

2019 Robert Wood Johnson Medical School Distinction Abstracts

Distinction in Bioethics

Distinction Director: Dr. Eric Singer

Natasha Dilwali

Faculty Mentor: Dr. Eric Singer

Title: “Physician Heal Thyself” Ethical Issues in Medical Trainee Self-Care

Medicine is a profession rooted in the healing relationship. Bioethicist and doctor, Edmund Pellegrino, eloquently stated, “What is unique about the medical encounter is the interactions between someone who is ill, on the one hand, and someone who professes to heal, on the other.¹” Yet, the culture of medicine has caused breaks in Pellegrino’s described healing relationship. Many medical trainees have forgotten that these aspects of a healing relationship not only apply to their patients, but to their own mental wellness as well. This paper will apply the specific aspects of the “healing relationship” which include the fact of illness, the act of profession and the act of medicine in the context of medical trainees as the patient, and medical institutions as the doctor. It will argue how many of the obstacles and stigmas surrounding mental health fail to truly understand the healing relationship between the patient (medical trainee) and doctor (medical institution). Additionally, this paper will reflect on current practices and innovative ideas that address barriers to care. While there is a growing recognition of the severity of this problem, there is still a crucial need for a more comprehensive approach to meet the needs of medical trainees.

Travis Kling

Faculty Mentor: Dr. Eric Singer

Title: Bioethical Implications of Medical Student Participation in Global Health Experiences

Global Health Experiences are an increasingly popular activity for medical students; with thousands of students from developed nations traveling to areas with high levels of unmet healthcare needs each year. Students stand to gain both personal and professional competencies from their participation while also helping to address healthcare disparities. However, student involvement raises a number of ethical considerations in regards to patient safety and health. Chief amongst these, the principle of nonmaleficence has the potential to be breached, especially in resource-poor areas with little student supervision. The responsibility to provide just care may also fail to be met if patient populations do not derive a level of benefit commensurate to the risk they incur by having foreign medical students involved in their care. In every experience and interaction, students would do well to exercise virtue and recognize when they have the potential to do good and when they do not. Despite the risks of medical student involvement in global health experiences, interventions including institutional oversight, curricular changes, and an increased emphasis on outcome data collection will allow medical student integration into international health to be realized both ethically and practically.

Distinction in Global Health

Distinction Directors: Dr. Javier Escobar and Dr. Karen Lin

Zina Model and Dhaval Mehta

Faculty Mentor: Dr. Gregory Peck

Co-authors: Paul Truche, MD; Camilo Cuatin Gutierrez; Vicente Gracias, MD; Carlos Ordoñez, MD; Gregory Peck, DO; Luis Fernando Pino, MD

Title: Feasibility of Prospective Prehospital Process Improvement and Data Collection in Cali, Colombia

Objective: Two objectives exist; 1) Establish the groundwork for prehospital longitudinal needs assessment and process improvement, 2) Prospectively assess prehospital and hospital data collection and integration feasibility for a regional trauma center.

Methods: Three US medical students spent three months in collaboration with Colombian medical students and prehospital stakeholders for a prehospital needs assessment in Cali, Colombia between April and July 2016 at a highest tier public trauma facility. A one-week feasibility study followed to assess capability of collecting data from prehospital providers at the time of hospital presentation for prospective data collection and process improvement.

Results: Minimal prehospital data penetrates the existing hospital data registry as no process exists to transfer prehospital data at the time of patient arrival (Table 1). Process improvement led to reciprocal ethics committee analysis and interpretation of the study protocol, multidisciplinary participation between epidemiologists, research students, trauma surgeons, prehospital providers, and emergency department faculty, and secure online database initiation. A data collection form including a short list of variables was created. Feasibility of data collection was demonstrated (results summarized in Tables 2 and 3).

Conclusion: This early work lays the foundation for sustainable prehospital and hospital process improvement. Successful early adoption in one hospital indicates that data transfer between prehospital providers and the hospital is feasible. The process may be scaled across multiple Colombian agencies and cities, ideally to promote trauma center and system prehospital inclusivity. This process is an important first step towards the goal of developing a data link between prehospital care and hospital registries for eventual trauma outcomes assessment.

Ethan F. Pearlstein

Faculty Mentor: Javier I Escobar, M.D.

