a priori identified brain regions of interest were adjusted for intracranial volume (ICV) and fatigueability was dichotomized to higher(HF) and lower(LF) physical and mental fatigueability status based on established cutpoints. T-tests and non-parametric methods were performed to compare mean-normalized GMV by higher and lower physical and mental fatigueability. An exploratory significance level of p<0.1 was used.

Results: The analytic sample (n=29) had a mean (SD) age of 77.2(5.5) years (range=70.3 to 88.3 years), was mostly female (86.2%), 37.9% White and 31.0% had completed greater than a high school education. A majority of participants reported higher fatigueability for physical and mental categories (65.5% for each). For the right hippocampus, mean (SD) GMV was lower for those with HF (0.261(0.039)) compared to LF (0.273(0.022)) for physical measures, p=0.07. Similar associations were found for the right putamen (HF: 0.273(0.030), LF: 0.292(0.030), P=0.05) and left (HF: 0.254(0.043), LF: 0.314(0.024), P=0.04) and right thalamus (HF: 0.285(0.032), LF: 0.307(0.023), P=0.08). The associations were similar for mental fatigueability for the right hippocampus and thalamus with addition of the right cingulum posterior (HF: 0.260(0.040), LF: 0.276(0.015), P=0.05) and left (HF: 0.075(0.012), LF: 0.086(0.006), P=0.02) and right amygdala (HF: 0.081(0.015), LF: 0.086(0.010), P=0.05).

Conclusion: Preliminary analyses are suggestive of neural correlates of physical and mental fatigueability in older adults. Future analyses include covariate-adjusted linear regression models for brain regions using continuous fatigueability measures. These findings will advance neuroepidemiological knowledge about the role of the brain and fatigueability in the disablement pathway.
Vascular Comorbidities Associated with Insertion Versus Removal of Intrauterine Devices (IUDs)

**Background:** Intrauterine devices (IUDs) are a popular form of birth control, but there are still many questions about their side effects. The objective of this translational epidemiological study is to explore whether vascular comorbidities are related to the removal of IUDs in the hope of determining potential side effects of IUD use. This study is an example of an in silico approach where preexisting data are combined to help provide evidence to facilitate new research hypotheses. We examine if comorbidities impact the races differently and then investigate genetic catalogs to identify potential genetic biomarkers.

**Methods:** AHRQ/NIS (National Inpatient Sample) data from 2010-2014 were obtained, patients who had either IUD insertion or removal were identified, and their IUD comorbidities were collected. Associations for CCS (Clinical Classifications Software) codes related to hypertension, cardiovascular, cerebrovascular, and peripheral vascular diseases were tested using chi-square tests and logistic regression on SAS 9.4. Genetic data from the NHGRI-EBI GWAS catalog and Ensembl were searched to identify a potential biomarker for adverse events among different races.

**Results:** Hypertension and cerebrovascular disease rates most significantly differed between IUD insertion and removal (43.48% insertion, 56.52% removal, p<0.0001 and 35.29% insertion, 64.71% removal, p= 0.0002 respectively). Black women had 3.54 times higher odds of hypertension than white women adjusting for insertion or removal status. A potential biomarker is rs1735151 which is associated with hypertension and is much more prevalent in African populations.

**Conclusion:** This study is an example of the in silico approach that shows potential reasons for IUD removal using existing data and a potential biomarker that could help predict side effects if IUD use. This approach could also be applied to other situations to facilitate precision medicine and highlights the importance of stratifying data by race.

Experiences in Clinical Database Management for Existing and Early Stage Databases

**Background:** Database management is critical to effectively collect and analyze data, and can be impacted by many factors including data collection and entry methods, variable coding, and overall structure of datasets. During my internship at VA Pittsburgh Healthcare System (VAPHS), I got a multifaceted experience of data management through a variety of database types. The objectives of my projects included: 1) Restructure the existing VAPHS cardiac rehabilitation (CR) data to merge with a new multi-site database; 2) Create new REDCap forms for CR as a more secure, standardized method for data collection; 3) Create a new REDCap data dictionary for future heart failure (HF) studies.

