

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 or explore a new area of research. Internship placement, goals, and responsibilities are developed in collaboration with the students' faculty advisors and preceptors in order 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!

# **Epidemiology in Action!**

## **Annual Internship Poster Session**

## **Abstract Book**

**Thursday, October 13, 2016**



Department of Epidemiology





**Presenter: Julia Carter**

*Faculty Advisor:* Brenda Diergaarde, PhD

*Internship Preceptor:* Shervin Assari, MD, MPH

### **Depressive Symptoms May Not Similarly Reflect Body Mass Index of Blacks and Whites**

**Background/Objective:** Although it is known that high body mass index (BMI) and physical activity affect psychosocial well-being [e.g. self-rated health (SRH) and depressive symptoms (CES-D)], it is currently not clear whether these effects vary based on race, gender, and their intersection. Using six-year follow-up data of a nationally representative sample of adults over age of 50 in the United States, this study aimed to explore race by gender differences in additive effects of sustained high BMI and physical activity on sustained depressive symptoms and SRH.

**Methods:** Data came from waves 7, 8, and 10 (2004 to 2010) of the Health and Retirement Study (HRS), an ongoing national cohort started in 1992. The study enrolled a large, representative sample of Americans (n= 19,280) over the age of 50. The main predictors of interest for the current study were latent factors reflecting sustained BMI and physical activity based on measurements in 2004, 2006, and 2010, while the main outcomes were latent factors reflecting sustained SRH and depressive symptoms based on measurements done in the same years. Age, education, and income were included as confounders. Multi-group structural equation modeling (SEM) was used to test the additive effects of BMI and physical activity on depressive symptoms and SRH, where the groups were defined based on race by gender.

**Results:** Group differences were apparent in the association between sustained high BMI and depressive symptoms. The association was significant for White women (p= .007), marginal for White men (p= .062), and missing among Black men (p= .564) and Black women (p= .110). No group differences were observed in the associations between sustained physical activity and CES-D, physical activity and SRH, and BMI and SRH.

**Conclusion:** Our data suggests that sustained high BMI is differentially associated with sustained high depressive symptoms for Black men and women compared to White men and women. The association between BMI and well-being is not uniform across race and gender. Clinical and public health interventions and programs targeting obesity should be tailored to the target population in order to be effective.

**Presenter: Pantila Taweewigyakarn**

*Faculty Advisor:* Evelyn Talbott, DrPH, MPH

*Internship Preceptor:* Yongjua Laosiritaworn, PhD

### **Comparison of The Degree of Concordance between Two systems of Dengue Reporting in Thailand**

**Background/Objective:** Dengue has been an officially notifiable disease in Thailand since 1964. However, in 1968 the R506, a civilian based communicable disease surveillance was enacted. Since 2007, the Ministry of Public Health in Thailand established an electronic national health record system (ENHR) with the intention to build a national health database collecting all health-related data on the population. The study's objective is to compare the distribution and agreement of these two systems with regard to dengue disease distribution.

**Methods:** We studied the distribution of dengue cases by sex, age group, race, disease severity, type of treatment, time of diagnosis and geographical distribution. We collected the relevant variables from R506 database and from 6 out of 43 folders of the ENHR database recorded from January 1 to December 31, 2015. Differences in number of cases between the 2 databases were compared as well as the distribution of cases by each covariate. (presented by graph)

**Results:** Overall, the data showed that the R506 civilian reported method resulted in a 30-50% reduction in the numbers of cases compared to the ENHR for the same time period. However, the differences varied by the factor studied. Despite fewer number of cases detected by the R506, the distribution of dengue cases of the 2 databases were similar in terms of sex, age group, race, disease severity and type of treatment. However, there was discordance in month of diagnosis and geographic distribution in this study with some areas reporting fewer cases especially in Bangkok.

**Conclusion:** The R506 represented the ENHR quite well in some aspects such as sex, age group, race and time of diagnosis and does not appear to be biased with regard to any one subgroup. However, due to the large amounts of missing data, and possible reporting error, the information on place and time in the ENHR were not a proper reference for dengue data in the R506 database. More work is needed to educate districts within Thailand of the importance of reporting this condition in a uniform manner so that it can inform public health officials of areas with the greatest need for control measures.