Title: “The Abuse of Psychiatry Globally: A Little-Known Historical Example from Francoist Spain”

This Distinction in Global Health project examines Francoist medicalization, or the characterization of the Spanish Civil War in medical terms, as suggested by Spanish psychiatrist Dr. Antonio Vallejo-Nágera. This work looks to address the function that medicine served for the Franco regime, and to justify the introduction of a directorship in psychiatry in the Nationalist camp as early as August of 1936. Through close textual analysis of several key publications by Vallejo-Nágera, including *Racial Politics of the New State* (1938), and “*Psyche of Marxist Fanaticism: Psychologic Investigations in Delinquent Marxist Feminists*,” (1939), this project traces the development of a Nationalist medical discourse and argues for its significance in writing of the enemy as psychiatrically degenerate, while advocating for and justifying the violent repression of the Republican opposition. The project also contextualizes the abuse of medicine as a global practice throughout history, citing examples including the Aktion T-4 project in Nazi Germany, the Tuskegee syphilis experiment in the United States, and the application of false psychiatric diagnostic labels in the USSR.

Deesha Sarma

Faculty Mentor: Dr. Greg Peck

Title: Assessing the Strength of the Surgical System in Medellin, Colombia

Background: Surgery has recently emerged as a global health priority in recognition of its potential for alleviating the global burden of disease. The Lancet Commission on Global Surgery (LCoGS) identified six indicators for assessing surgical system strength. Colombia was one of the first Latin American countries to begin the process of data collection for these indicators.

Methods: A pilot study was completed in Medellin, Colombia from June – July 2016. Data for Indicators 1-3 was collected via partnerships with local institutions, while data availability and infrastructure was assessed for Indicators 4-6.

Results: The collected data provide preliminary insights into the state of surgical care and highlight challenges to indicator assessment. For instance, although comprehensive records are kept on ambulance response times, hospital wait time data must also be collected to accurately represent Indicator 1. Of the surgeries that took place January - June 2016 at San Vicente Hospital, 40% were emergent procedures that took place in the ER operating room (OR), while others were prescheduled for specific ward ORs.

Conclusion: These data are the first collected and shared from any of the LCoGS research projects in Colombia. The insights and next steps in indicator data collection, analysis, and interpretation will not only guide planning as this project scales up nationally in Colombia, but also provide an implementation framework methodology for other Latin American research teams.

Bo Tang

Faculty Mentor: Dr. Karen Lin

Title: Applying cultural competency: the framework for improving patient outcomes by addressing racial and ethnic disparities in health care

Objective: The project describes the culturally relevant healthcare model used in Chiayi, Taiwan and its efficacy in addressing health care disparities within its population.

Methods: We describe a unique one-month educational activity experienced by medical students from Rutgers RWJMS. These students worked with the local non-profit culture and education foundation in conjunction with local primary care physicians to coordinate better patient outcomes by including the help of the town's community service groups, restaurant owners, and shrine keepers. Discussion with Chiayi's residents and surveys performed by local physicians were used to determine whether patients' health care compliance and use increased after the implementation this model.

Results: Both satisfaction with, and the use of, health services in Chiayi were higher after implementation of the new healthcare model. The inclusion of community members and acknowledgement of patients' spiritual and ethnic beliefs was reported by participants as a major contributing factor in improving patient-physician relationships. Students who were involved reported better understanding of diverse racial and ethnic beliefs, benefits of community involvement, and physicians' role in providing culturally competent care.

Conclusion: Inclusion of cultural competent medical training and its implementation in clinical medicine can help physicians overcome barriers in racial and ethnic disparities in health care.

Aisha Van Pratt Levin

Mentor: Dr. Karen Lin

Title: Health Passport to Healthy Living (HPhL)

HIPHOP Promise Clinic, the student-run free clinic at Rutgers Robert Wood Johnson Medical School, provides primary care to uninsured adults in New Brunswick. Patient referrals originate from our local soup kitchen, Elijah's Promise. Approximately 45% of clinic patients have hypertension and 20% have diabetes. In such a vulnerable and complex patient population, it is imperative to find creative solutions to help individuals better understand their health and feel empowered to make healthier choices.