**Methods:** Using SAS 9.4 software, I recoded the existing CR database into a structure consistent with the REDCap data dictionary for the new multi-site project. I first recoded all variables and created new categorical variables in multiple datasets separated into baseline, 3-month, and 6-month follow-up data. I merged the sets containing the same observational period, and stacked the resulting 3 datasets to create 3 rows per patient (longitudinal dataset format). From this dataset, I exported four new datasets based on patient groups (enrolled, not enrolled, not interested in CR, non-VA care). I utilized REDCap to create clinical data collection forms for future CR studies. I created a new REDCap data dictionary for the HF study via excel coding and the REDCap online designer.

**Results:** The SAS program I created restructured the current CR database, consisting of 21 data files with 743 outpatient consults and approximately 1,000 variables, into four datasets that can be merged with the REDCap data dictionary for the multi-site project. The REDCap CR forms and HF data dictionary were imported into early stage REDCap databases for future studies.

**Conclusion:** The SAS code generated for this project will enable accurate data transfer for the multi-site project. This SAS program can also be easily adapted for future projects and analysis using the CR data, thus the database transformation is reproducible. The new HF data dictionary and clinical forms will facilitate improved REDCap data collection for future VAPHS studies.
The Relationship between Personality Changes and Amyloid-β in Non-Demented Older Adults

**Background:** Alzheimer’s Disease (AD) is a progressive neurodegenerative disorder accounting for 60% to 80% of all dementia cases. AD neuropathology is characterized by both intracellular tau and extracellular amyloid-β (Aβ), the latter of which is thought to accumulate a decade or more before onset of clinical symptomology. Personality change is often associated with AD. Additionally, epidemiologic studies suggest some premorbid personality traits are a risk factor for incident AD and cognitive decline in aging. Two hypotheses have emerged to explain this association: the Risk Factor hypothesis posits that personality is a true risk factor independent of disease, while the Reverse Causality hypothesis holds that personality reflects behavior change as an early indicator of sub-clinical AD neuropathology. The aim of this study was to evaluate the Reverse Causality hypothesis by testing whether Aβ levels predict change in personality in non-demented older adults, with a focus on high neuroticism and low conscientiousness based on previous literature.

**Methods:** Data were collected between 2010 and 2016 from two University of Pittsburgh imaging studies. All individuals completed a 11C Pittsburgh Compound B (PiB)-PET scan measuring brain Aβ deposition and NEOTM-FFI-3 personality assessment at baseline and had data available for one or more follow-up assessments (N=158). Baseline dementia cases were excluded. Total scores for the five personality domains (neuroticism, extraversion, openness, agreeableness, and conscientiousness) were calculated and demographic, APOE genetic status, and Mini-Mental State Exam variables were included. Preliminary analysis utilized linear regression analysis to test the association between PiB status and personality scores. All analyses were conducted in SPSS v.24.

**Results:** Initial results indicate that global PiB retention is positively associated with greater neuroticism scores cross-sectionally although not significantly (p=0.075). Linear regression analysis between baseline global PiB and change in neuroticism was not statistically significant (P=0.377 CI: -2.32, 5.98).

**Conclusion:** Our data suggest that there is no association between baseline PiB status and self-reported personality in non-demented older adults with 1-2 years follow-up. Our data do not support the Reverse Causality hypothesis. Results are consistent with the Risk Factor hypothesis that premorbid personality traits (e.g., neuroticism) predicts AD.

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Animal Bite and Rabies Surveillance in Allegheny County, 2015-2016

**Background:** The Allegheny County Health Department (ACHD) maintains an animal bite surveillance program as part of rabies prevention efforts. ACHD monitors the health of both the victim and animal so that victims can receive the rabies post-exposure prophylaxis vaccination (PEP), if they are at risk for contracting rabies, which must be administered before symptoms develop. The purpose of this study was to produce a description of the relative burden of animal bites and rabies in Allegheny County and to monitor if physicians were properly following ACHD rabies treatment protocols.

**Methods:** This study included all animal bites reported to ACHD in a two year period (2015-2016). Data was exported to Microsoft Excel from Oracle for analysis. Variables tracked included victim’s personal information, characteristics of the victim’s medical treatment, and information about the animal being monitored. Data were cleaned for duplicates and some responses were re-categorized using a combination of Microsoft Excel and SAS. Frequency distributions of characteristics of the bites and victims were obtained in SAS.

