1. Improving access to dermatologic care for deaf and hearing impaired patients in Massachusetts

PI: Louis Kuchnir, MD, PhD

Interview required – please contact PI via text or voice at 508-450-6141 to arrange a phone call or meeting and email CV to Kuchnir@alum.mit.edu

Description:
The Americans with Disabilities Act and the Affordable Care Act require physicians to provide accommodations for all patients with disabilities. Nevertheless, the deaf community faces significant barriers when attempting to access healthcare. This research project attempts to improve access to private practice dermatology services, specifically.

Prior research by our group includes meetings with advocates, interpreters, lawyers, and dermatologists, and we have developed a high-quality toolkit with various accommodations that physicians may utilize when caring for the deaf and hard of hearing population. While in-person American Sign Language is the preferred accommodation for many deaf patients, there is a spectrum of abilities that physicians must accommodate (e.g. a patient who becomes deaf later in life and does not know sign language). Furthermore, ASL interpreters are costly and often unavailable for private practices (as opposed to hospitals, which frequently have on-site interpreters). There are several alternatives to in-person interpreting, such as video remote interpreting, that will appropriately suffice for many clinical interactions.

Our group partners with the National Association for the Deaf on this project. While the immediate focus is Massachusetts dermatologists, this toolkit may ultimately be distributed more broadly, improving patient outcomes on a larger scale. Minimal research has been conducted on accommodations for deaf patients in the health care setting, and results from our research will be highly informative for providers, as well as strongly impactful for patients. Identifying an approach that successfully educates providers about caring for underserved communities could also lead to improved access for other underserved communities in the future.

Student's role:
- To understand the toolkit, improve its effectiveness, and usher its acceptance.
- This summer's research student may design an effort to distribute the toolkit and/or educate about accommodation options; collect data on the efficacy of this effort; and analyze these results.
- However, this project has significant flexibility and the summer research fellow will have the opportunity to move the project forward in any direction that he or she sees fit. Examples of other possible directions include medical-legal research, creating ADA-compliancy training for physicians and/or medical students (such as with standardized patient scenarios), or creating a "best-practices" manual for improved utilization of ASL/VRI services.
- Publication in peer-reviewed literature is a central goal.
- The student will also have the opportunity to explore dermatology as a potential future career field by participating in dermatology clinic, journal club, and grand rounds during this research fellowship.

Required Skills:
N/A

Location of research:
kuchnirdermatology.com

Students will complete clinical research at many of our practice's offices, including:

- Marlborough Office
  340 Maple Street, Suite 203
  Marlborough, MA 01752
- Milford Office
  1 Maple Street
  Milford, MA 01757
- Shrewsbury Office
  24 Julio Drive
  Shrewsbury, MA 01545
- Framingham Office
  125 Newbury St., Suite 400
  Framingham, MA 01701

2. Risk of cytomegalovirus (CMV) disease with the use of low dose valganciclovir prophylaxis after solid organ transplantation

PI: Nicole Theodoropoulos, MD MS, Assistant Professor (to be) and Jennifer Daly, MD, Professor (co-PIs)

Interview required – please contact PI at 508-856-3158 or Nicole.theodoropoulos@umassmemorial.org

Description:
Current recommendations are that all solid organ transplant recipients receive prophylaxis (either universal or preemptive) against CMV reactivation or infection if they or their donor have a history of CMV infection (CMV D+/R- or CMV R+). Universal prophylaxis is the use of valganciclovir post-transplant at a dose of 900 mg a day for recipients with normal renal function. At UMass, we historically used "low dose" valganciclovir (450 mg/day) for recipients with normal renal function due to concerns about cost and medication toxicity. Our project will retrospectively review this cohort of patients and determine the incidence of CMV infection and disease despite prophylaxis and how this affected graft and patient outcomes.

Student's role:
Data collection, data analysis, abstract and manuscript drafting

Required Skills:
N/A

Location of research:
University Campus
Department of Medicine
Division of Infectious Diseases & Immunology

3. Fentanyl exposure among heroin users presenting to the Emergency Department

PI: Kavita Babu, MD Associate Professor Dept of EM Division of Medical Toxicology

Interview required – submit via email – CV with current contact information for an interview (Kavita.babu@umassmemorial.org)

Description:
In this study, we will interview heroin users who present to the Emergency Department after overdose requiring naloxone. Building off our existing work, we will expand our questions to include details regarding fentanyl knowledge, attitudes, beliefs and practices. We will couple this information with rigorous drug testing methodologies. Additionally, students will be given the opportunity to participate in Overdose Prevention Fund education and advocacy activities in the community. The student will be part of the Division of Medical Toxicology, which is made up of several faculty members and four fellows. Our inclusive group providers clinical care, conducts original research, and advocates for the care of addicted patients.

Student's role:
Research assistant/ co-investigator

Required Skills:
Outstanding written, verbal and interpersonal skills

Location of research:
University Campus
Emergency Department

4. Development of a Novel Trauma Symptom Screening Tool for Use in Pediatric Primary Care

PI: Heather Forkey, MD Associate Professor of Pediatrics, Division Director Child Protection Program, Director, Foster Children Evaluation Service

Description:
Expanding evidence from molecular biology, genomics, immunology and neuroscience links the early experience of toxic stress with subsequent mental and physical illness. As recognition of the consequences of toxic stress has expanded, so too has interest in identification of affected children. However, it is difficult to predict individual consequences of toxic stress in children and, significantly, no single gold standard exists for the diagnosis of trauma symptoms in children. The tools that are currently available are too time consuming and cumbersome for the primary care setting, assess symptoms in only one domain, or are specific to PTSD, which, as described, is now thought to be only one of the manifestations of trauma exposure.

In order to address these current limitations, we are developing a screening tool for use in primary care settings. Preliminary work done has allowed us to develop a preliminary tool which has been through content validity testing with content experts. We will now be beginning the work of clinical validation of the tool through testing in a clinical setting. Student involvement in the project will be to work with PI to begin to pilot the use of this tool in the clinical setting, collect and evaluate results.

Student's role:
Student will participate in this tool validation study under the guidance of statistician and PI.

Required Skills:
Familiarity with statistical analysis, data collection, excel and RedCap.

Location of research:
University Campus
Benedict Building
Pediatrics

5. Healthy Aging Research – Aging in Place

PI: Wenjun Li, PhD, Associate Professor, Director of Health Statistics and Geography Lab

Interview required – submit via email – CV, statement of interest and professional goals with current contact information for an interview (Wenjun.Li@umassmed.edu)

Description:
The project examines racial, sex and rural-urban differences in diet quality, food purchasing behaviors, physical activity, neighborhood preferences/perceptions, living arrangements and use of neighborhood resources among community-dwelling older adults. The study aims to a better understanding the social, behavioral and environmental mechanisms of successful aging in place. The results can inform the design of aging-friendly residential neighborhoods, and interventions to support aging in place.

Student's role:
Literature review, participating manuscript writing and assisting with preparation of grant applications.

Required Skills:
Critical thinking, literature review, and excellent skills in scientific writing and oral communication. Knowledge/experience in GIS and spatial data analysis is preferred, but not required. Strong interest in aging and public policy research. CITI certificate for Human Subjects Protection training.