In Mexico, the Cartilla Nacional de Salud (National Health Card) was developed so patients have their health information at their fingertips and to improve continuity of care as patients visit different providers. Health Passports to Healthy Living, a project modeled after Mexico's Cartillas de Salud, aims to bring similar tools to the greater New Brunswick community. We hope to determine whether the use of health passports can lead to better healthcare outcomes, increased health literacy, and increased empowerment among our uninsured patients. We will assess these changes through bi-annual surveys. We predict that consistent use of health passports will lead to a patient's increased understanding of their health, awareness of resources available to them, improved communication with their providers, and ultimately an increase in their self-advocacy.

Distinction in Leadership in Academic Healthcare

Distinction Directors: Dr. Martha Lansing and Dr. Carol Terregino

Caroline Kwon

Project Advisor: Dr. Christina Duzyj Buniak, MD MPH

Significant Contributions: Rick Lang, MS4

Title: Informal Leadership in Improving the Patient Safety Culture in Obstetrics

According to Leadership: Communication and Social Influence in Personal and Professional Contexts, “Informal leadership tends to be emergent rather than predetermined, as is the case with formal leadership roles. For example, through specific behaviors such as suggesting alternative courses of action, motivating others, or influencing the beliefs of growing members, the informal leader emerges naturally.” While the concept of a “leader” has been described extensively across multiple disciplines, it has yet to be fully defined with respect to health care. This may stem from the diverse competencies and complex interactions inherent to health care, a hierarchical setting in which both “formal” and “informal” leaders are present. For example, while a provider must assert experience and knowledge to care for a patient, he or she must also respect patient autonomy. Similarly, a senior member of a patient’s team may defer to a skill of a trainee to empower independence as a provider and leadership development.

The primary objective of this distinction project was to develop and utilize “informal” leadership skills necessary to gather buy-in for team competency-based patient safety trainings on the obstetrics units towards the goal of improving adverse perinatal outcomes. Baseline assessment of safety culture, as well as course design and implementation at the hospital level was conducted amongst the Ob/Gyn, Anesthesia, Pediatrics, and Nursing departments. The secondary objective was to understand barriers to the training implementation in order to improve future patient safety activities.

Shirin Poustchi

Project Mentor: Dr. Paul Weber

Project Title: Local Interdisciplinary Care Collaborative (LINC)

Local Interdisciplinary Care Collaborative (LINC) is a student-run interdisciplinary community health initiative with a two-fold purpose. Established in 2015 under the umbrella of the RWJMS Homeless and Indigent Population Health Outreach Project (HIPHOP), LINC seeks to establish community relationships with underserved neighborhoods in New Jersey to improve the health of these communities along with building a collaborative network of hands-on learning experiences for Rutgers health professions students through an interdisciplinary, innovative practice model. With support from Rutgers Global, our team in conjunction with our community partner, the Franklin Food Bank, conducted a Community health needs Assessment for their patrons. As a multi-phase initiative and in alignment with the standard of evidence-based medicine, the findings of the community health needs assessment are now guiding the design and implementation of student-run, sustainable health interventions for those within the community. We strive to gain greater perspective on the social determinants of health affecting communities neighboring our institution in order to shed light on the role academic healthcare institutions can play in partnering with communities.

Kristin Raphel

Faculty Mentor: Dr. Colleen Donovan, MD

Title: Teamwork in Medical Education: Implementation of TeamSTEPPS Training Into Third Year Medical Student Clinical Simulation Training Exercises

Teamwork, communication, and leadership errors consistently rank as top causal factors for preventable medical errors. TeamSTEPPS is a program designed to equip healthcare professionals with the skills to circumvent these errors. As future healthcare team leaders, it is important for medical students to cultivate these skills early. For my DILAH distinction project, I utilized and honed my own unique leadership skills by creating a TeamSTEPPS integrated clinical simulation for incoming third-year medical students. This exercise allowed students to further develop their leadership skills with repeated opportunities to use them. We provided students with a TeamSTEPPS refresher lecture prior to the exercise and furnished them with laminated TeamSTEPPS playbooks and Roles & Responsibilities cards during their simulations. Students worked together to navigate a simulation with a high-fidelity mannequin. Following the exercise, faculty and TeamSTEPPS Master Trainers led both a clinical debrief and a teamwork debrief to address the teamwork, leadership, and communication skills observed. This activity was rated very favorably by participants and has helped elucidate areas of strengths and weaknesses for further improvement. This TeamSTEPPS-simulation integration furthers our institution's devotion to teaching students the skills necessary to help avert future preventable medical errors and to become effective healthcare team leaders.