**Results:** There were 3722 total bites reported to ACHD in 2015-2016, with dogs (72.6%) and cats (22.5%) and bats (1.6%) responsible for the vast majority of reported bites. Of all the bites, 20 resulted in an exposure to a confirmed rabies positive animal, all of which were due to wild animals or feral cats. One person exposed to rabies refused treatment with PEP, but did not develop rabies. An additional 172 persons received PEP primarily due to being exposed to an animal where rabies status could not positively be confirmed as positive for negative, although 27 of these 172 persons received PEP unnecessarily.

**Conclusion:** The animal bite reporting system remains successful in preventing human cases of rabies in Allegheny County. The primary vector for human exposure in Allegheny County is from wild animals, suggesting that stronger communication on the risks posed by approaching wild animals may be beneficial. Physicians in Allegheny County are prescribing their patients PEP too often when there is no risk of rabies, causing undue stress and financial burden. Better communication of PEP treatment protocols to physicians in Allegheny County may be necessary.
**Presenter:** Ayushi Divecha  
*Faculty Advisor:* Caterina Rosano, MD, MPH  
*Internship Preceptor:* Andrea L. Rosso, PhD, MPH

**The Role of Telomere Length in Risk of Colorectal Cancer: A Cohort Study from the Singapore Chinese Health Study**

**Background:** Telomeres are repeated DNA sequences localized at the end of chromosomes involved in maintaining chromosomal stability and integrity. Telomere length (TL) is considered a reliable marker of cell turnover. As cancer is a common genetic disorder, it is a reasonable to assess its association with TL. However, despite clinical significance of colorectal cancer (CRC), there is a lack of consensus about its relationship with TL. Previous studies, primarily of case-control or cross-sectional design, have reported short telomere length to be associated with higher risk of CRC.

**Methods:** We obtained blood sample from 26540 healthy participants in Singapore Chinese Health Study between April 1994 and April 2005. TL in leukocytes was tested using monochrom qPCR. Until December 31, 2015, 347 (1.31%) subjects developed colorectal cancer. 209 (60.23%) of these subjects were diagnosed with colon cancer, and 138 (39.77%) with rectal cancer. Cox proportional hazard regression method was used to calculate hazard ratio (HR) and their 95% confidence interval.

**Results:** In a fully adjusted model including age group (46-65, 71-75, 76-80, 81-86), gender, education level, alcohol drink per week, smoking index, family history of CRC, BMI (17.5, 17.5-23.0, 23.0-27.0, 27+), weekly physical activity measures, and history of diabetes, subjects with TL in the fourth quartile (relative length range=1.15-3.24) had 1.456 times higher risk of developing CRC compared with those with TL in the first quartile (relative length range=0.19-0.87) (P-trend=0.0482). This positive TL-CRC risk association became stronger after excluding patients who were diagnosed with CRC within first two years post blood collection, in a way to reduce impact of CRC on TL, although the p-value for trend was no longer statistically significant due to small sample size and number of cases. Different patterns of association between TL and HR of CRC were observed between participants with and without history of diabetes.

**Conclusion:** This large cohort study provides new evidence that longer TL may be associated with higher risk of developing colorectal cancer.

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**Assessment of Environmental Walkability in Community Dwelling Older Adults in Pittsburgh**

**Background:** Mobility is influenced by strong driving factors like environmental characteristics, cognitive function and physical well-being. It is therefore very important to objectively quantify all these entities to understand the role of mobility as an early indicator of neurodegenerative diseases. However, objective measurement of environmental walkability in cohort studies is rare.

**Methods:** A modified Active Neighborhood Checklist (ANC) was developed in order to create a standardized tool to evaluate crucial environmental characteristics like land use, presence of public transport, street characteristics, quality of physical environment, quality of sidewalk, neighborhood characteristics and residential characteristics. This tool is being used to perform independent web based virtual audits using Google Street View technology by two trained auditors. Both auditors shall retrospectively audit 1/8th mile or 660 feet distance on each side of a given residence for street view in 2007 or the earliest available street view. 703 community dwelling older adults residing in Allegheny County who participated in the 2006-2007 follow up of Health ABC study will be included in the study. A detailed protocol was created for instructions to follow for each audit for the purpose of standardization and reproducibility.