**Presenter: Eric Swetts**

*Faculty Advisor:* Dara Mendez, PhD, MPH

*Internship Preceptor:* Yvonne Eaglehouse, PhD, MPH

### **Behavioral Lifestyle Intervention in Overweight Colon and Breast Cancer Survivors: A Pilot Study**

**Background/Objective:** Excessive body weight and type 2 diabetes are known risk factors for breast and colon cancer. Lifestyle factors, such as diet and physical activity levels, increase breast cancer survivors' risk of developing or worsening comorbid chronic health conditions such as type 2 diabetes and cardiovascular disease, and in both breast and colon cancer survivors, such comorbidity is shown to increase all-cause and cancer-specific 5-year mortality. Finally, research suggests increased rates of obesity in breast and colon survivors. Thus, there is strong impetus to intervene with this population on addressing lifestyle factors influencing body weight, physical activity, and dietary patterns. The Pittsburgh Healthy Eating and Active Living Study aims to investigate an evidence-based program's impact in this critical population.

**Methods:** The pilot study utilizes a modified version of the Diabetes Prevention Program, an evidence-based behavioral intervention successfully shown to reduce type 2 diabetes incidence in high-risk individuals. The study promotes a calorie-restrictive (1200-2000 kcal/day), medium-fat diet, and doing moderate-intensity activity at least 150 minutes/week, through a series of 13 weekly educational sessions. Program metrics include an increase of moderate-intensity physical activity to 150 minutes/week, and weight loss of 7% of baseline body weight. Recruitment was conducted primarily via a research registry (N=8) and referral from oncologists (N=9) at UPMC Presbyterian-Shadyside. Baseline statistics on our sample (N=17) were gathered via in-person interviews using validated questionnaires to capture overall physical activity, self-reported overall health and fatigue, demographic information, and BMI measurements.

**Results:** My roles have been to assist in primary data collection through administering baseline interviews; stewarding all database design, validation, and analysis of baseline data via Access and SAS; conduct two separate sessions pertaining to environmental cues and physical activity; assist in all phases of study execution post-recruitment. The study is ongoing until November 2016, and thus results are forthcoming.

**Conclusion:** This study will be among the first to examine the role of behavioral intervention in addressing physical activity and dietary habits in cancer survivors, a population with obesity rates greater than the general population and in whom successful intervention could have implications for long-term health.

**Presenter: Yuqing Chen**

*Faculty Advisor:* Nancy W. Glynn, PhD

*Internship Preceptor:* Sharon Welburn, MPH

### **Quality Control Activities for Visit 2 Data of Long Life Family Study**

**Background/Objective:** The Long Life Family Study is an international, multi-center longitudinal cohort study of familial exceptional survival. This cohort (N=4952) has been followed continually since a baseline in-person visit 2006-2009 with subsequent annual telephone follow-up. A 2nd in-person visit began in September 2014, and measurements included socio-demographics, personal history (smoking and drinking history), medical history, medications, cognitive and physical function, carotid artery scans, depression, spirometry, anthropometrics, and phlebotomy. Data are collected by centrally trained, certified research assistants (RAs) and then entered into REDCap by graduate students. The aim of this project was to conduct and evaluate the quality control (QC) of visit 2 data and characterize error subtypes and causes in order to make recommendations for improvement.

**Methods:** The LLFS Data Management and Coordinating Center (DMCC) queried 382 QC items for the Pittsburgh site during monthly surveillance in June 2016. All items were checked and compared against original files. We categorized all errors as attributed to the DMCC QC algorithm, data entry, or RAs, and true errors were corrected in REDCap and other actions were reported to the DMCC. We then examined error subtypes by DMCC QC algorithm, entry error, missing code, missing, inconsistent, and misclassification. Subtypes were compared by form and type of corrective action needed. Statistical analysis of frequency, percentage and composition of different errors was conducted using SAS 9.4.

**Results:** Of the items QC'ed, 76% were real data entry errors with >50% a result of the data entry process and ~20% generated by the RAs. Among error types, missing was the most frequent (38%), followed by entry error (14.5%), and missing code (13.4%).

**Conclusion:** A snapshot of QC conducted at the Pittsburgh LLFS site for June 2016 revealed that 25% of errors were due to the QC algorithm, indicating the algorithm still needs to be refined to trigger fewer false negatives. Recommendations for preventing RA errors include double checking skip patterns on forms in the field and during their post-visit review of all forms prior to data entry. To reduce data entry errors by the students and ensure clean data for subsequent analyses, better understanding of the purpose and meaning of the data items and double-checking their entries is needed.

**Presenter: Jessica Cheng**

*Faculty Advisor:* Wendy King, PhD

*Internship Preceptor:* Saul Shiffman, PhD

### **Interaction between Race and Smoking Type with Nicotine Dependence**

**Background/Objective:** Some data suggest that, among daily smokers, African Americans develop dependence at lower levels of cigarette consumption than Caucasians. Additionally, African American smokers are more likely to be intermittent smokers (ITS), who smoke some but not every day, than are Caucasian smokers. How race and smoker type relate to variations in dependence is unclear.