Distinction in Medical Education

Distinction Directors: Dr. Robert Lebeau

Yatee Dave

Faculty Mentor: Dr. Hanin Rashid

Title: Personality characteristics and burnout in third-year medical students

Introduction: Burnout is a rising issue given its negative impact on professional development and personal health (Dyrbye 2016) and high prevalence amongst medical students (Dyrbye 2006). Although burnout is oft viewed as a system issue (Shanafelt 2017; Dyrbye 2016; Maslach 2003; Maslach 2016), personality is an individual factor that may explain why some individuals are more vulnerable to burnout. Few studies explore the relationship between personality and medical student burnout during major clerkship year (Lee 2017; Lin 2016; Hansen 2016; Dahlin 2007; Bughi).

Methods: 174 third-year medical students at one institution were invited to complete the NEO Five Factor personality inventory and Maslach Burnout Inventory. A series of multiple regression analyses were conducted, with personality traits as predictors and burnout subscales as criterion variables.

Results: 116 students completed the survey for a response rate of 67%. 61 students (53%) were burned out. Personality accounted for 23.4 – 49.5% of the variance in burnout. Neuroticism, conscientiousness, extraversion, and openness were significant predictors.

Conclusions: This study advanced the literature on personality and burnout amongst medical students. These findings have implications for students' future wellness as residents and physicians, as this is their first experience with the clinical aspects of medicine. Burnout management strategies include personality-specific coping mechanisms to foster resilience (Campbell 2006). More research is required to investigate the utility of personality assessments in mitigating burnout.

Barbara Dutra

Co-authors: Matthew Lissauer MD; Hanin Rashid, PhD

Title: Nutritional education on the wards: A self-directed module for improving medical student knowledge of nutrition assessment and interventions

Objective or purpose of innovation: To provide medical students at Rutgers RWJMS an introductory education module on nutritional assessment, nutritional needs and the use of enteral and parenteral nutrition support.

Background: Nutrition plays a key role in the prevention and treatment of disease. Hospitalized patients are often malnourished which is a major contributor to medical complication, decreased quality of life, lengthened medical stay and increased health care costs (1). However, current data reveals inadequate nutrition training in medical schools and residencies in the United States and medical students and physicians report feeling poorly trained. (2,3,4).

Design: Third and fourth year medical students at Rutgers RWJMS in medicine, surgery and critical care clerkships were given access to the nutrition education module and a pre and post-module survey aimed at measuring nutritional knowledge. A one-sample T-test was used to assess the relationship between the mean scores of the pre and post-module surveys.

Outcomes: 109 of 255 students responded to the pre-module survey. Of these, 82% reported no formal nutritional education, yet 64% encountered cases that required nutrition intervention, and 51% reported poor understanding of the recommendations. 32 students completed the module and post-module survey. There was a significant difference in the mean score between students who completed the module and post-module survey ($M=4.51$, $SD=0.68$) compared to the overall student population score prior to having access to the module ($M=2.42$, $SD=1.49$; $t=22.7$, $p=0.0001$).

Innovation's strengths and limitations: Medical students have limited training in nutrition education and our findings show that a self-directed online module could improve students' knowledge (2,3). However the study is limited by its power, which can be partially explained by the limited independent study time noted in prior studies (4).

Feasibility and generalizability: An online module is easily accessible to students and could serve as a tool to increase medical student knowledge of nutrition management.

Yousef Elfanagely

Title: Taking the USMLE Step 1 before or after clerkship experience: Does the timing of the USMLE Step 1 influence student perceptions of Basic Science?

Purpose and Background: Basic science is the foundation for clinical reasoning and diagnostic accuracy.

1. Perceived value of basic science has implications for learning and achievement 2. Student perceptions of the value of basic science may be shaped by the timing of the USMLE Step 1 exam. This study compares students' perceived value of basic science in schools who take the USMLE Step 1 exam after core clerkships (AC) and those who take it before clerkships (BC).