**Results:** Web based audits were completed for 50 participants. Conducting virtual audits using street view images is a feasible method to identify retrospective individual as well as composite walkability for existing cohort studies. However, there were some limitations to this method. The resolution of street views from 2007 was poor, therefore inadequate to identify street characteristics as well as residential characteristics like limited hour parking signs, special speed zones, integrity of sidewalks for uneven surfaces or cracks, number/integrity of stairs and ramps. Auditing specified distance over each segment is time consuming. Additionally, street views were not available for all participant residences.

**Conclusion:** Assessment of inter rater reliability of individual and composite walkability for a sub sample of 50 individuals using SAS. Complete data for all residents shall be used to identify change in environmental walkability over time. This data shall be very crucial in identifying influence of walkability on mobility as well as cognitive outcomes.
Presenter: Monica Heinrich  
Faculty Advisor: Emma J.M. Barinas-Mitchell, PhD  
Internship Preceptor: Lauren Brungo, MPH, BSN, RN

Evaluation of Nursing Recruitment and Retention at a Local Health Department

Background: Over the past four years, there have been 15 resignations out of a total of 31 public health nurses who left their employment at the Allegheny County Health Department (ACHD). Because few studies have looked at the work environment and job satisfaction specifically among public health nurses, the aim of this quality improvement project is to identify how ACHD can improve retention and recruitment of public health nurses.

Methods: A mixed-methods approach was used. Qualitative data was collected through focus groups with public health nursing supervisors and interviews with both current and former public health nurses, and key informants. An electronic survey was sent to current employees. The survey results were reported and interpreted through the median, IQR and “percent favorable” score. The Fisher’s exact test was used to test satisfaction among nursing programs and the Kruskal-Wallis test was used to test significant differences in satisfaction, as well as differences in survey scores.

Results: Nurses in the Tuberculosis Program reported higher dissatisfaction than other programs. Those working in the Nurse Family Partnership Program generally gave more positive responses; however, turnover intent is high. Among individual programs, many had a high percent favorable response (>70%) agreeing that their work gives them a feeling of personal accomplishment and they leave work feeling they have positively impacted lives. Questions regarding pay and opportunity for advancement scored the most negatively. There are not significant differences in satisfaction among nursing programs.

Conclusion: The following quality improvement opportunities were identified through the evaluation: increase advertisement of employment opportunities available at ACHD; promote public health nursing as a career at high schools and colleges; and, increase duration of clinical nursing rotations at ACHD and/or shadowing opportunities. The data also highlights the importance of minimizing vacancies of public health nurse supervisor positions — those without current supervisors had the most job dissatisfaction. Continued improvement of facilities and technology was also a recurrent theme and should be continued by department leadership.

Presenter: Heather Phelos  
Faculty Advisor: Tina Costacou, PhD  
Internship Preceptor: Trevor Orchard, MBBCh, MMedSci, FAHA, FACE

Demographics, Clinical Measurements, and Behavioral Predictors of Type 1 Diabetes Mortality in Rwandan Adults

Background: Life for a Child (LFAC) is an international program that provides care and education to needing youth with Type 1 Diabetes in over 42 countries. The program’s approach is to work with local partners, providing necessary insulin, blood glucose testing supplies, and education to all youth (age ≤26) in need. In Rwanda, LFAC works primarily through the Rwanda Diabetes Association (RDA). The current study is being conducted to serve the need of LFAC to evaluate long-term outcomes, including mortality, and uses a retrospective cohort design to survey 84 participants who ‘aged out’ of the LFAC program in 2012 or 2013, i.e. 4-5 years prior to being surveyed (2017).

Methods: Baseline data were obtained from the 2012/2013 clinical exam records kept by the RDA staff. The current mortality status was ascertained between May-July of 2017 via subsequent RDA clinical exams and local hospital consultation. Descriptive statistical evaluation of baseline data and last available LFAC measures were performed using Stata. Logistic regression analysis was performed to assess baseline predictors of mortality status.