**Methods:** Community volunteers from the Pittsburgh area aged 21 years or older were recruited via advertisement. Participants (N=482) had to have been smoking for at least 3 years and smoking at their current rate for at least 3 months. African-American smokers were oversampled because of their higher likelihood of being ITS. Associations between race, smoking type and several different validated dependence scales assessed via questionnaire were analyzed with linear and logistic regression.

**Results:** A race by smoker type interaction was observed on the Wisconsin Inventory of Nicotine Dependence ( $p < 0.05$ ) with the scores being similar between African American and Caucasian daily smokers (mean=52.2 SD=13.0 vs. mean=55.3 SD=14.1), but among ITS, African Americans were more dependent than Caucasians (mean=36.1 SD=12.0 vs. mean=32.2 SD=10.8). However, when higher cigarettes per day among African American vs. Caucasian ITS was accounted for, the interaction was non-significant. Results were similar with several other dependence measures (the Fagerstrom Test of Nicotine Dependence, the Hooked on Nicotine Checklist, Smoker Self-Concept scales). However, the interaction between race and smoker type in relation to the Nicotine Dependence Syndrome Scale scores remained significant with control for cigarettes per day smoked where African American ITS (mean= -1.74 SD=0.67) were more dependent than Caucasian ITS (means=-2.03 SD=0.63) but African American daily smokers (mean=-0.46 SD=1.06) were less dependent than Caucasian daily smokers (mean=-0.07 SD=1.08).

**Conclusion:** A racial disparity in nicotine dependence seems to exist at the low-end of the dependence spectrum (i.e. among intermittent smokers) and may be accounted for by higher cigarette consumption among African-Americans.

**Presenter: Kristin Selker**

*Faculty Advisor:* Brenda Diergaarde, PhD

*Internship Preceptors:* Elizabeth A. Rodgers, MPH & Nancy W. Glynn, PhD

### **Experiences Implementing Community-Based Research through the Mobility and Vitality Lifestyle Program (MoveUp): The Accelerometry Ancillary Study**

**Background/Objective:** The MoveUp Program is a community-based, translational behavioral weight management program with the primary objective to implement a 13-month evidence-based physical activity and weight loss intervention program in obese, older adults aged 60-75 years and evaluate its impact on physical function. The MoveUp accelerometry ancillary study aimed to examine the impact of the intervention on changes in fatigability and physical activity. My role focused on implementation of the ancillary study and gaining exposure to community-based research through interaction with study participants and the community health workers who lead the program as well as experience with data collection and management.

**Methods:** Accelerometry data were collected at three time points over the 13 month intervention: baseline, at 5 months, and between 9-13 months. Seven days of objective physical activity monitoring occurred at each time point using a wrist ActiGraph worn on the non-dominant wrist, and a SenseWear Armband worn on the left tricep. Participants also completed the Pittsburgh Fatigability Scale (PFS) at all time points. Software was used to properly prepare the ActiGraphs and SenseWear Armbands for distribution prior to site visits. A script was used to explain the fatigability scale and instruct participants on how to wear the two activity monitors. After participants had worn the devices for seven days, they were collected and the data were downloaded. Detailed reports generated from the SenseWear Armbands were reviewed and mailed out to participants.

**Results:** During my internship, I visited each of the eleven accelerometry sites for assessments and interacted with 98 participants. SenseWear Armband reports were sent out to 78 participants. All three accelerometry visits have been completed for six sites. The remaining sites will complete their final assessment by January 2017.

**Conclusion:** My involvement in this study allowed me to gain invaluable skills and experience in the implementation of community-based research. Working with activity monitors and older adults posed unique challenges such as allergic reactions, communication issues, and technical problems. Data collected from the activity monitors and fatigability scales can be used in future studies to relate activity level and fatigability in older adults.

**Presenter: Julie Paronish**

*Faculty Advisor:* Nancy W. Glynn, PhD

*Internship Preceptor:* Ryan Shields, PharmD, MS

### **Emerging Waves of Carbapenem Resistance among Gram-negative Pathogens at a Tertiary Center**

**Background/Objective:** Carbapenem resistant organisms (CROs) have emerged as a public health crisis. Epidemiologic and clinical factors contributing to the patient outcomes vary. Our objective was to evaluate the emergence of CRO pathogens, and to identify factors associated with patient mortality.