Methods: A 22 item anonymous questionnaire assessed student perception and integration of basic science using a 5-point Likert scale. Fourth-year students from three medical schools (two AC, one BC) participated in the study after having completed Step 1 and core clerkships. Independent t-tests were calculated for difference in combined items measuring constructs after verifying that the two AC schools were not significantly different.

Results: Surveys were completed by 120 AC (41%) and 84 BC (60%) students. Students who took Step 1 before clerkships were more inclined to see value in basic science. This is evidenced in AC students more strongly agreeing that basic science has minimal value for clinical knowledge ($t = -5.394, p < .001$), less strongly agreeing that basic science is foundational to practice ($t = 2.80, p = .006$), and less strongly endorsing physicians' integrating basic science ($t = 2.31, p = .022$). BC students reported more strongly agreeing that basic science is educationally valuable and actively integrating their knowledge during clerkships ($t = -2.04, p = .043$).

Conclusions: The structure of a medical school's curriculum may influence student perceptions of basic science, which has implications for learning and long-term retention³. Taking Step 1 after clerkships may promote lower perceptions of the clinical value of basic science. It may also result in students less purposefully recalling and integrating basic science knowledge during clerkships. Future studies will include more medical schools to account for school culture.

Richard Lang

Project Advisors: Dr. Carol A Terregino, MD; Dr. Gregory L Peck, DO FACS

Significant contribution by Robert Lebeau, EdD

Other Supporting Students: Kevin Fitzpatrick, Kristin Raphael, Thomas Kuriakose, Stephanie Latham

Title: Teamwork in Medical Education: A Student-Led Initiative in Quality and Safety

Introduction: Comprehensive literature indicates that effective teamwork improves patient safety and that teamwork training is necessary within health professions education. A paucity of guidance exists on methods to best conduct teamwork training in educational curricula. The primary objective of this study was to examine the effectiveness of a student-veteran inspired intervention to increase teamwork behaviors of medical students. The secondary objective was to understand barriers to teamwork training implementation.

Methods: Student-led TeamSTEPPS-based training was developed and administered across three curricular settings at Robert Wood Johnson Medical School. Pre and post intervention analysis was completed via TeamSTEPPS-based surveys, with mixed method analysis utilized to analyze 486 completed surveys. Cohens-d effect sizes were calculated to quantify behavioral magnitude of change. Qualitative assessment identified reported barriers to intervention implementation.

Results: Near-moderate to high effect was demonstrated across all settings for student leadership behaviors, frequency of briefing and debriefing, and perception of preparedness for team events. Initially unforeseen programmatically-imposed teamwork barriers limited program effectiveness in two settings.

Conclusion: Student-led faculty-supported teamwork training is as an effective mechanism to increase teamwork behaviors of students. Achieving effective academic curricular teamwork training requires an evidence-based teamwork training model with recurring teamwork barrier assessment. Recommendations for curricular teamwork training are provided.

Periel Shapiro

Co-authors: Robert Lebeau, Ed.D.; Anthony Tobia, MD

Title: Mindfulness Meditation for Medical Students: A Student-Led Initiative to Expose Medical Students to Mindfulness Practices

Objective or purpose of innovation: To provide a basic theoretical and experiential familiarity with mindfulness meditation and to explore expectations and perceived problems associated with mindfulness in medicine and medical education.

Background and/or theoretical framework and importance of the field: Mindfulness meditation is a wellness practice that is being incorporated into the curriculum of a growing number of U.S medical schools (1).

Exposure to mindfulness practice may improve student wellness, enhance understanding of mindfulness modalities, and provide an experiential foundation for the biopsychosocial model (2). Medical student exposure to mindfulness interventions has been associated with a greater likelihood that students will administer or suggest such interventions in the future (3).

Design: 41 Rutgers Robert Wood Johnson pre-clinical medical students attended a two-hour introductory mindfulness class and requested to participate in a full 8-week course; 20 were randomly accepted due to technical constraints. The course consisted of eight 1.5-hour weekly group sessions, a mindfulness in medicine didactic component, and daily home practice. Course materials were adapted from Mindfulness-Based Stress Reduction (MBSR). The course was taught by a trained MBSR instructor.

Outcomes: 80% of students who took the full mindfulness course expressed comfort with utilizing mindfulness modalities, versus only 23% of those who attended the introductory session alone. Thematic analysis revealed a perception of mindfulness as a safe alternative that fosters patient autonomy but also requires cognitive effort and dedication.