Results: Out of the 84 participants with a mean baseline age of 24.07 years, 51 (60.7%) were women. During the 1.9 years of mean follow-up, there were 11 deaths (8 female (72.7%)), giving an incidence density of 6.86/100 person-years. In the logistic regression models, higher last visit hbA1C levels (OR=1.39, p=0.045) were significantly associated with mortality status. A borderline significant association was also observed for higher baseline diastolic blood pressure (OR=1.09, p=0.071). No other significant mortality predictors were observed among variables tested (i.e., duration, gender, body mass index, microalbuminuria, glucose meter possession, systolic blood pressure, and length of follow-up).

Conclusion: The results show an alarmingly high mortality rate for these youth. HbA1c was the sole significant mortality predictor, though the low sample size and the high degree of missing data do not allow for definitive conclusions. Thus, all assessed risk factors may be important and merit further study.
Presenter: Joseph Penzelik  
Faculty Advisor: Bedda Rosario-Rivera, PhD  
Internship Preceptor: Elizabeth Rodgers, PhD, MPH

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**Health literacy or Poverty: Associations with Medicaid Costs in Southwestern Pennsylvania**

**Background:** Through understanding social determinates of health’s impact on health-related costs, the potential exists to reduce them and improve public health. The aim of the study is to compare the effects of health literacy and poverty on health care related costs for Medicaid recipients enrolled in a managed care organization in southwestern Pennsylvania.

**Methods:** Members from the managed care organization (n=93,261) were selected based on two criteria: member was continuously receiving Medicaid benefits from April 2016 through March 2017 and they must reside in southwestern Pennsylvania, as determined by census tract. Multi-variable linear regression was used to study the relationships between poverty, health literacy, and health-related costs (i.e. medical, pharmacy, and total) after adjusting by age, gender, a summation of 65 potential comorbidities, claims related to drug-abuse, claims related to alcohol-abuse, history of suicidal ideations, and frailty related conditions. Results were presented as β coefficients and 95% confidence intervals for health literacy and poverty as they related to each type of cost.

**Results:** Multiple linear regression analyses showed that there is a negative association between poverty level and health-related costs (i.e. as level of poverty increases, all health-related costs decreased) [total health care costs, β= -275.88, 95% CI (-465.80, -85.96), medical costs, β= -171.18, 95% CI (-285.37, -57.00), pharmacy costs, β= -83.92, 95% CI (-203.05, 35.21)]. Secondly, a positive association between health literacy and all health-related costs was shown (i.e. as health literacy increases, all health-related costs increased) [total health care costs, β= -1048.24, 95% CI (-1714.16, -382.33), medical costs, β= -586.25, 95% CI (-995.93, -176.57), pharmacy costs, β= -331.25, 95% CI (-749.00, 86.50)]. Results showed no statistically significant associations between independent variables and pharmacy costs.

**Conclusion:** Results suggest that as health literacy increases or poverty decreases, health-related costs increase. These findings are not consistent with previous studies. The study of social determinates of health in relation to costs is in its infancy, so further analysis is required for better understanding. Through further analysis, there is the potential to inform managed care organizations and policy makers to aid in implementing preventative measure and interventions that could improve public health.

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Presenter: Kailey Hughes  
Faculty Advisor: Catherine Haggerty, PhD, MPH  
Internship Preceptor: Lynne Marshall, PhD

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**Influence of Polypharmacy on 30-day Readmission Rates among Medicare Recipients**

**Background:** As chronic diseases become increasingly treatable, the American population continues to experience longer lifespans. These longer lifespans place an increased burden on federally funded healthcare programs, including Medicare and Medicaid. Created by Medicare, the 30-day All-Cause Hospital Readmission measure objectively evaluates the level of care and identifies areas in need of improvement within hospitals. The goal of the measure is to provide better quality care to patients and reduce 30-day readmissions. In this study, we aimed to investigate the influence of polypharmacy on 30-day readmissions among Medicare patients.

**Methods:** Gateway Health Medicare members with at least one inpatient hospital discharge during 2016 was the target population for this investigation. To be included in the study, members were required to have been continuously enrolled in a Gateway Health Medicare plan for at least one year prior to their first admission, and for at least thirty days after being discharged. A total of 9,414 Gateway Health Medicare members met the study eligibility requirements. Defining polypharmacy as five or more medications taken for at least thirty days, members were divided into non-polypharmacy and polypharmacy. Multivariable logistic regression was used to determine the relationship between polypharmacy and 30-day readmission.