Location of research:
University Campus
Medicine, Division of Preventive and Behavioral Medicine
Health Statistics and Geography Lab
School Building 4th floor

6. Autoreactive T cells directly from islets of human individuals with Type 1 Diabetes

PI: Sally C. Kent, Ph.D, Assistant Professor of Medicine, Diabetes Center of Excellence

Interview required – please contact PI at 508-856-2044 or sally.kent@umassmed.edu

Description:
Understanding the pathogenesis of Type 1 Diabetes (T1D) has benefited greatly from the study of the non-obese diabetic mouse (NOD) model of human T1D. By necessity, the study of human autoreactive T cells has been limited to T cells in the periphery and while much has been learned about the phenotype of autoantigenic reactivity and HLA restriction of these T cells, the extent of immunopathologic involvement represented by these circulating is T cells is unknown. Until recently, it was thought that the recovery of islets from human subjects with T1D was not possible; however, this has been accomplished. There are now initiatives in the United States to recover and study islets from subjects with T1D, subjects with new onset T1D, and subkects with islet reactive autoantibodyin their circulation, but with no clinical diagnosis of T1D ("pre-diabetes') including the Islet Pilot Programs from the Network of Pancreatic Organ Donors with Diabetes (nPOD) and by Drs. Al Powers at Vanderbilt University

To date, we have received 13 islet isolations from subjects with T1D and we have directly grown or directly sorted >250 T cell lines/clones, both CD4 and CD8 T cells. We have determined autoantigen reactivity and HLA restriction for 19 CD4 lines and 3 CD8 T cell lines (recently published in *Nature Medicine*). The goal of this project is to determine the autoreactivity, HLA restriction and functional phenotype of as many of these islet infiltrating T cells as possible, using a variety of techniques. The study of islet-reactive T cells isolated directly from human islet isolates from subjects with T1D has the distinct potential to inform us about the immunopathology of human T1D.

Student's role:
The student would work directly with me on this project and be involved in discussions of experimental design, execution and analysis.

Required Skills:
This is mostly a cell culture project utilizing basic lab skills with analysis by flow cytometry, potentially cell sorting (FACS) and other techniques like ELISA. Some PCR will be performed. As part of the learning process, I would instruct the medical student in these techniques. Knowledge of immunology would be extremely useful.

Location of research:
University Campus
Division of Diabetes
ASC7-2012

7. The Use of Blood Gas Sampling in the Preterm Population

PI: Lawrence Rhein, MD, MPH

Interview required – submit via email – CV with current contact information for an interview (Lawrence.rhein@umassmemorial.org)

Description:
Significant attention has been drawn to oxygen saturations, partially due to the now easily obtainable non-invasive oximetry data that allows continuous monitoring or recording. Less attention has been focused on the role of hypercapnia, partially due to the need for invasive collection of such data, requiring intermittent and not continuous assessment. Permissive hypercapnia is a standard treatment approach for premature infants, and so it is common for premature infants to leave the neonatal intensive care unit (NICU) with elevated pCO2 levels. In the NICU at UMMMC, it is standard protocol to preform blood gas to be measured weekly for preterm infants.

We propose to investigate the number of infants with blood gas measurements, during their NICU course and especially before discharge while the patients were on respiratory support of nasal cannula or room air. With the data we obtain we will be able to evaluate the frequency with which infants are assessed for hypercapnia and adherence to prior published recommendations. For the subset of infants with CO2 measurements obtained (a) within 3 weeks of discharge and (b) on respiratory support of nasal cannula oxygen or no respiratory support, we will dichotomize infants based on high or low levels of CO2, and correlate clinical variables with this outcome.

Student's role:
This project is a retrospective chart review project. The student will receive proper training by the PI and associated study staff. This will include education on how to write a protocol and submit to the IRB. Their role in this project will be to review patient's medical records and log data using a secure online database. Once data collection is complete the student will be a vital part in data analysis. They will attend meetings with the statistician on the project to complete a write-up and data figures. The summer student will be an active member on this project and learn skills in database creation, data extraction, analysis, and presentation.

Required Skills:
N/A

Location of research:
Memorial Campus
Pediatrics - Neonatology
Room MB2.018

8. Pulmonary Hypertension screening effects in the preterm infant

PI: Lawrence Rhein, MD, MPH

Interview required – submit via email – CV with current contact information for an interview (Lawrence.rhein@umassmemorial.org)

Description:
Elevated pulmonary pressures have a dramatic effect not only on the acute NICU clinical course but have an effect on long term pulmonary and neuro-developmental outcomes including increased risk of death during the first six months after diagnosis in cases of severe hypertension. This effect upon mortality and morbidity is due to further aberrations in gas exchange seen in patients with pulmonary hypertension. The specific aims in this study include (1) Pulmonary hypertension screening in an at risk population will improve rates of early identification and provide improved clinical outcomes in screen positive neonates. (2) Pulmonary hypertension screening will provide a cost effective means to identifying and treating at risk infants.

This study will be a retrospective medical chart review that will look at premature infants that are at risk for pulmonary hypertension and bronchopulmonary dysplasia (BPD). The chart review will follow the eligible patient from NICU admission till discharge. Data that will be collected included clinical interventions, response to treatment, growth rates, length of NICU stay, ventilator support requirements, and supplemental oxygen required during stay. We will determine the frequency of screening and positive findings. We will then identify all infants that would have been eligible for screening using current guidelines to estimate the potential number of unidentified cases of pulmonary hypertension, and identify rehospitalizations in this cohort.

Student's role:
This project is a retrospective chart review project. The student will receive proper training by the PI and associated study staff. This will include a review on study design and submission of protocol to the IRB. Their role in this project will be to review patient's medical records and log data using a secure online database. Once data collection is complete the student will be a vital part in data analysis. They will attend meetings with the statistician on the project to complete a write-up and data figures. The summer student will be an active member on this project and learn skills in database creation, data extraction, analysis, and presentation.

Required Skills:
N/A

Location of research:
Memorial Campus
Pediatrics - Neonatology
Room MB2.018

9. Molecular Methods for the Diagnosis of T-Cell Lymphoma

PI: Kristine Cornejo M.D. Assistant Professor

Interview required – submit via email – CV with current contact information for an interview (Kristine.cornejo@umassmemorial.org)

Description:
Distinguishing T-cell lymphoma from benign lymphoid reactions can be challenging as they have overlapping histologic features. A misdiagnosis may have an adverse impact on the patient as the necessary treatment may not be initiated or an over diagnosis may result in unnecessary therapy.

Currently, we use histopathology in conjunction with immunohistochemistry and molecular testing such as T-cell receptor polymerase chain reaction (TCR-PCR) studies to aid in the diagnosis. Most T-cell lymphomas have a clonal population of malignant lymphocytes with a T-cell receptor gene rearrangement which is identified by the gold standard method of TCR-PCR. However, a small subset of T-cell lymphomas do not contain a T-cell receptor gene rearrangement and some reactive lymphoid infiltrates may contain a small clone of lymphocytes that contain a T-cell gene rearrangement, making it difficult to distinguish these two entities. Therefore, despite these ancillary tools, a subset of cases remains difficult to unequivocally categorize as benign or malignant, and are termed atypical lymphoid infiltrates.

Recently, next generation sequencing has been reported to be more a more accurate and useful diagnostic tool in comparison to TCR-PCR in identifying T-cell gene receptor rearrangements with the latter containing a 40% false positive rate. Our Molecular Oncology laboratory has the capability of performing next generation sequencing which analyzes for gene mutations and gene copy number variation and is currently being used in other malignancies such as melanoma but not in T-cell lymphoma.

The study has 2 goals: (1) determine whether next generation sequencing can identify a mutational profile that may aid in accurately distinguishing T-cell lymphoma from benign lymphoid reactions and (2) verify whether next generation sequencing in comparison to TCR-PCR is a more accurate diagnostic tool in identifying T-cell receptor gene rearrangements in these atypical lymphoid infiltrates.

Student's role:
1. Review atypical lymphoid infiltrates with the Pathologist.
2. Aid in the DNA extraction of specimens.
3. Aid in performing and/or analyzing Next Generation Sequencing and RT-PCR.
4. Aid in classification of specimens that are positive/negative for point mutations or chromosomal abnormalities/gene rearrangements to determine whether they are benign or malignant.
5. Review medical records for outcome data.
6. Aid in the creation/maintenance of a database for statistical analysis of the data.