Innovation's strengths and limitations: The course provided students with a greater understanding of mindfulness interventions in clinical medicine and student wellness. The responses elicited from students also illuminated medical student perceptions of mindfulness in medicine. However, the time commitment required of medical students was a significant limitation on attendance and participation.

Feasibility and generalizability: 20 students attended most or all components of a full course. The Rutgers Robert Wood Johnson medical student population is similar to that of many other U.S medical schools. As such this innovation is feasible and can be generalized to other medical U.S schools.

Distinction in Medical Innovation and Entrepreneurship

Distinction Director: Dr. Paul Weber

Christopher Bargoud

Faculty: Dr. Todd Demmy

Title: Suffusion Technologies – SPACCS (Selective Pulmonary Artery Catheter Control System)

Lung cancer is the 2nd most common cancer for both sexes; behind skin cancer and approximately 415,000 patients in the US have been diagnosed with lung cancer at some point in their lives. Current treatment options include surgery, chemotherapy, radiation therapy, other surgical techniques, or any combination however they have poor 5-year survival rates, high relapse rates, undesirable due to intolerable side effects, or are not practical due locally advanced or metastatic disease at the time of diagnosis.

SPACCS is a novel catheter with 4 lumens and 2 balloons designed to facilitate Pulmonary Suffusion. It is specifically designed to mitigate the systemic side-effects of chemotherapy and to provide a new alternative to advanced, un-resectable lung cancer by delivering the chemotherapy, at 5% of the systemic dose, directly to the lung via pulmonary suffusion. This administration minimizes the systemic side effects while still providing adequate chemotherapy to the lung. In addition, it provides a treatment option for those with otherwise untreatable lung cancer.

Raymond Cai

Faculty Mentor: Paul Weber MD, MBA, RPh and Tomer Davidov, MD

Title: The Biband

Congestive heart failure (CHF) is a disease that plagues many Americans. In 2018, there were an estimated 6.5 million adults afflicted, with projections rising to more than 8 million adults by 2030. With the disease comes many hospital visits and in turn high healthcare costs as well. Our product, the Biband, introduces a revolutionary method for treating congestive heart failure. It consists of 2 bands placed around the lower extremities that measure the circumference of the limb. These measurements are sent to an app that the device is paired with. Once the circumference crosses a threshold, indicating a possible impending CHF exacerbation, users are alerted to contact their primary care physician (PCP) to determine their next steps to avoid a possible ER visit. Users can also grant family members and their PCP access to their account, receive alerts, and take action as well. Furthermore, the measurement data will be stored on the app, which would allow users to track their health status across time and optimize treatment strategies. All of these functions combined will allow users to take a more proactive stance about their health, which will lead to an improved quality of life as well as decreased healthcare costs.

Shirin Poustchi

Project Mentor: Dr. John Collins

Title: Suretify

The discharge process is a well-known “pain point” in the hospital system as it is often time-consuming, convoluted and exhausting for both the patient and the healthcare team. Suretify is a web based platform seeking to simplify the hospital discharge process through the use of an information guided discharge assistant that helps elucidate a patient's required resources once they enter the transition of care (TOC) process from the hospital to home/rehab facility. The Suretify mission is to align the right resources for the right patient and provide actionable resource delivery for the health care team without additional workflow deviation. The Suretify platform solution utilizes defined electronic health record variables and patient engagement surveys to automatically trigger platform connected third party resources and follow up action item checklists for any resource a patient may need after leaving the hospital setting.

Distinction in Research

Distinction Director: Dr. Celine Gelinias and Dr. Anna Petrova

Joshua A. David

Co-authors: Alvaro Villareal-Ponce, PhD11, Salma A. Abdou, BAI, Darren Sultan, BAI, Jennifer Kwong, BAI, William J. Rifkin, BAI, Sonali Sharma1, Ernest S. Chiu, MD1, Piul S. Rabbani, PhD,1 Daniel J. Ceradini, MD1

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Faculty Mentor: Richard L. Agag, MD

Title: Nrf2 Dysfunction Impairs Wound Healing in Diabetes Via Impairments in Re-Epithelialization

