

EAST CAROLINA UNIVERSITY



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Brody Commons

22ND ANNUAL
MEDICAL STUDENT
SCHOLARSHIP FORUM

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Health System Transformation and Leadership Distinction Track

Navigating High-Risk OB/GYN from the Patient's Eyes

Camille Bauer, LINC Scholar

Care Setting: Middle-aged mother at 32 weeks gestation for her weekly checkup at ECU Physicians OB/GYN high-risk outpatient clinic.

Background and Rationale: Navigating the healthcare system through the patient's eyes allows for purposeful feedback and improvement. The increased rate of complications associated with higher risk pregnancies results in the review of more symptoms and tests at appointments in a short period of time. Providers expressed frustration with backlog, especially at ultrasound, slowing down clinic efficiency.

Details of the Care Experience: The patient's care experience included the following touchpoints: waiting room, a Nonstress Test (NST), ultrasound, Nurse Practitioner examination, and checkout. The patient had three appointments that ran very smoothly- NST at 8 am, Ultrasound at 8:40 am, and practitioner visit at 9 am. The space was very clean, and all the staff were friendly, informative, and comforting, which was reassuring to my nervous patient.

Opportunities for Improvement/Possible solutions: Although my patient did not experience backlog in her appointments, a solution for this issue is to provide patients with restaurant buzzers, allowing them time to leave the waiting area where they are alone with their thoughts. Stress during pregnancy can cause a number of additional risks and complications, so it is important to have patients as stress free as possible.

Recommendations: Overall, she felt she had a great care experience, but I have recommendations for the clinic's improvement in their delivery of rules and need for patient distraction materials. The Ultrasound tech began her appointment by stating the rule that only one family member is allowed. A patient's support system is an important part of having a good outcome with a high-risk pregnancy, so I feel as though the clinic should work with patients on allowing more family. Although, if this rule is 100% necessary, it would be better to display a sign in the waiting room instead of having caregivers deliver this message, so appointments do not begin negatively. The waiting area and procedure rooms could be improved by providing distraction pieces for anxious mothers (magazines, Wi-Fi).

Patient Shadowing Identifies Areas for Improvement in the Vidant Children's Emergency Department

Garrett Berk, LINC Scholar

Care Setting: 17 year-old girl with mother at Vidant Children's Emergency Department (ED).

Background and Rationale: The ED receives numerous patients for a variety of issues and has increasingly become the first point of contact for patients without a primary care provider. Wait times can become an issue during busier days. They request input on efficiency and patient satisfaction.

Details of the Care Experience: The patient presented to the ED for evaluation of a widespread rash. Although this was a relatively simple case from the department's perspective, it still required the patient to make contact with a variety of Vidant staff. Throughout this visit, which totaled 2 hours and 17 minutes, the patient interacted with security, reception, registration, the triage nurse, care nurse, resident, attending, and nurse assistant.

Opportunities for Improvement: While the patient reported a high level of satisfaction upon leaving, there were multiple opportunities for improvement. The family was unaware of the patient flow protocol within the ED, resulting in confusion of the various roles of healthcare personnel. Additionally, the resident appeared to ignore the mother talking at times during the exam. Lastly, the discharge vitals were checked twice within 10 minutes of each other by different staff members, wasting unnecessary resources in the process. While this did not bother the patient, the extra time spent could be costly on a busier day and having blood pressures repeatedly taken could be traumatic for younger children.

Recommendations: Providing the patient with an overview of how the emergency department process works as well as clear introductions when entering the room would allow for better role clarification. Orienting families to the location of amenities outside of the exam room (such as restrooms/water fountains) as well as asking "Is there anything more I can do for you?" before exiting the room would provide a greater emphasis on hospitality. Facilitating better communication among staff or assigning protocol-driven, role-specific responsibilities would reduce redundancy, resulting in a more efficient use of time and resources

Observation of Patient at ECU Med-Peds Clinic Yields Recommendations for Improvement

Anita Gandhi, LINC Scholar

Care Setting: The visit centered around a 26-year-old female with moderate to severe autism, who received care at an Internal Medicine-Pediatrics outpatient clinic for a follow-up visit. The patient was recovering from pneumonia secondary to dysphagia and was also being seen for weight loss.

Background and Rationale: The clinic is located by Vidant Medical Center and sees a high volume of patients from the surrounding community. Due to this high volume and commitment to patient satisfaction, input was requested to evaluate efficiency and flow.