Required Skills:
Computer literacy

Location of research:
Three Biotech
Department of Pathology
Room 276

10. Program In Support of Moms (PRISM): a Group Randomized Controlled Trial

PI: Nancy Byatt, D.O., M.S., M.B.A., F.A.P.M., Medical Director, Massachusetts Child Psychiatry Access Project for Moms (MCPAP for Moms)

Interview required – submit via email – CV and a 3-4 line statement of interest with current contact information for an interview (nancy.byatt@umassmemorial.org)

Description:
We have an excellent research opportunity for students interested in Women's Health, OB/Gyn, psychiatry and/or research. The Ob/Gyn and Psychiatry department are collaborating on a statewide research project that is refining and evaluating a program to improve how depression is addressed in outpatient obstetric settings.

This project provides the opportunity for a student to be actively involved in all steps of the research project. The student will meet with the PI, Dr. Byatt and the Co-PI's/Co-Is for mentorship and supervision, and teaching. The student will have the opportunity to play an active role in preparing and submitting posters and manuscripts related to the project.

The primary goal of this project is to refine, evaluate, and disseminate a new low-cost and sustainable stepped care program for Obstetrics/Gynecology (Ob/Gyn) clinics to improve perinatal women's treatment rates and outcomes. There is a tremendous public health need for this research as depression is the leading cause of disability among women of reproductive age worldwide. One in seven women suffers from perinatal depression. It has deleterious effects on birth outcomes, infant attachment, and children's behavior/development. Maternal suicide causes 20% of postpartum deaths in depressed women. Although the vast majority of perinatal women are amenable to being screened for depression, screening alone does not improve treatment rates or patient outcomes. Ob/Gyn clinics need supports in place to adequately address depression in their patient populations. Thus, we developed and pilot tested the Program In Support of Moms (PRISM) Program, to create a comprehensive intervention that is proactive, multifaceted, and practical. PRISM aims to improve perinatal depression treatment and treatment response rates through: (1) access to immediate resource provision/referrals and psychiatric telephone consultation for Ob/Gyn providers; (2) clinic-specific implementation of stepped care, including training support and toolkits; and, (3) proactive treatment engagement, patient monitoring, and stepped treatment response to depression screening/assessment. We are comparing two active interventions, PRISM vs. enhanced usual care (access to resource provision/referrals and psychiatric telephone consultation) in a cluster-randomized trial in which we will randomize 12 Ob/Gyn clinics to either PRISM or enhanced usual care. We are comparing the effectiveness of PRISM vs. enhanced usual care to improve depression severity and treatment participation in pregnancy through 12 months postpartum among 300 patients (n=150/group, 25/clinic). This has been approved by the IRB and we are currently in year 2 of the 5 year project.

Student's role:
Responsibilities would include:

1. Attend working group meetings
2. Assist with revision of the PRISM provider toolkit, training program and fidelity measures
3. Participate in preparing and submitting related posters and manuscripts
4. Meet regularly with the project team and assist in organizing materials for team meetings and activities
5. Assist research team with recruitment activities, interfacing with clinic sites, data management, and other project activities

The student will be supervised by Dr. Byatt and the PRISM project director and be co-located with them at the UMMS Systems and Psychosocial Advances Research Center in the Chang Building, Shrewsbury, MA.

Required Skills:
N/A

Location of research:
Co-located with them at the UMMS Systems and Psychosocial Advances Research Center in the Chang Building, Shrewsbury, MA.

11. Vocal biomarkers in Parkinson disease using a smartphone application

PI: Kara Smith, MD, Assistant Professor

Interview required – CV with current contact information for an interview (kara.smith@umassmemorial.org)

Description:
Parkinson disease (PD) patients commonly experience changes in speech and communication. It may be possible to use speech to monitor symptoms and response to treatment in PD.

This study will use an investigational smartphone application to evaluate speech and other symptoms in PD and healthy control subjects. Participants will use the app for 4 weeks. We will analyze speech to learn about the differences between PD patients and non-PD patients, and to learn how speech varies with both motor and cognitive PD symptoms and with medication dosing.

Student's role:
Patient enrollment/informed consent, conducting study assessments (will learn how to do motor and cognitive assessments), conducting videoconferences with participants, maintaining study database and documents, working with collaborators on preliminary data analysis

Required Skills:
N/A

Location of research:
University campus
Neurology clinic

12. The Investigation of Retinal and Choroidal Vascular Abnormalities in Obstructive Sleep Apnea (OSA) Patients using Optical Coherence Tomography Angiography (OCTA)

PI: Shlomit Schaal, M.D., Ph.D.

Interview required – CV with current contact information for an interview (S.Schaal@umassmed.edu)

Description:
Optical Coherence Tomography Angiography (OCTA) is a novel non-invasive imaging modality that uses light waves to take cross section pictures of the different layers of the retina and the choroid. Obstructive sleep apnea (OSA) is caused by complete or partial obstructions of the upper airway. It is characterized by repetitive episodes of shallow or paused breathing during sleep, and is usually associated with a reduction in blood oxygen saturation. The purpose of this study is to characterize the early and late changes in retinal and choroidal vasculature that occur in OSA patients using OCTA imaging. Characterization of these changes may assist in the early diagnosis and in the systemic and ocular management of OSA patients.

Student's role:
1. Help in study design
2. Collect and be familiar with the relevant literature
3. Be responsible for all future modifications of the IRB
4. Coordinate the study collaborations between the sleep lab and the ophthalmology clinic and help in recruiting candidate subjects for study
5. Explain the consent form to each individual participating in the research and answering any questions in regards to the consent form
6. Perform imaging and collect patient data in a secure manner
7. Compile all interim and final scientific reports of data interpretation
8. Participate in writing scientific manuscripts that will result from this collaborative project
9. Present a scientific presentation summarizing this project at ARVO international conference in 2017

Required Skills:
N/A

Location of research:
281 Lincoln St. Worcester, MA. 3rd floor
368 Plantation St. Worcester, MA. 6th floor
Eye Center

13. Neglected by the Evidence: Health Policy Research in Older Adults with Cerebrovascular Disease

PI: Kate Lapane, PhD, Associate Dean, Clinical and Population Health Research

Interview required – CV with current contact information for an interview (kate.lapane@umassmed.edu)

Description:
Options for acute stroke treatment have long been limited, with administration of tissue plaminogen activator (tPA) occuring in only 5% of stroke patients. The emergence of safe and effective vascular interventions in recent years has revolutionized the acute treatment paradigm. For both tPA and vascular interventions, patient eligibility for treatment is dependent on the time since the onset of stroke symptoms, and delays in treatment translate into loss of brain tissue. Emergency medical services are confronted with challenging decisions in the field, whereby time and distance to nearby facilities must be weighed against the types of treatments each facility can administer and the likelihood a patient will be eligible for each treatment. There are presently 1500 Joint Commission certified primary stroke centers, generally capable of administering tPA, and 110 Comprehensive Stroke Centers capable of performing vascular interventions. Other stroke centers may be self-declared or have other credentials, creating further challenges in distinguishing between the types of interventions and quality of care provided for all stroke patients and for specific subsets of patients.

Despite improvements in treatment, stroke remains a leading cause of disability. The majority of patients require rehabilitation services in skilled nursing facilities, inpatient rehabilitation facilities, or with home health services. The evolving policy and reimbursement landscape is poised to realign incentives for the delivery of stroke care and to encourage coordination of care between settings. Ongoing episode based payment initiatives foster collaboration between acute and post-acute care settings, while holding providers accountable for patient transitions within and between settings in the course of an episode of care. Planned consolidation of the post-acute rehabilitation reimbursement systems from four separate systems into one uniform system will realign incentives by dissuading unnecessary provision of therapy services and instead reimbursing providers based upon a patient's level of medical complexity, regardless of the site of rehabilitation.