Chronic diabetic wounds are the leading cause of lower extremity amputations in the United States, and remain a difficult therapeutic and financial challenge despite advancements in glucose control and wound therapies. We, and others, have previously implicated dysfunction of the Nrf2/Keap1/ARE antioxidant pathway in diabetic wound-healing whereby, despite ongoing reactive oxygen species (ROS) production, nuclear localization of Nrf2 and antioxidant gene activation is disrupted. However, the spatial contributions of Nrf2 dysfunction within the regenerative wound microenvironment remain relatively uncharacterized, and the extent - if any - to which these defects extend to humans is unknown. Here, we demonstrate Nrf2 expression within the cutaneous epithelium is critical for proper wound regeneration, and loss of this transcription factor in basal keratinocytes recapitulates the diabetic wound-healing phenotype through defects in cellular redox homeostasis and expression of key antioxidant molecules. These defects are manifested on a cellular level through pathologic accumulation of ROS, and on a tissue level through impaired wound regeneration. Moreover, defects in cutaneous Nrf2-expression extend to chronic, diabetic wounds in humans. Of significant clinical importance, Keap1 inhibition can reverse this signaling defect in diabetic keratinocytes, restore cellular redox homeostasis, and re-establish key functional regenerative processes of re-epithelialization and proliferation.

Danielle Levin

Faculty Mentor: Dr. Shaul Cohen

Title: Effectiveness of P6 Stimulation for Reduction of Nausea and Vomiting During Cesarean Section Under Combined Spinal-Epidural Anesthesia: A Randomized Controlled Trial

Obstetric patients who receive combined spinal-epidural anesthesia for elective cesarean section frequently experience intraoperative nausea and vomiting. Prophylactic therapy with antiemetic agents can have multiple adverse effects to the mother and baby. We designed a randomized clinical trial to evaluate the efficacy of electrical P6 stimulation for prophylactic nausea and vomiting treatment for scheduled elective cesarean section performed under combined spinal-epidural anesthesia. Following IRB approval, a total of 180 patients were randomly allocated into three groups: (1) P6 stimulation, (2) intravenous antiemetic medications, and (3) control. Significantly fewer patients experienced intraoperative nausea and vomiting in the P6 group (nausea 36.7% and vomiting 13.3%) and intravenous antiemetic group (nausea 23.3% and vomiting 16.7%) than those in the control group (nausea 73.3% and vomiting 45%; $p < 0.001$). In addition, significantly fewer patients required rescue antiemetic medications in the P6 group (35%) and the intravenous antiemetic group (31.7%) than those in the control group (73.3%; $p < 0.001$). Our data suggest that P6 stimulation is as simple and as effective as our routine prophylactic intravenous antiemetic treatment for prevention of N&V during CS performed under CSE anesthesia that could be of great interest to patients and obstetric anesthesiologists who prefer treatments with fewer potential side effects.

Jennifer O'Donnell

Mentor: Dr. Catherine M. Gordon, MSc, MD, Boston Children's Hospital

Title: Correlation of Functional MRI Response to Visual Food Stimuli with Clinical Measures in Adolescents with Restrictive Eating Disorders

Objective: Previous reports have shown increased activation in anxiety networks in individuals with restrictive eating disorders (EDs). This study investigated functional abnormalities within brain systems upon food provocation, and correlated data with behavioral outcomes.

Methods: Eighteen females, aged 13-18, with restrictive EDs completed a baseline visit which included functional magnetic resonance imaging (fMRI) during a visual food paradigm. Visual stimuli included five categories of food and non-food images. Anxiety and disordered eating cognitions were assessed using the State-Trait Anxiety Inventory (STAI) and the Eating Attitude Test (EAT-26). Voxel-wise analyses were performed to contrast responses to stimuli and test for correlations between contrasts and behavioral scores.

Results: Contrasts of all foods versus nonfoods resulted in positive responses in occipital regions and negative responses in temporal and parietal gyri. Similar activation was seen examining sweets vs. nonfoods with addition of activation in the hippocampus. Contrasting sweets to nonsweets, the medial prefrontal cortex and anterior cingulate were activated. In correlation with the STAI-State (SS) scores, the food vs. nonfood contrast showed a positive correlation to SS in the orbitofrontal cortex, anterior cingulate (ACC),

Continued – Jennifer O'Donnell

and the amygdala and negative correlation in the precuneus. Finally, sweets vs. nonsweets contrast correlated positively with EAT-26 in ACC and other frontal areas.