Details of the Care Experience: The appointment overall was efficient and timely, with the entire experience totaling to forty-five minutes. The patient and her guardian first parked in the lot by the clinic, entered, took an elevator to the 2nd floor, checked in with a receptionist, waited in the children's waiting room, and were called back five minutes later by a medical assistant (MA). The MA took the patient's vitals and then sat them in the exam room. The physician arrived five minutes later and met with the patient and addressed all concerns. After, the patient/guardian checked out with a separate **receptionist** and exited. Overall, the area was clean, and the staff were very friendly. Also, the physician treated the patient comprehensively, tailored care to specific needs, and was very empathetic.

Opportunities for Improvement/Possible solutions: It was noted that the patient's autism added a layer of depth, as communication was difficult for her. The patient was also frequently distracted by objects during all steps of the appointment, and the guardian felt the need to sit them in isolation in a separate waiting room as a result. Additionally, the patient was rarely addressed by members of the care team. Rather, discussion was had with the guardian.

Recommendations: Per the observations, recommendations include toys/books in the children's waiting room, engaging the patient in her care, and, if possible, preparing a room for the patient in advance void of distractions.

Patient Navigation Experience of a 19-Year-old Juvenile Diabetes Patient at the ECU Pediatric Specialty Clinic Reveals Strengths and Opportunities for Improvement

Atima Huria, LINC Scholar

Care Setting: A 19-year-old female patient presented at the ECU Pediatric Specialty clinic for a juvenile diabetes continuity care visit.

Background and Rationale: The patient was seen by her pediatric endocrinologist who has been her provider for 11 years. The task was to observe and gather perspective about the patient care experience from patient arrival to departure.

Details of the Care Experience: The patient checked in at reception, was taken to obtain vitals and HbA1C by the medical assistant and escorted to the exam room to be seen by the physician. After the visit, the patient checked out and left the building. The appointment took 50 minutes, with 20 minutes, the largest portion of time, spent in patient-physician interaction.

Opportunities for Improvement and Possible solutions: While taking vitals, the medical assistant had to retake the blood pressure because the patient was nervous. To alleviate this issue, the medical assistant should ensure the patient is relaxed with normal breathing. Furthermore, during the physician exam, the patient was confused about a possible clinical sign, redness in her toes, and why the provider insisted that she should be cautious of this symptom. To resolve confusion, the doctor should improve her explanation about what certain signs mean and what to do if they happen. In conversation about the clinic experience, the patient stated that if you miss or cancel your appointment, it's difficult to reschedule. A possible solution is to implement an appointment waitlist. If a patient cannot be rescheduled within the next 2 weeks, they are placed on a waitlist to fill open spots from cancellations within a given week. My recommendation overall is to implement more patient-centered practices in care delivery and appointment scheduling.

Recommendations: The patient was greeted with familiarity from each caregiver. Additionally, the physician allowed the patient herself to judge how comfortable she felt with increasing the medication dosage and incorporating the changes into her lifestyle. The visit was also very timely and was completed in less than an hour. As a whole, the patient was satisfied with her care and stated that she has had a positive experience at each visit.

Need for Improved Communication and Appointment Utilization in Outpatient Rehab

Veronica Lavelle, LINC Scholar

Care Setting: Elderly woman accompanied by several members of her family who serve as her caregivers. The patient presented post-cerebrovascular accident (CVA), commonly known as a stroke, that left her with severe deficits in speech, swallow and movement.

Background and Rationale: The objective of this project was to use this exercise of patient navigation to critically evaluate the Outpatient Neuro Rehabilitation Unit at Vidant Medical Center. Patients in this clinic see 1-3 therapists at each visit depending on the severity of their condition and their individual needs. This patient had her weekly 3-hour visit scheduled into hour blocks with speech therapy (ST), physical therapy (PT), and occupational therapy (OT).

Details of the Care Experience: Although appointments were scheduled for an hour, various factors reduced the contact time to about 40-50 minutes. These factors included transport time in the wheel chair, staff availability, the need to be changed, and patient disengagement due to fatigue. The majority of the patient's appointments were conducted without the family present, with the exception of OT. The patient's cognition difficulties and the lack of a caregiver present resulted in various gaps in communication between appointments.

Opportunities for Improvement: The family expressed satisfaction with the care they received that day as well as at previous appointments. However, three areas for improvement were noted. These included increased interprofessional communication, better utilization of appointment time, and the need for a new cohesive space.