**Results:** Discharge to Home Healthcare (HHC) (OR: 1.408, 95% CI: 1.244, 1.593), discharge to Skilled Nursing Facilities (SNFs) (OR: 1.927, 95% CI: 1.669, 2.225), and a Significant Persistent Mental Illness (SPMI) flag (OR: 1.939, 95% CI: 1.548, 2.427) were associated with an increased risk of 30-day readmission.

**Conclusion:** The results of this study indicate several characteristics that increase an individual’s risk of 30-day readmission. Polypharmacy individuals discharged to HHC and SNFs often have complex medical conditions and comorbidities that pose unique challenges to recovery. Polypharmacy individuals living with a SPMI face additional obstacles such as unstable living conditions and limited access to mental health care. Addressing individuals’ medication burden prior to discharge, improving HHC, and expanding mental health services could lead to a reduction in 30-day readmissions in this vulnerable population. By focusing on a non-traditional barrier to care, hospitals can provide better care for their patients and improve public health in the surrounding communities.
A Review of Postoperative Delirium Incidence Risk Factors among Patients that Underwent Total Knee Arthroplasty

**Background:** Delirium is a neurocognitive disorder characterized by the presence of disturbance in attention that develops over a short period of time, which is not explained by another preexisting neurocognitive disorder and it is the physiological consequence of another medical condition. Although there are no known causes of delirium, multiple factors are thought to play a role in the development of the disorder. Postoperative delirium (POD) is common in hospitalized patients undergoing surgery. Studies have indicated that POD incidence varies depending on the type of surgery performed, the criteria used to diagnose delirium, and the population being studied. Consequences of POD include elongated hospitalization, decline in cognitive function, and an increase in mortality rate. The purpose of the study was to systematically review the literature on the risk factors of delirium incidence postoperatively among patients undergoing total knee arthroplasty (TKA).

**Methods:** We conducted a systematic review of publications relating to POD in TKA patients and its determinants using the PubMed database from January 2011 to July 2017. Medical Subject Heading (MeSH) terms were searched to identify relevant studies. Studies that addressed outcomes of interest other than POD, case reports, correspondences, and reviews were excluded.

**Results:** Fourteen publications met inclusion criteria. Incidence of POD was determined by the following risk factors: type of pain medication prescribed (n=6), older age and history of psychiatric disorders (n=3), electrolyte disorders (n=1), preoperative cerebrospinal fluid β-amyloid/tau ratio (n=1), preexisting obstructive sleep apnea (n=1), use of preventative screening measures (n=1), and vigorous physiotherapy (n=1). Overall, studies supported the association of increased POD incidence in adults undergoing TKA, however, retrospective data, inconsistent outcome measurement methods, homogenous populations, and small sample sizes limited the interpretations of the findings.

**Conclusion:** In this systematic review of the literature, type of pain medication given preoperatively, intraoperatively, and postoperatively was one of the most common risk factors of POD after TKA surgery. However, these findings were primarily limited by the lack of a standardized diagnosis tool. Future studies of diverse populations that use consistent standardized diagnosis measures and interventions may help in prioritizing delivery of prevention measures in clinical care.

Global Health Experiences Working with a HIV Transmission Reduction Trial in Cape Town, South Africa

**Background:** South Africa has the largest HIV epidemic in the world with an estimated 7,000,000 people living with HIV. However, mathematical modelling shows that if a high proportion of the population is tested, and those who are found to be HIV-infected are offered immediate antiretroviral therapy, HIV infections could be reduced substantially and potentially eliminated. The goal of my internship was to gain global health field and epidemiological methods experience through a large research study aiming to reduce population-level HIV incidence in Cape Town, South Africa.

**Methods:** I interned with Kheth’Impilo, a not-for-profit organization, and the Desmond Tutu TB Centre (DTTC) at Stellenbosch University Medical School. Both organizations are collaborators for the HIV Prevention Trials Network (HPTN) 071 PopART cluster-randomized trial assessing the impact of a combination prevention package. While at Kheth’Impilo, I was exposed to the data analysis aspect of global health work. Through the DTTC, I shadowed multiple research teams to gain an understanding of the implementation process of an intervention and study in the global health setting.