Evidence is scarce describing the relationship between competing and colaborating acute care hospitals within and between varying levels of stroke treatment capacities. The organization and delivery of stroke care throughout the duration of an entire acute and post-acute episode also remains to be thoroughly characterized. As these relationships between providers are heterogeneous, planned investigations must consider the variety of state policies, geographic organization, and market dynamics affecting the delivery of stroke care. The influence of these numerous and diverse components of this complex system on the health outcomes of patients remains to be elucidated.

Specific aims:
1. Characterize the current organization and delivery of acute and post-acute services for stroke patients.
2. Evaluate relationships between attributes of the delivery system and health outcomes.

Student activities will include:

- Attendance at the bi-weekly PhARE group meetings to develop an understanding of the diverse research topics under study and methods being applied by the group
- Opportunity to gain didactic instruction in:
    - Epidemiology

    - Biostatistics
    - Statistical programming
- Components of the student's work on the primary research project may include:
    - Contributing to the development and implementation of:
        - A study protocol
        - Data collection form
        - A statistical analysis plan
    - Primary data collection
    - Interpretation and dissemination of research findings, with opportunities for:
        - Poster presentation
        - Manuscript co-authorship
- The student will be expected to give 3 slide presentations to the research team encompassing:
    - Planned strategy for data collection
        - Data will be obtained through telephonic outreach to key stakeholders such as primary and comprehensive stroke centers, post-acute care providers, provider organizations, and regulatory/legislative entities
    - Interim results
    - Final results
- In addition to the primary research project, the student will support other ongoing projects with responsibilities potentially including:
    - Brainstorming of research questions
    - Targeted literature review
    - Development of operational definitions for study variables
    - Interpretation and dissemination of research findings

Required Skills:

- Proficiency with Microsoft Office
- Proficiency in constructing strategic searches of published literature (e.g., PubMed) and broader internet searches for grey literature

Location of research:

University Campus
Albert Sherman Center
Quantitative Health Sciences

14. The Role of Screen Time in Recovery from Concussion

PI: Theodore Macnow, Assistant Professor of Pediatrics

Interview required – CV with current contact information for an interview (Theodor.Macnow@umassmemorial.org)

Description:
Concussion is an increasingly recognized injury and cause of morbidity in the pediatric population. While clinicians' understanding of the pathophysiology and treatment in concussion has improved greatly, there is still much to be learned about this condition. Most clinicians agree that cognitive and physical rest are important in concussion recovery; however there is no standard for the use of screen time. Some clinicians favor screen time, saying it is a form of cognitive rest and one of the few options for pediatric concussion sufferers to keep themselves occupied; others strongly caution against the use of screen time arguing it prolongs the recovery. There are no randomized controlled trials looking at this question. This study will prospectively examine the effect of screen time on recovery from concussion. It will prospectively recruit patients presenting to the pediatric emergency department with head injury and randomize them to allow for screen time as tolerated or completely abstain from screen time. Patients (or parents) will fill out an initial survey regarding mechanism of head injury, medical and demographic information, current symptoms, and screen time habits. Follow up phone calls assessing amount of screen time and concussive symptoms will occur daily for one week and then weekly for at least a month or until concussive symptoms have resolved. The primary outcome is time to recovery from concussion. Secondary outcomes include time to return to school, time to return to sports, assessment of specific symptoms, and presence of symptoms with screen time. Data will likely be analyzed as an intention-to-treat analysis. Subgroups will be analyzed including: different ages, mechanisms for concussion (i.e. presumed occipital strike), and those with multiple concussions.

Student's role:
During regular weekday daytime hours, the student will be in the pediatric emergency department actively recruiting and consenting patients who present for closed head injury. The student will assist patients or parents in completing the initial survey. Also, while in the emergency department the student will perform follow up phone calls for patients already enrolled in the study. Likely we will stop recruitment of new patients a week before the student's allotted time to focus on data analysis and poster preparation and completing follow up phone calls. The long term goal for the project will be an abstract submission to the Pediatric Academic Society meeting in 2018 (due in November 2017) and a manuscript for publication in a medical journal.

In addition to learning about all aspects of research including project design, recruitment, survey tools, data analysis, data presentation and manuscript writing, the student will have the opportunity to become immersed the world of pediatric emergency medicine and have opportunities to shadow and learn from other patients who are not eligible for the study.

Required Skills:
None. This is an ideal project for a student who has interest but not necessarily research experience. The student should be personable and feel comfortable talking to parents.

Location of research:
University Campus
Pediatric Emergency Medicine

15. Role of Hdac3 during Cardiac Development

PI: Chinmay Trivedi, MD PhD, Assistant Professor, Medicine

Interview required – please contact PI at 508-856-6947 or chinmay.trivedi@umassmed.edu

Description:
Congenital and adult heart diseases are the leading causes of mortality in the developed world. The underlying pathology is improper development of cardiomyocytes that leads to the heart defects in 1% of newborn children and loss of diseased cardiomyocytes that leads to heart failure in adults. Unfortunately, heart is one of the least regenerative organs in the body with negligible endogenous capacity to repair or replace affected cardiomyocytes. Ability of pluripotent stem cells and cardiac progenitor cells to progressively and restrictively differentiate into various lineages, like cardiomyocytes, smooth muscle cells and endothelial cells, provides tantalizing promise for exogenous cell-based therapy. However, lack of thorough understanding of the mechanisms governing lineage commitment and differentiation of these progenitor cells to mature cardiomyocytes significantly limits our ability to harness its therapeutic potential. My lab is interested in understanding the roles of chromatin and epigenetic modifications during cardiac development and diseases. Specifically, we study the roles of chromatin modifying enzymes, like histone deacetylase 3 (HDAC3), in cardiac progenitor cells. Using various genetic murine models, we investigate how cardiac progenitor cells differentiate into various lineages to form functional heart in developing embryo. We have demonstrated that Hdac3 acts as a key regulatory switch within primary heart field cardiac progenitor cells to promote cardiomyocyte lineage specification.

Student's role:
About two-thirds of human congenital heart disease involves second heart field- derived structures; however, role of histone deacetylase enzymes within the second heart field progenitor cells remain elusive. Recently we demonstrated that histone deacetylase 3 (Hdac3) orchestrates epigenetic silencing of Tgfβ1, a causative factor in human congenital heart disease pathogenesis, in a deacetylase-independent manner to regulate development of second heart field- derived structures. In murine embryos lacking Hdac3 in the second heart field cardiac progenitor cells, increased Tgfβ1 bioavailability is associated with ascending aortic dilatation, outflow tract malrotation, overriding aorta, double outlet right ventricle, aberrant semilunar valve development, bicuspid aortic valve, ventricular septal defects, and embryonic lethality. Using various molecular biology / biochemistry and histology related techniques (performed routinely in our lab), student will characterize functional relationship between Hdac3 and TGF-β in disease samples.

Required Skills:
Microsoft office, Prior research experience in histology or cell and molecular biology / biochemistry is desired but not required.

Location of research:
Albert Sherman Center
AS7-1016
Department of Medicine

16. Examining Stakeholder Perspectives on the Implementation of an Asthma Medication in School Program

PI: Michelle Trivedi, MD MPH

Interview required – CV and 3-4 line statement of interest with current contact information for an interview (michelle.trivedi@umassmemorial.org)

Description:
This is a project which evaluates a Worcester Public School program for pediatric asthma prevention. We will perform interviews and surveys in order to assess the specific issues that may help or impede the implementation of this evidenced based program in a real world setting.

Aim 1: To generate hypotheses on the specific facilitators and barriers to program implementation according to stakeholders. The goal of this aim is to gain understanding of the perspectives of stakeholders in the Asthma Medication in School Program (AMISP) with special attention to potential barriers to implementation. We will accomplish this study aim by designing and performing semi-structured, qualitative interviews of the following program stakeholders: children (6-18 years old), their parents, school nurses, teachers, administrators from the Worcester Public Schools, and medical professionals. We will examine the processes, contexts, feasibility, acceptability, and opportunity for improvements in the implementation of the AMISP.