**Methods:** Microbiology records were extracted for the most common Gram-negative pathogens, *E.coli* (Ecol), *Klebsiella pneumoniae* (Klpn), *Pseudomonas aeruginosa* (Psar), *Enterobacter aerogenes/cloacae* (Entb), *Serratia marcescens* (Serm), and *Acinetobacter baumannii* (Acat) from 2000-2015.

**Results:** 84,597 isolates from 37,823 patients were identified. 8,864 (9.5%) isolates were classified as CROs. Standardized by patient, 7.5% of isolates were CR in 2000 and 14.6% in 2015 ( $P<0.001$ ). 58% of CROs were Psar, followed by Klpn-17%, Acat-12%, Entb-7%, Ecol-4%, and Serm-2%. Psar accounted for 86% in 2000 but only 55% in 2015 ( $P<0.0001$ ). On the other hand, Acat, Klpn, and Entb increased from 1-4% CR isolates, to 9%, 19%, and 15%, respectively ( $P<0.0001$  for each). Psar was the most common CR pathogen each year; however, other CROs emerged in waves as second most common (Acat, 2010; Klpn, 2012; Entb, 2014). 90d recurrence rates were highest for Psar (23%), and lowest for Ecol (3%,  $P<0.001$ ). Carbapenem daily defined doses (DDD's)/1,000 patient days increased over the study ( $P<0.001$ ); other antibiotics were unchanged. By cross-correlation analysis, carbapenem DDDs correlated with emergence of CROs at a zero-lag time interval ( $R^2=0.90$ ,  $P<0.001$ ), indicating that increased consumption and emergence of CROs occurred simultaneously. CROs were identified from 4,994 patients; mean age was 57.8 years, 56% were men, and 41% were in the ICU. 26% were solid-organ-transplant recipients. 30- and 90-day mortality rates were 19% and 32%, respectively. 30d rates were higher for Acat (28%,  $P<0.001$ ), and lower for Psar (17%,  $P<0.001$ ). Rates ranged by culture site from 27% (blood) to 12% (urine,  $P<0.001$ ). Age (OR=1.02, 95% CI:1.016-1.026,  $P<0.001$ ) and ICU residence (OR=3.63, 95% CI:3.10-4.26,  $P<0.001$ ) were independent predictors of 30d mortality. Mortality rates were lower among SOT recipients ( $P<0.001$ ). A prediction model was constructed to estimate risk for 30d mortality.

**Conclusion:** CROs have emerged in waves at our center, which is not associated with increased carbapenem usage. CROs are associated with high mortality rates and a prediction model may be useful for clinicians evaluating their patients.

**Presenter: Gabriel Conzuelo-Rodriguez**

*Faculty Advisor:* Lisa Bodnar, PhD, MPH, RD

*Internship Preceptor:* Aurelio Cruz Valdez, DrSciPH

### **Institutional Factors Associated with Cesarean Section Rates in Hospitals of Mexico**

**Background/Objective:** Worldwide, cesarean section (CS) rates have increased in the last decades, particularly the number of elective procedures. Although CS contribute to reduce maternal and fetal morbidity and mortality under appropriate medical indications, risks overpass the benefits when done indiscriminately. In Mexico, CS rates are higher than those recommended by the WHO. Institutional factors such as infrastructure and availability of services have been recognized as predictors of CS, yet they have not been widely explored. The aim of this study is to evaluate the association between obstetric institutional capacity and CS rate in a Mexican setting.

**Methods:** We used Mexican data of the 2010-2012 waves of the WHO Multi-Country Survey (WHOMCS). Data comes from 14 hospitals in Mexico City and Guanajuato. The analysis included 13,060 obstetric events. CS rate was the outcome variable and Facility Capacity Index (FCI) score the main predictor. FCI comprised six service categories: standard of building/basic, medical, emergency obstetric, laboratory tests, hospital practices and human resources, ranging from 12 to 57 points. We also considered type of hospital: public or private, teaching facility and maternity exclusive as secondary predictive variables. We used two multilevel logistic regression approaches to evaluate the relationship between FCI score and CS rates, the first was adjusted for sociodemographic characteristics of the mother and fetus; the second was also adjusted for institutional factors other than FCI score.

**Results:** CS rate in the sample was 47.5%, among which, 34.2% had no evidence of labor. FCI score lied within 32 and 57 points. Hospitals with lower scores were mostly private. In the first model, we found an inverse association between FCI Score and CS rate (OR= 0.93; 95% CI=0.88-0.99). Yet this association is attenuated when the model is adjusted for other institutional factors (OR=1.02; 95% CI= 0.79-1.31).