**Results:** Throughout my ten weeks in Cape Town, I spent three days a week at Kheth’Impilo exploring the use of data analysis to assess health outcomes and two days a week shadowing doctors, researchers, and community HIV-care providers in the field. I visited five different research sites in communities that had adult HIV prevalence rates ranging from 14%-22%. During these visits, I joined research teams who performed HIV tests, screened for TB and STIs, and taught prevention in participants’ homes. I also witnessed the linkage of care for HIV at three local health facilities.

**Conclusion:** Through this internship, I was exposed to the realities of working in global health. Each day I saw the difficulties of providing care in resource poor communities. By talking with researchers, I gained perspective on the many complexities of a large randomized-trial and population-level intervention. However, I was also constantly reminded that the results of important studies like this one will be applied to improve health outcomes for millions of people living with HIV for the ultimate betterment of public health.
Mosquito Arbovirus Surveillance in Allegheny County

Background: West Nile Virus is an arbovirus transmitted through the bite of an infected Culex mosquito. Since the virus is considered endemic to Allegheny County since 2002, the Allegheny County Health Department (ACHD) maintains a vector control program in which mosquito surveillance and control take place. The role of the program is to interrupt the mosquito’s life cycle through habitat elimination, code enforcement, public education, and the use of pesticides. The Mosquito-Borne Disease Control Program conducted by Pennsylvania’s Department of Environmental Protection (DEP), provides ACHD with a state-funded grant, aiming to identify and monitor mosquitoes throughout Pennsylvania which test positive for arboviruses including West Nile. Once these are identified, control efforts are put into place. ACHD contributes to this statewide data by trapping and processing mosquitoes at local fixed trap sites in Allegheny County. Both gravid and BG Sentinel traps are used. The gravid traps attract the Culex mosquito, which is tested for West Nile, while the BG Sentinel traps attract the Asian Tiger mosquito, which is tested for Zika.

Methods: 20 gravid traps and 10 BG Sentinel mosquito traps were set weekly throughout the summer of 2017 at fixed sites in the Pittsburgh area. The traps were set in the afternoon, left to run for 20-24 hours, and collected the next day. They were then taken to ACHD for processing, where the mosquitoes were knocked down on dry ice, sorted and counted. The samples were entered into the Mosquito-Borne Disease Control Program database and ultimately sent to DEP’s Vector Management lab in Harrisburg to be tested for arboviruses.

Results: Of the 20 sites over the course of 15 weeks, 15.3% of samples tested positive for West Nile, and 1 human case was documented. There were no Zika positives.

Conclusion: Data collected through the Mosquito-Borne Disease Program is used each year to monitor trends in West Nile activity and provide information to focus future control efforts. This can ultimately limit the number of human arbovirus cases, having valuable public health implications.

A Comparison of 8-hour versus 12-hour Shift Duration on Fatigue and Fatigue Related Indicators in Emergency Medical Services and Related Shift workers: A Systematic Review

Background: Extensive literature over the past 30 years has examined the harmful effects of fatigue in a shiftwork setting. Long duration shifts have been linked to higher levels of fatigue and higher incidence of fatigue-related outcomes (Patterson et al., 2017 IN PRESS). We systematically reviewed the literature to determine if physical and psychological well-being differs by 8-hour and 12-hour shift durations.

Methods: We used a systematic literature review study design and searched five databases and one website: PubMed/Medline, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, PsycINFO, the Published International Literature on Traumatic Stress (PILOTS), and the publications section of the National Institute of Justice (NIJ) website. We isolated our focus to studies that included EMS personnel and related shift workers, used the Standard Shiftwork Index (SSI), compared outcomes between 8-hour and 12-hour shifts, and reported the following outcomes job satisfaction, cognitive anxiety, somatic anxiety, psychological well-being, neuroticism, extraversion, digestive problems, cardiovascular problems, social disruption, domestic disruption, non-domestic disruption, sleep quality, and chronic fatigue. Details of the initial search are reported in a separate paper (Patterson et al., 2017 IN PRESS). Meta-analyses will be performed on recurring outcomes that were similar in study design, data collection, and shift definition.