Aim 2: To determine whether categorical issues and themes identified in Aim 1 are applicable to a wider pool of stakeholders. The goal of this aim is to determine the extent to which themes, identified in Aim 1 as key to program implementation and success, are applicable to a wider population of stakeholders. We will utilize data from Aim 1 to create and administer hypothesis-driven, structured surveys to a larger pool of program.

Student's role:
Help perform interviews of stakeholders in the Asthma Medication in School Program (interview school nurses, children, teachers, etc). Participate in elements of study design for implementation research, learn about implementation research for a community program, learn basic methods in qualitative analysis and clinic research, participate in scholarly writing and presentation.

Required Skills:
Detail oriented nature, Spanish-language fluency is helpful, Background or interest in statistics is helpful

Location of research:
University Campus
Pediatrics

17. History of blood transfusion

PI: Manisha Desai, MD

Interview required – CV with current contact information for an interview (Manisha.desai@umassmemorial.org)

Description:
Blood transfusion, a routine life saving procedure had its origins in many disasters before many aspects of safe transfusion were elucidated. In fact, the opposite procedure, blood-letting, was in use for centuries – an attempt to remove disease causing material from the body and restoring it to the necessary healthy balance of its core components.

We will examine every major advance in our experience and knowledge about blood transfusion. Rather than merely put together a chronological listing of names, dates, and achievements – we aim to examine the state of medical practice before the advance, describe exactly how the advance was carried out, and examine its impact on medical practice thereon. We then move on to the next advance, determining at every stage how societal needs gave rise to attempts to improve medical care, and how each advance affected society.

Primary sources will be used as far as possible during this investigation.

Student's role:
I will provide the student with a few review articles and books related to blood transfusion. The student will use these and internet based searches to prepare a list of primary sources. Next, we will obtain copies of these documents and use the information obtained to prepare a coherent manuscript for publication in a peer reviewed journal. The student will be expected to make a presentation at a national or international conference related to history of anesthesia.

Required Skills:
Inquisitive mind, love of reading, online search using PubMed, and strong presentation and writing abilities.

Location of research:
Anesthesiology
Historical research can be performed from any location with access to online documents. Locating primary documents may require contacting individuals at other institutions.

18. A Study of Anti-Dengue Virus Antibody Mediated Transplacental Transport of Zika Viruses

PI: Daniel Libraty M.D., Professor of Medicine

Interview required – CV and 3-4 line statement of interest with current contact information for an interview (Daniel.libraty@umassmed.edu)

Description:
During pregnancy, there has been evidence of maternal-fetal transmission of the Zika virus, and there has been an accumulation of evidence that a causal relationship exists between prenatal Zika virus infection and microcephaly and other serious brain anomalies. The spread of Zika viruses in the Americas is occurring on a background of prior immunity to another flavivirus, the dengue viruses (DENVs). Several papers have previously described immunogenic cross-talk between the DENVs and Zika viruses. Traditionally, the Zika viruses have been classified into either African or Asian genotype lineages. The recognition of maternal-fetal transmission resulting in fetal/neonatal neurological abnormalities has occurred with the spread of newly recognized Latin American genotype Zika virus strains. The focus of this project is to examine the enhancement of the transplacental transport of Latin American genotype Zika virus strains by particular anti-DENV antibodies. We hypothesize that polyclonal anti-DENV antibodies in pregnant women augment the maternal-fetal transmission of Latin American genotype Zika virus strains to a much greater degree than African or Asian genotype Zika virus strains.

To conduct the proposed experiments, the BeWo human syncytiotrophoblast cell line will be cultured in confluent monolayers on collagen-coated transwells. Stock solutions of a panel of Zika virus strains will be prepared for the proposed experiments. The panel of Zika virus strains will include 2 Latin American genotype strains, 2 African genotype strains, and 2 Asian genotype strains. The apical to basolateral transport of Zika viruses across human syncytiotrophoblast monolayers will be measured by quantitative (q)RT-PCR of Zika virus RNA, and by live virus focus-forming assays, in the top and bottom wells.

Student's role:
The student's role will be to culture and test BeWo cell lines from different commercial vendors for their ability to form confluent monolayers and express the neonatal Fc receptor (FcRn) by Western blot. The student will also prepare stock solutions of the 6 Zika virus strains for the proposed experiments.

Required Skills:
Prior lab experience a plus, but not required

Location of research:
University Campus
LRB 3rd floor
Medicine

19. Group Prenatal Visits at a CHC: Making a Difference

PI: Sara G. Shields, MD, MS, FAAFP and Jennifer Averill Moffitt, CNM

Interview required – CV and 3-4 line statement of interest with current contact information for an interview (Sara.shields@umassmed.edu)

Description:
Group prenatal care has been shown to reduce preterm birth and improve breastfeeding and other postpartum outcomes, particularly in women traditionally at risk for poor perinatal outcomes such as urban, low-income minority women.[1] The Family Health Center of Worcester is an accredited site for the CenteringPregnancy program and has been doing group care including groups in Spanish, Portuguese, and Vietnamese since 2007 for 50-80 women annually, or about 20 percent of our overall prenatal population. Preliminary results indicate improved breastfeeding rates among our group women compared to women served through traditional individual visits. We have a database for our perinatal population to collect various demographic, clinical and outcome measures. We seek a summer student to help us review this database and analyze our retrospective data to understand if our outcomes match the published outcomes and to target further improvements in our program based on this analysis. We have qualitative patient satisfaction data about the groups and need to develop a similar survey for our overall perinatal population to address how to improve both group care and our overall care. We have four bilingual/bicultural perinatal community health workers ("advocates") who are an integral part of the logistics of our group program and with whom the student will work closely.

Student's role:
1) assist with chart reviews to help clean up data; 2) set up data analysis to compare group women with individually-seen women for several birth outcomes including preterm birth, birthweight, breastfeeding at discharge; 3) assist with ongoing data collection for groups in 2017; 4) assist with coordinating group activity supplies and ideas ; 5) assist with development of perinatal program patient satisfaction survey

Required Skills:
basic Excel skills, biostatistics helpful

Location of research:
Family Health Center of Worcester
26 Queen Street

[1] Ickovics, J. R., Kershaw, T. S., Westdahl, C., Magriples, U., Massey, Z., Reynolds, H., et al. (2007). Group prenatal care and perinatal outcomes: A randomized controlled trial. *Obstetrics and Gynecology*, *110*(2 Pt 1), 330-339.

20. Addressing Tobacco Through Organizational Change (ATTOC)

PI: Douglas Ziedonis, MD, MPH

Interview required – CV with current contact information for an interview (Douglas.Ziedonis@umassmemorial.org)

Description:
Despite an overall reduction in US smoking rates from >50% in the 1960s to about 20% by 2000, the rate of smoking among persons with a serious mental illness (SMI) remains 2-3 times greater than in the general population. Further, very recent data show that the small decline in smoking rates that occurred in the general population in the past decade has not been seen among smokers with an SMI. In fact, 44% of all the cigarettes consumed in the US are by individuals with SMI and the primary cause of death among Americans with an SMI is tobacco-related disease. Unfortunately, ≤ 25% of smokers with an SMI receive evidence-based treatment for their tobacco use disorder (TUD), and mental health clinicians, compared to other specialists, are significantly less likely to address TUD in a patient with an SMI. Transforming the mental healthcare system to integrate and adhere to practice guidelines for the provision of evidence-based TUD treatment is a priority of the National Institute of Mental Health (NIMH) and is a critical component of a national effort to meet Healthy People 2020 target goals for tobacco use (www.healthypeople.gov).

This project is assessing the effectiveness of an organizational change approach in helping behavioral health organizations in Connecticut and Pennsylvania integrate tobacco cessation into their routine work.