**Conclusion:** These results suggests that CS is most frequently performed among low capacity hospitals in Mexico which, in our sample, were from the private sector. In those less prepared hospitals for obstetric care, the majority of CS showed no evidence of labor. Current regulations must be enforced in order to limit CS to necessary cases only.

**Presenter: Haidong Feng**

*Faculty Advisor:* Emma Barinas-Mitchell, PhD

*Internship Preceptor:* Hawre Jalal, MD, MSc, PhD

### **Cost-Effectiveness Analysis of Out-of-Hospital Cardiac Arrest Management Strategies**

**Background/Objective:** Out-of-hospital cardiac arrest (OHCA) is the sudden cessation of the heart in an out of hospital setting. In the United States, the incidence of OHCA is estimated at 110 individuals per 100,000 per year. The overall survival rate is 10.8%. The American Heart Association guidelines recommends angiography for patients who have ST elevation in electrocardiogram followed by proper treatments. In patients without ST elevation, other general test and observations would be conducted before further interventions. Some evidence suggests that angiography and immediate percutaneous intervention for OHCA patients could result in better healthcare outcomes regardless of the presence of ST elevation in electrocardiogram. The goal of this study is to investigate whether immediate angiography and PCI are cost-effective compared to the standard of care.

**Methods:** We built a decision tree model in TreeAge Pro to compare the cost-effectiveness of immediate angiography followed by proper interventions to standard care. The model calculates the costs and benefits of each strategy over a one-year time-horizon. We reviewed literatures to obtain the model parameters, including the outcome probabilities, intervention costs, quality of life weights and life expectancy estimates. We calculated incremental cost-effectiveness ratio of immediate angiography strategy compared to standard of care. In addition, we calculated the robustness of our outcomes using one-way sensitivity analysis, and probabilistic sensitivity analysis (PSA) were varied all the parameters jointly.

**Results:** Immediate angiography was more expensive than the standard care (\$122) per patient treated, but more effective [0.03 quality-adjusted life-years (QALYs)], resulting in an ICER of \$3600/QALY compared to the standard care. These findings were robust to all one-way sensitivity analyses. In addition, PSA showed there is more than 80% probability that immediate angiography is more cost effective than the standard care conditional on \$100,000/QALY willingness to pay threshold.

**Conclusion:** Our results suggest that immediate angiography is more cost effective than the standard care for OHCA patients from a societal perspective because the ICER is well below the upper limit of the threshold that is generally considered to be cost-effective by many health-care agencies.

**Presenter: Bethany Hallam**

*Faculty Advisor:* Nancy W. Glynn, PhD

*Internship Preceptor:* Courtney Kuza, MPH

### **Provider Perceptions of Rounding Checklists in UPMC Intensive Care Units**

**Background/Objective:** Checklists are used in industries that recognize the possibility of human error and resulting harm from stressful working conditions. Though ICUs are known to be stressful working environments, there have been conflicting results concerning the utility of checklists in critical care medicine. While other fields have improved outcomes and avoided accidents with the application of checklists, the field of critical care is just beginning research on the development and implementation of checklists. This Quality Improvement project seeks to understand UPMC critical care providers' perceptions and utilization of checklists during daily rounds.

**Methods:** We performed a mixed-methods project in 36 ICUs in 14 hospitals in the UPMC system. The ICUs had varying degrees of checklist use, from no use to integrated use. Data collection consisted of field notes of observations of daily physician rounds and transcripts of semi-structured interviews with clinicians who attend rounds. We collected demographic data from interview participants via questionnaire and attributes of each hospital via report from Unit Directors. Using NVivo, we performed thematic content analysis on field notes and interview transcripts.

**Results:** Participants identified several common barriers to checklist use, including the opinion of the attending physician, redundancy with one's mental checklist, and wishes to keep rounds efficient. Perceived facilitators to checklist use included integrating its use into rounds and having buy-in from members of the rounding team. Participants had varying opinions of checklists from positive positions on being used for new staff to negative connotations with "cookbook" medicine. It is important to note that not all units utilized checklists. Units which utilized checklists were typically larger with higher patient acuity than units that did not utilize checklists. In addition, units which utilized checklists most commonly had fellows or residents attend rounds during the week.

**Conclusion:** Effective adoption of rounding checklists in UPMC ICUs would require addressing concerns about their perceived usefulness and time commitment. If a unit chose to implement checklists, obtaining buy-in from attending physicians would be an integral part of the sustainability plan of checklist use. Additionally, physicians and other stakeholders should be included in the development and promotion process.