Discussion: Food visual stimuli elicited brain responses in the reward circuitry and sweet foods extended activation to other limbic domains. Correlations with behavior included sweet food contrasts to EAT-26, which aligns with the default mode network tied to introspection. Thus, we conclude that visual food stimuli produce activation in reward- and anxiety-regulating regions in patients with restrictive EDs that correlate with symptom severity.

Continued – Distinction in Research

Alexander Watson

Title: Impact of Physician Workload on Burnout in the Emergency Department

The “Impact of Physician Workload on Burnout in the Emergency Department” was a study I designed with Dr. Jonathan McCoy to determine how physicians attribute changes in their patients’ outcomes to the effects of increasing workload and how these perceptions are related to changes in burnout. As a first step, Dr. Daniel Gundersen and I modified and tested an instrument for use with Emergency Medicine physicians that had originally looked at the perceived effects of workload on patient care by hospitalists. Then, we took these subjective assessments and correlated the items within them with the burnout domains of Emotional Exhaustion, Depersonalization, and Personal Achievement. Ultimately, the final manuscript was published in *Psychology, Health & Medicine*.

I undertook this project, because it afforded me the opportunity to learn the research process from start to finish under the guidance of prolific researchers. The follow-up projects that resulted from the initial study allowed me to improve upon some of the strategies I’d learned and begin to teach aspects of the research process to other novice researchers. This distinction project completely changed my career trajectory and has inspired me to pursue a career in academic rehabilitation medicine with a dual clinician-researcher role.

Distinction in Service to the Community

Distinction Directors: Dr. Michael Steinberg, Ms. Maria Pellerano, Dr. Eric Jahn

Catherine Parkhurst Gardiner

Co-authors: Emily Fennell and Megha Patel

Project Title: One Meal at a Time

One Meal at a Time created a hands-on, nutrition education program to improve health outcomes for a local population recovering from substance use disorders. Nutritional programs for patients in recovery have been shown to help patients establish a healthy routine, lose weight, and support remission by balancing blood sugar and maintaining healthy neurotransmitter levels. One Meal at a Time created six nutritional sessions per year with the residents of Good News Home for Women, a residential treatment center for substance use disorders in Flemington, New Jersey. At each session, we cooked a family-style meal centered around a specific nutrition lesson, followed by a focused discussion over dinner. The student leaders cooked and enjoyed the meal alongside the residents to promote a sense of community and guide the session's discussion topics toward the residents' needs. The residents left each session with the evening's recipe and other recipes and templates to create healthy dishes to their preferences. This project served as practical tool to encourage healthy eating and living for women seeking to rebuild their lives as they recover from substance use disorders.

Katherine Schertz and Becky Temkin

Faculty Advisor: Dr. Anthony Tobia

Central Jersey Family Health Consortium and Rutgers Robert Wood Johnson Medical School

Project Title: The INSPIRE Project

Introduction: Perinatal mood and anxiety disorders (PMAD), comprised of depression and anxiety during and after pregnancy, significantly impact women and their families. Barriers such as stigma, language, cultural norms surrounding motherhood, and difficult-to-access community services prevent many women from seeking care, especially those of low socioeconomic status.

Aims: The aim of this project was to increase understanding, decrease stigma, and normalize treatment-seeking behaviors among new moms with PMAD.

Project Implementation: Sessions were conducted with Central Jersey Family Health Consortium-affiliated support groups. We collected personal accounts and artistic renderings from women in eight sessions, representing a broad spectrum of PMAD experiences. Sessions were run using a novel curriculum designed by the INSPIRE creators.

Community Engagement: The curriculum was piloted and edited with the input of moms at the Monmouth Perinatal Mood and Anxiety Disorder Center.

Outcomes: The anthology consists of stories from three different support groups, diverse in language, socioeconomic status and experience, and distributed to Monmouth Perinatal Mood and Anxiety Disorder Center, Harvest Family Success Center, and Chandler Health center.

Sustainability: Eight support group leaders were trained to use the INSPIRE curriculum. The anthology will be used at each support group site, and wider distribution is planned.