Student's role:
Learn the ATTOC Approach
Participate in research meetings and implementation of the research plan for the Pennsylvania project
Data analysis of the Connecticut project
Writing

Required Skills:
CITI Training (This is an online training)

Location of research:
University Campus
Department of Psychiatry

21. Post-operative venous thromboembolism (VTE) prophylaxis in the elective oncologic surgery population: can compliance ratios predict inpatient VTE events?

PI: Heena Santry, MD, MS

Interview required – CV and 3-4 line statement of interest with current contact information for an interview (Stacy.sanders@umassmemorial.org)

Description:
Venous thromboembolism (VTE) is estimated to effect approximately 350,000 medical and surgical patients annually at a cost of $5-$8 billion dollars. The therapeutic and cost-saving benefits of mechanical and chemoprophylaxis in preventing VTE have been repeatedly demonstrated in the medical literature, however VTE prophylaxis is not consistently prescribed.

The ENDORSE study (2006) was a multinational cross-sectional survey which included 311 patients from our medical center. It assessed the prevalence of VTE risk in the acute care hospital setting as well as the proportion of at-risk patients who received evidence-based prophylaxis. Between 41-64% of patients in this setting were found to be at risk for VTE and appropriate VTE prophylaxis was grossly under-prescribed. Significant variation in VTE prophylaxis practice patterns among providers was also observed.

This project will build upon the methodology established by the ENDORSE study and will be a retrospective review of post-operative patients who have undergone an elective surgery for a cancer diagnosis. The medical records of a representative subset of patients will be reviewed for demographic information as well as risk factors, prescribed prophylaxis (agent/dose), interruptions in prophylaxis, and development of a hospital-acquired VTE. Once the data has been aggregated and analyzed, we will 1) determine compliance with ACCP-defined appropriate prophylaxis in the elective oncologic surgery population and 2) attempt to devise a ratio which quantifies the proportion of time during a patient's hospitalization that he/she is on appropriate VTE prophylaxis. By comparing the ratios with VTE occurrence as an inpatient, we seek to determine whether these ratios can be used to predict VTE in the elective oncologic surgical population. Similar studies will be performed during the same time using other populations—patients undergoing elective orthopedic surgery as well as and trauma patients (see additional research assistant listings).

This study is intended to be translational in nature with the results being used to guide future clinical practice guidelines within the department at the Medical Center.

Student's role:
The student will function in a full Research Assistant capacity and will be fully integrated into the Surgical Research Scholars Lab as part of their experience. Because IRB approval will already be obtained prior to the student's start date, he/she will not participate in study design however will have opportunities to learn more on this topic via weekly lab conferences. Once trained to navigate through the patient's medical record, the student will assist with data extraction and entry. The student will then assist with analysis and interpretation, culminating in a poster-presentation at the end of the experience.

Required Skills:
The majority of the medical student's time will be spent performing data extraction/entry from patient medical records maintained within several clinical information systems (Soarian, Allscripts, Visicu). Prior knowledge and facility with these systems is not mandatory, however is helpful. The student will also assist with literature

reviews; ability to perform literature searches and critically review relevant articles is desired. Prior to the student's start date, online CITI training/ certification will need to be completed.

Location of research:
University Campus
Department of Surgery

22. Post-operative venous thromboembolism (VTE) prophylaxis in the elective orthopedic surgery population: can compliance ratios predict inpatient VTE events?

PI: Heena Santry, MD, MS

Interview required – CV and 3-4 line statement of interest with current contact information for an interview (Stacy.sanders@umassmemorial.org)

Description:
Venous thromboembolism (VTE) is estimated to effect approximately 350,000 medical and surgical patients annually at a cost of $5-$8 billion dollars. The therapeutic and cost-saving benefits of mechanical and chemoprophylaxis in preventing VTE have been repeatedly demonstrated in the medical literature, however VTE prophylaxis is not consistently prescribed.

The ENDORSE study (2006) was a multinational cross-sectional survey which included 311 patients from our medical center. It assessed the prevalence of VTE risk in the acute care hospital setting as well as the proportion of at-risk patients who received evidence-based prophylaxis. Between 41-64% of patients in this setting were found to be at risk for VTE and appropriate VTE prophylaxis was grossly under-prescribed. Significant variation in VTE prophylaxis practice patterns among providers was also observed.

This project will build upon the methodology established by the ENDORSE study and will be a retrospective review of post-operative patients who have undergone an elective surgery for a cancer diagnosis. The medical records of a representative subset of patients will be reviewed for demographic information as well as risk factors, prescribed prophylaxis (agent/dose), interruptions in prophylaxis, and development of a hospital-acquired VTE. Once the data has been aggregated and analyzed, we will 1) determine compliance with ACCP-defined appropriate prophylaxis in the elective oncologic surgery population and 2) attempt to devise a ratio which quantifies the proportion of time during a patient's hospitalization that he/she is on appropriate VTE prophylaxis. By comparing the ratios with VTE occurrence as an inpatient, we seek to determine whether these ratios can be used to predict VTE in the elective oncologic surgical population. Similar studies will be performed during the same time using other populations—patients undergoing elective orthopedic surgery as well as and trauma patients (see additional research assistant listings).

This study is intended to be translational in nature with the results being used to guide future clinical practice guidelines within the department at the Medical Center.

Student's role:
The student will function in a full Research Assistant capacity and will be fully integrated into the Surgical Research Scholars Lab as part of their experience. Because IRB approval will already be obtained prior to the student's start date, he/she will not participate in study design however will have opportunities to learn more on this topic via weekly lab conferences. Once trained to navigate through the patient's medical record, the student will assist with data extraction and entry. The student will then assist with analysis and interpretation, culminating in a poster-presentation at the end of the experience.

Required Skills:
The majority of the medical student's time will be spent performing data extraction/entry from patient medical records maintained within several clinical information systems (Soarian, Allscripts, Visicu). Prior knowledge and facility with these systems is not mandatory, however is helpful. The student will also assist with literature

reviews; ability to perform literature searches and critically review relevant articles is desired. Prior to the student's start date, online CITI training/ certification will need to be completed.

Location of research:
University Campus
Department of Surgery

23. Post-operative venous thromboembolism (VTE) prophylaxis in the elective trauma population: can compliance ratios predict inpatient VTE events?

PI: Heena Santry, MD, MS

Interview required – CV and 3-4 line statement of interest with current contact information for an interview (Stacy.sanders@umassmemorial.org)

Description:
Venous thromboembolism (VTE) is estimated to effect approximately 350,000 medical and surgical patients annually at a cost of $5-$8 billion dollars. The therapeutic and cost-saving benefits of mechanical and chemoprophylaxis in preventing VTE have been repeatedly demonstrated in the medical literature, however VTE prophylaxis is not consistently prescribed.

The ENDORSE study (2006) was a multinational cross-sectional survey which included 311 patients from our medical center. It assessed the prevalence of VTE risk in the acute care hospital setting as well as the proportion of at-risk patients who received evidence-based prophylaxis. Between 41-64% of patients in this setting were found to be at risk for VTE and appropriate VTE prophylaxis was grossly under-prescribed. Significant variation in VTE prophylaxis practice patterns among providers was also observed.

This project will build upon the methodology established by the ENDORSE study and will be a retrospective review of post-operative patients who have undergone an elective surgery for a cancer diagnosis. The medical records of a representative subset of patients will be reviewed for demographic information as well as risk factors, prescribed prophylaxis (agent/dose), interruptions in prophylaxis, and development of a hospital-acquired VTE. Once the data has been aggregated and analyzed, we will 1) determine compliance with ACCP-defined appropriate prophylaxis in the elective oncologic surgery population and 2) attempt to devise a ratio which quantifies the proportion of time during a patient's hospitalization that he/she is on appropriate VTE prophylaxis. By comparing the ratios with VTE occurrence as an inpatient, we seek to determine whether these ratios can be used to predict VTE in the elective oncologic surgical population. Similar studies will be performed during the same time using other populations—patients undergoing elective orthopedic surgery as well as and trauma patients (see additional research assistant listings).