Recommendations: Based on these deficits, it is recommended that the unit implement paper score sheets that accompany patients on their visit. These sheets would be filled out by caregivers along the way and would track major changes and developments at each point of care. Additionally, it is recommended that limitations are placed on the number of sequential appointments to mitigate patient disengagement. Finally, it is recommended to consolidate rehab services into a new building to increase collaboration and access to extremely limited parking, a major concern for patients visiting a rehabilitation center.

Patient Navigation at Vidant Pain Clinic Reveals Opportunities for Improvement

Mark McAlister, LINC Scholar

Care Setting: Vidant Pain Clinic, staffed by Nurse Practitioners (NP) and Physicians, manages patients suffering from chronic pain. Treatments range from medication maintenance and control to procedures, such as epidural spinal injections. My experience at the clinic followed each touchpoint of care for two patients: a new patient scheduled with a NP and a return patient scheduled for a Lower Epidural Spinal Injection.

Background & Rationale: The 2019 LINC Scholars Cohort aimed to gain insight towards patient care systems from the patient's point of view in order to offer outside comments on strengths and weaknesses of clinic procedures. Although much of my time was spent shadowing care providers, instead of the patient, it proved a valuable space to observe the role of communication within the clinic and between providers.

Details of the Care Experience & Opportunities for Improvement: Encounters with both patients ran accordingly without problems from face value; however, having time to witness the space outside of the patient room and within the care provider's offices illuminated areas for improvement. Based off a pre-determined "Overdose Risk" Score calculated from patient medication records, providers were given a value assigned to each patient they see. This value was assigned and reviewed by providers prior to having seen the patient. At different points in the care process, language regarding the new patient being seen was repeatedly used in ways that could be indicative of bias derived from these scores as well as conversation about prior, non-clinical knowledge the providers knew of the patient.

Recommendations: Although the majority of my time remained positive, these interactions with potential biases stood out the most. First and foremost, the clinic must collectively address the issue and the role language plays within and outside of patient rooms. All staff should reflect on the type of care they provide, and the importance of entering each patient encounter from a neutral stance. Furthermore, bias training regarding pain management and opioids should be introduced into aspects of the clinic's continuing education strategies.

Quality Improvement Opportunities for the Observational Unit

Christel Molnar, LINC Scholar

Care Setting: The patient shadowed was a 66-year-old female in the observational unit. Her stay in observation was the next morning after a colonoscopy due to bleeding complications.

Background and Rationale: The observational unit requested LINC scholars' input on efficiency and satisfaction.

Details of the Care Experience: The patient interacted with many different nurses, the attending, resident, care manager, and Medicare team member all within the patient's room. Whenever the patient had to use the restroom, she would attempt to go by herself, putting herself at a fall risk. Occlusion in the flow of an antibiotic administered by the nursing staff caused the monitor to go off for several minutes without acknowledgement by the nurse. The attending and resident gave the patient differing information that left the patient confused about when she would be discharged. An excellent hospital guide was placed on the bedside of the patient. However, without a formal walkthrough of the hospital guide, the patient was unaware of its existence. Lastly, an attempt to explain payment methods by Medicare and Medicaid left the patient confused.

Opportunities for Improvement/Possible Solutions: Improvements for patient safety and satisfaction include proactive toileting, portable alarms that signal nurses when monitors are reading an error, communication between the resident and attending, better explanations and information of how Medicare and Medicaid will be paying for the hospital visit, and educating the patient about the hospital guide that is at their bedside.

Patient Navigation Experience at PDAY Reveals Some Opportunities for Improvement

Tejal Naik, LINC Scholar

Care Setting: I shadowed a teenage patient at the Pediatric Day Medical Ambulatory Unit (PDAY). She came in for a chemotherapy treatment and was accompanied by her family. She has been coming to PDAY routinely for chemotherapy since her initial leukemia diagnosis in January of 2019.

Background and Rationale: PDAY sees a variety of patients for same day procedures. The touchpoints of care and timing for the procedures varies from patient to patient. Through the patient navigation experience, the clinic requested that we as LINC Scholars provide them with input on care efficiency and patient satisfaction.

Details of the Care Experience: The patient's PDAY experience began when she arrived at the front door of the clinic. The patient then checked in at the front desk. After a short wait, she was promptly taken back to her room by a nurse. In her room, the patient interacted with two different nurses, a physician, an experimental study member, a care manager, and a translator. In less than an hour, the patient completed her chemotherapy course and was discharged.