Results: Initial screening was completed for 21,674 records. Of the 480 articles reviewed pertaining to shift duration, only 38 (7.9%) compared 8 and 12-hour shifts. Six studies reported findings germane to our outcome of interest. Four of the six (75%) found that 8-hour shifts were unfavorable toward social and domestic disruption. No other differences with sleep, physical and psychological health, or job satisfaction were noted.

Conclusion: No definitive conclusions can be drawn at this time. Meta-analyses have yet to be performed. Further conclusions will improve the public health of the workforce by moving toward safer and more satisfying shift durations.
Experience Working in Clinical Trial of HIV Prevention Intervention in Cape Town, South Africa

**Background:** South Africa is home to over 7,000,000 people living with HIV/AIDS, making it the largest HIV epidemic in the world. Reducing the spread of HIV is an absolute imperative, and can be done through risk reduction, widespread condom use, and early treatment. The aim of my internship was to gain experience in both global health and HIV-specific epidemiologic methods through work on a trial of an intervention to reduce community-level HIV incidence in Cape Town, South Africa.

**Methods:** I spent 10 weeks in an internship centered around HPTN 071 trial, better known as PopART. PopART is a cluster randomized trial of a test-and-treat package of HIV prevention services. I spent time working with two PopART collaborators: the not-for-profit organization Kheth’Impilo and the Desmond Tutu TB Centre (DTTC) at Stellenbosch University Medical School. While at the DTTC, I was able to shadow multiple PopART teams to gain a better understanding of research in a global health setting. During my time at Kheth’Impilo, I worked with data from the PopART trial to gain experience with data analysis and scientific writing.

**Results:** While at the DTTC, I was able to visit five of the communities enrolled in this trial. I accompanied community health workers offering HIV testing and counseling, and TB and STI screening. I was also able to join teams performing outcomes data collection in these communities, and witness linkage to care in three local clinics. While at Kheth’Impilo, I was able to explore analysis and literature review on both virological and adherence outcomes of the intervention.

**Conclusion:** This internship provided me with invaluable experience in global health. Through my field work visits, I gained insight into the challenges of intervention implementation and data collection in low resource settings. More importantly, I was able to learn how this complex, large-scale trial has dealt with unexpected hurdles. I am now equipped with an understanding of obstacles to personal behavioral change, health care access, data collection, and community recruitment. Moving forward, I plan to incorporate these lessons into any development of research questions, protocols, and study design.

Raccoon Oral Rabies Vaccination Hand Baiting Program in Allegheny County

**Background:** The National Rabies Management Program (NRMP) was established in 1995 by the United States Department of Agriculture Wildlife Services to prevent the spread and then eliminate terrestrial racies in the United States. The raccoon rabies reservoir stretches from Alabama up to Maine and east to the Atlantic Ocean. To prevent the westward spread of raccoon rabies, the Pennsylvania Wildlife service began an oral rabies vaccination program in 2001 for the raccoon variant of rabies. Since the beginning of the program, the Allegheny County Health Department has worked with the United States Department of Agriculture to hand bait all of Allegheny County. Allegheny County currently stands as the largest hand baiting effort in all of the United States, due its urban nature aerial baiting is not an option. The main objective of this project is to distribute over 300,000 baits throughout Allegheny County in six days.

**Methods:** Education of the public is a major component of the raccoon oral rabies vaccination program due to the possibility of baits being found by the public. To do this, lists of all police chiefs, municipality managers, veterinarians and librarians were created. Then a mailing which included information about the program was sent to all of them in an effort to inform as many people as possible. Additionally, an email was sent to all municipality managers, parks, and emergency preparedness managers. Then, volunteers, mainly Allegheny County Health Department employees, were recruited. Every volunteer was trained on the proper way to bait. Teams were determined, assigned to areas, and assigned to a vehicle.

**Results:** This year, volunteers distributed all 300,000 baits throughout every municipality in Allegheny County within six days. Baits were placed in raccoon habitats such as wooded areas, storm drains, and near dumpsters. Volunteers avoided manicured lawns and areas easily accessible to pets and children.

**Conclusion:** I learned about rabies and the prevention efforts being made throughout the East Coast to prevent the spread of raccoon rabies. I also gained valuable experience in coordinating an enormous volunteer effort and experienced firsthand working with multiple agencies to complete an extensive project.