This study is intended to be translational in nature with the results being used to guide future clinical practice guidelines within the department at the Medical Center.

Student's role:
The student will function in a full Research Assistant capacity and will be fully integrated into the Surgical Research Scholars Lab as part of their experience. Because IRB approval will already be obtained prior to the student's start date, he/she will not participate in study design however will have opportunities to learn more on this topic via weekly lab conferences. Once trained to navigate through the patient's medical record, the student will assist with data extraction and entry. The student will then assist with analysis and interpretation, culminating in a poster-presentation at the end of the experience.

Required Skills:
The majority of the medical student's time will be spent performing data extraction/entry from patient medical records maintained within several clinical information systems (Soarian, Allscripts, Visicu). Prior knowledge and facility with these systems is not mandatory, however is helpful. The student will also assist with literature

reviews; ability to perform literature searches and critically review relevant articles is desired. Prior to the student's start date, online CITI training/ certification will need to be completed.

Location of research:
University Campus
Department of Surgery

24. Open Dialogue fidelity project

PI: Douglas Ziedonis, MD, MPH

Interview required – CV current contact information for an interview (Eileen.small@umassmed.edu)

Description:
Open Dialogue (OD) is an innovative, language-based, network approach to treating acute psychiatric crises, developed by clinicians in Finland. It aims to improve treatment outcomes in the severely mentally ill, by reducing hospitalizations, improving overall quality of life and functioning, and maintaining good relationships with treatment providers and family. This psychosocial intervention combines a community-based, integrated treatment system that engages families and social networks, and a distinct and unique form of dialogues within open psychiatric meetings. The approach has been effective in reducing symptoms of psychosis, leading to fewer and shorter hospitalizations, reduced medication dosages, greater improvements in functioning, and improved likelihood of employment (Seikkula et al. 2006). A multi-disciplinary team at UMMS is working to prepare the Finnish Open Dialogue for adaptation and implementation in the U.S.

Student's role:
We are seeking a medical student that is eager to continue helping with this behavioral health services implementation project. The main focus of the student's project would be to evaluate research efforts at other sites and assess their adherence to the OD protocols established. The student will learn about severe mental illness and the treatment provided by various clinicians, including psychiatrists. The student will also learn about implementation research and behavioral health interventions, as well as general research principles applicable to any field, including conducting literature reviews and data entry and being involved in a project as a collaborative team member. The student need not have prior experience in psychiatry, behavioral health, or research.

Required Skills:
Completion of UMMS CITI training

Location of research:
University Campus
Department of Psychiatry

25. Advance Care Planning and Patient-Centered Prescribing for Older Adults with Limited Life Expectancy

PI: Jennifer Tjia, MD, MSCE

Interview required – CV with current contact information for an interview (Jennifer.tjia@umassmed.edu)

Description:
Advance care planning (ACP) is widely recognized as important for patients and families to prepare for current and future decisions about their medical treatment, particularly near the end of life. ACP allows for the greater likelihood of patient-centered health care delivery. Whether ACP can improve patient-centered prescribing in older adults with limited life expectancy is unclear. Our research group currently has transcribed interviews from physicians (n=9), nurses (n=11), patients (n=16) and family caregivers (n=7) that describe experiences with patient-centered prescribing at the end of life. Preliminary coding and analysis is complete. This is an opportunity for a student interested in prescribing, ACP, geriatrics, hospice or end-of-life to use qualitative analysis to code interviews and write a manuscript based on the analysis. Based on preliminary findings, there may also be an opportunity for conducting additional interviews as needed. The findings of this analysis will inform the development of models of care for patient-centered prescribing of chronic disease medications. Depending on level of interest, the participating medical student will also have the opportunity to engage in other closely related research projects related to hospice and caregiver stress management that are at different research stages, including patient recruitment and quantitative data analysis.

Student's role:
Qualitative analysis of transcribed interviews, follow-up interviews with clinicians, literature search, manuscript writing

Required Skills:
Human Subjects CITI training,
Interviewing skills
Attention to detail
Desire to learn NVivo (qualitative analysis software)

Location of research:
University campus
Quantitative Health Sciences
Albert Sherman Center

26. A quantitative analysis of the 3D printed models as a tool for teaching gross anatomy compared to the cadaveric prosection approach

PI: Yasmin Carter, Assistant Professor

Interview required – CV with current contact information for an interview (Yasmin.Carter@umassmed.edu)

Description:
Cadaveric materials such as prosections, have been standard components in gross anatomy education. However, the cost and time associated with cadaveric-based programs and a trend to incorporate methods that reflect continuous scientific advancements has put the role of cadaveric-based teaching methodologies into question. Proposed 'cost effective' 3D printed models and imaging systems such as CT, MRI and advanced technological visualization platforms, are becoming commonplace; in some cases, replacing cadaveric material altogether. This progression towards 'cadaverless' anatomy programs has led to much debate regarding the effect this has on the preparedness and quality of medical students. That said, analysis of modern teaching methodologies as a replacement to cadaveric material teaching methodologies has been largely qualitative and quantitative analyses have been met with mixed results. Thus, the goal of this study is to quantitatively test the hypothesis 3D printed models are an equivalent method to the cadaveric prosection method for preparing students for standardized testing of anatomical knowledge. First year medical student participants with little to no prior knowledge of human anatomy (i.e. have not taken any undergraduate anatomy courses) will be randomly assigned to either Group 1 (prosection) or Group 2 (Models). Each participant will be given a one hour overview of the test structure – the shoulder joint and associated soft tissue structures via the study material of their respective group along with the learning objectives of the study. Assessment will be administered using multi-level tests designed to test participants' level of anatomical comprehension of the Shoulder Joint beyond basic identification skills. To replace cadaveric materials such as prosections, 3D printing methods must surpass, or at a minimum, equal its application as a method of teaching anatomy, which has yet to be proven. This study is novel in quantitatively assessing 3D printed models as an equivalent platform for learning human gross anatomy and in identifying the degree to which anatomical knowledge acquired through the standard study of cadaveric prosection can be transferred and applied to modern, technologically advanced imaging systems. Such analyses will provide objective insight into the effects of current educational trends and what role cadaveric materials, such as prosections, should play in the teaching of human gross anatomy.

Student's role:
The student will be engaged with all stages of this study and will be provided with the necessary training and supervision. Their involvement will include: 1. Design and Creation of Anatomical teaching models in the virtual environment; 2. 3D printing of models for use in the educational environment; 3. Study design and Data analysis; and 4. Contribution to the preparation of a manuscript.

Required Skills:
While the specific skills required to design and print the models will be taught, this project would ideally suit someone with graphic design, imaging and or computer modeling backgrounds. Artistic or creative skills are an asset.

Location of research:
University campus
Department of Radiology
Division of Translational Anatomy

27. Percutaneous dilatational tracheostomy at UMass Memorial Medical Center: a quinquennial review

PI: Daniel Knox, MD, Assistant Professor of Medicine

Interview required – CV with current contact information for an interview (Daniel.knox@umassmemorial.org)

Description:
A tracheostomy is a surgical procedure in which a tube is inserted into an opening created through an incision the neck into the trachea to facilitate breathing in patients in need of airway protection. Many in whom tracheostomies are performed are in need of prolonged mechanical ventilation hence in such patients it is a long term treatment of respiratory failure.

The use of percutaneous techniques have gained widespread acceptance over the last two decades since the introduction of bedside percutaneous tracheostomy in 1985 by Ciaglia. This procedure, just like surgical tracheostomy is associated with major short and long term complications, including major bleeding, perforation, tracheal stenosis, stoma infection and accidental dislodgement.

At the Department of Pulmonary Allergy & Critical Care, percutaneous tracheostomies are performed by the interventional pulmonology service at bedside in the intensive care units (ICU). Surgical tracheostomies are performed by trauma surgery, otolaryngology or thoracic surgery services in the operating room (OR).

We aim to analyze data for 168 adult patients who had an elective tracheostomy at our institution with a view to determine the incidence of major and minor complications. This would be the first formal audit looking at patient characteristics, mortality and long term outcomes, and will therefore provide vital information for research comparing surgical versus percutaneous tracheostomy and also information that can be used for quality improvement at our division. Clinical predictors of complications will aid in future patient selection for either technique.

Student's role:
The student will be expected to play an active role in the conduct of the study, working in conjunction with a fellow and the PI to ensure regulatory compliance with the IRB. The student will be expected to assist in data collection, coding, analysis and interpretation of research data. Additionally, achievement of the aforementioned objectives. At the end of the student will be expected to:

1. Access, appraise, and assimilate the current medical literature pertaining to the research topic.
2. To gain an understanding of the scientific method by assisting in the design and write-up of a research protocol.
3. To learn about research ethics, informed consent, and the regulatory approvals process by completing CITI compliance training.
4. To learn basic biostatistics and data analysis as appropriate to the project

To demonstrate communication skills by presenting research results on Research Day and at a national/international society meeting.

Required Skills:

1. Proficiency in Microsoft word, Excel spreadsheet management
2. Must have access to the following EMR software: (Meditech, Soarian, Allscripts, Centricity, Hyland Onbase)
3. Experience with the use of a reference or citation management software (not mandatory)
4. Ability to work in a clinical setting; flexible, motivated and hard working

Location of research:
University campus
Department of Pulmonary Allergy & Critical Care

28. Regulation of translation termination

PI: Allan Jacobson, Haidak Professor of Cell Biology and Chair of the Department of Microbiology & Physiological Systems

Interview required – CV with current contact information for an interview (Allan.jacobson@umassmed.edu)

Description:
In humans, nonsense mutations have been implicated in more than 2000 inherited diseases, including cystic fibrosis (CF), Duchenne muscular dystrophy (DMD), hemophilias, lysosomal storage disorders, skin disorders, and various cancers. A substantial fraction of the genetic disorders that arise from nonsense mutations are disabling or fatal and have only palliative treatment options at best. Given the large number of individuals that are collectively afflicted by nonsense mutations, a therapeutic approach to nonsense suppression could be of considerable medical benefit. Of particular importance is the possibility that a drug capable of suppressing nonsense in a given gene would also be capable of having the same effect on nonsense mutations in a completely different gene. Thus, under ideal circumstances a single drug could have the potential to treat hundreds, if not thousands, of different disorders where the only commonality would be their common origin from nonsense alleles. With this objective in mind, Dr. Stuart Peltz and I co-founded PTC Therapeutics Inc. (http://ptcbio.com/) in 1998, an endeavor that led to the identification and characterization of ataluren (aka: Translarna/PTC124), a novel, orally bioavailable small molecule that selectively promotes readthrough of premature nonsense codons. Ataluren is currently being evaluated in clinical trials for several different nonsense-mediated genetic disorders. The mechanism of action for this drug relies on biochemical differences between normal translation termination (i.e., that which occurs at the end of all normal mRNAs) and premature translation termination (i.e., the mode of termination occurring as a result of a nonsense mutation). The goal of the project would be to understand further details of such mechanistic differences in termination modes using the yeast model system.

Student's role:
Work with a postdoctoral fellow to design and execute experiments in yeast cells that would dissect specific biochemical steps in translation termination.

Required Skills:
Standard microbiological and biochemical lab skills.

Location of research:
University Campus
Albert Sherman Center

29. Prehab for port films

PI: Janaki Moni, MD, Associate Processor and Jennifer Baima, MD, Assistant Professor

Interview required – CV and 3-4 line statement of interest with current contact information for an interview (jennifer.baima@umassmemorial.org)

Description:
Rehabilitation has the potential to improve post-radiation outcomes, as it has a highly favorable risk-to-benefit profile. Radiation therapy can affect the structure and function of the pelvic musculature.[i] The 5-year cumulate prevalence of insufficiency fracture after pelvic radiation has been reported as high as 45%.[ii] Positioning of the pelvis is a factor in the location and extent of the radiation treatment. It is desirable for patients to be in the same position daily to ensure accuracy and access to affected lymph nodes, and limit these potential adverse effects. This position is the position of the most relaxation, which is likely best achieved with stretching.

We hypothesize that two stretching exercises will be feasible to perform by subjects daily before radiation treatment and will change sacral slope measurement. We aim to offer two exercises: a hip extension stretch and a hip external rotation stretch. Flexion contractures are a common complication of immobility and can tilt the pelvis.[iii] As such, stretching in hip extension to minimize flexion contracture should aid in supine positioning. Since the supine position encourages hip external rotation at rest, an external rotation stretch was chosen to reinforce this position.

We will observe trends in the change in the sacral slope after at least 5 days of exercise in each subject to determine if this could improve set up accuracy for radiation treatment. Sacral slope is defined as "the angle between the superior plate of S1 and a horizontal line."[iv] We chose this measurement for two reasons: 1) It is an objective radiographic finding documented in the orthopedic literature. This measurement can be easily obtained from planning and port films already part of the standard of care for pelvic radiation. There is not a significant difference between men and women.[v] Joint replacement does not appear to change this measurement.[vi] 2) The radiation targets lymph nodes that lie along the curvature of the sacrum and a change in sacral slope would move these targets in or out of the radiation field.

Currently, there is no available data on change in sacral slope with exercise. The intersubject variation is from 2 to 8 degrees.[vii] The change after spine surgery can be as much as 14 degrees.[viii] Six degrees of change can be seen with manipulating the pelvis in the axial plane.[ix] Since we are comparing subjects to themselves, we estimate two to six degrees of change with pelvic relaxation. Learning if two exercises are feasibile and can affect any change will be helpful in planning future studies to improve exercise options and accuracy of radiation as well as potentially diminish adverse effects for pelvic cancer patients.

Student's role:
Describe study and consent subjects. Will be trained by the physiatrist on exercises. Demonstrate exercises and remain available for subject to perform. Will be supervised by the Radiation Oncologist while in the radiation suite. Help take sacral slope measurements as part of radiation planning and treatment process. Query subjects on potential adverse effects of the exercises. Continue usual clinical care. Enter data into spreadsheet. Meet with statistician to analyze data.

Required Skills:
Will have CITI training and knowledge of basic pelvic anatomy. Statistics not necessary, but interest in data analysis would be helpful.

Location of research:
University Campus
Radiation Oncology Suite

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[i] Bernard, Stéphanie, et al. "Effects of radiation therapy on the structure and function of the pelvic floor muscles of patients with cancer in the pelvic area: a systematic review." Journal of Cancer Survivorship (2015): 1-12.
[ii] Kwon JW, Huh SJ, Yoon YC, Choi SH, Jung JY, Oh D, Choe BK. Pelvic bone complications after radiation therapy of uterine cervical cancer: evaluation with MRI. Amer Journal of Roentgenology 2008 Oct;191(4):987-9
[iii] Fergusson, Dean, Brian Hutton, and Andrea Drodge. "The epidemiology of major joint contractures: a systematic review of the literature." Clinical orthopaedics and related researc*h* 456 (2007): 22-29.
[iv] Legaye J, Duval-Beaupere G, Hecquet J, Marty C. Pelvic incidence: a fundamental pelvic parameter for three-dimensional regulation of spinal sagittal curves. European Spine Journal. 1998 May 1;7(2):99-103.
[v] Endo K, Suzuki H, Sawaji Y, Nishimura H, Yorifuji M, Murata K, Tanaka H, Shishido T, Yamamoto K. Relationship among cervical, thoracic, and lumbopelvic sagittal alignment in healthy adults. Journal of Orthopaedic Surgery. 2016 Feb
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