Opportunities for Improvement/Possible solutions: After the patient navigation experience, I had some recommendations for improvement. First, it would be beneficial to notify the family of free valet parking prior to the visit. During this visit, the patient's sister had to park the car while the patient checked in at the front desk. Second, the patient's mom only spoke Spanish. Even though the family was in the waiting room for a short period of time, it would be nice to have Spanish magazines in the waiting room. With regard to direct patient care, I had two recommendations. First, have the care manager give one sheet with all future appointments instead of separate sheets. Second, have a translator accompany the physician in the patient's room when interacting with non-English speaking families. Overall, however, the patient had a great experience during her time at PDAY. The visit lasted less than an hour, the facility was clean and spacious, and the staff was welcoming and friendly.

Opportunities for Improvements at ECU Physicians Firetower Medical Office

Tulsi Patel, LINC Scholar

Background: The Leaders in Innovative Care (LINC) Scholars participated in patient navigation experiences in order to identify barriers to quality healthcare from the perspective of a patient in the health system. This opportunity intends to direct a more patient-centered healthcare experience that prioritizes valuable interactions with every component of the health system.

Care Setting and Experience: This particular experience occurred at the ECU Physicians Firetower Medical Office in Greenville, North Carolina. This family medicine office treats patients of all ages with a variety of common diseases. The care of a middle age patient well-established at the clinic was followed. She presented at the clinic three days after an emergency room visit for leg injury due to a fall. Significant to her care experience, she arrived to the clinic from New Bern in a wheelchair and holding crutches. The touchpoints of her experience include the reception and waiting area, nursing unit, exam room, patient bathroom, and check-out desk. She interacted with receptionists, nurses, medical assistants and a physician during her time there. The total time of her appointment was one hour and forty-one minutes.

Opportunities for Improvement: Observations of this care experience identified the major opportunities for improvement to include the wheelchair accessibility of the clinic and efficiencies in the health system. This conclusion results from witnessing difficulty and discomfort in patient transport through narrow hallways and a small exam room, as well as conversations with the patient about their frustration with the length of the appointment. Obvious barriers to these improvements are building limitations and the established systems of healthcare practice. Despite these barriers, recommendations to better the healthcare experience for patients at the clinic include the establishment of an accessible patient room and communications with the Craven County Emergency Room administrative staff to create a more efficient system to transfer patient records. With process improvements at the micro-, meso-, and macrosystems, the Firetower Medical Office can contribute toward a more beneficial patient experience that emphasizes the quality of care delivered.

A High Quality Patient Experience: Patient Navigation at the ECU Family Medicine Center

Usman Saqib, LINC Scholar

Care Setting: An elderly male patient arrived to the ECU Family Medicine Center for a follow-up visit for his chronic conditions.

Background and Rationale: The ECU Family Medicine Center is a new, state-of-the-art facility providing primary care to a large population of residents of Eastern NC. The facility seeks to learn ways to improve its patient's experiences by assessing various contact-points through the patient navigation experience.

Details of the Care Experience: Our patient had a fairly standard follow-up visit. They arrived at the clinic for their two o'clock appointment, were called back into triage, and then promptly taken to their patient room. The physician arrived and discussed with the patient their current results and various concerns for approximately twenty minutes. Finally, the patient received their prescription refills and headed to the lab to have a routine blood draw. Our overall observation was that staff was friendly and exceedingly helpful, the environment was clean and orderly, and the patient verbally reported having a satisfactory encounter.

Opportunities for Improvement/Possible solutions: There are a few areas for improvement that we noted throughout the experience. One major point would be to address the various areas of breach in patient confidentiality such as the triage room and lab area. These locations were either in high foot-traffic spaces of the clinic with minimal barriers or places with multiple patients in close proximity while patient information was being discussed. One proposed solution would be to have triage completed in individual patient rooms rather than in the current triaging area. Another improvement measure could be the implementation of dedicated prescription printers in each patient room to ensure patients receive their scripts upon discharge.

Recommendations: The ECU Family Medicine Center is a highly organized, well planned facility that puts their patient's experiences at the forefront of their mission. By implementing new and innovative changes, we can promote high quality experiences and improve patient satisfaction.

Service-Learning Distinction Track

An Observational Study of Referrals and Follow-Ups of the homeless populations at the Greenville Community Shelter Clinic

Louisa Appiah, SLDT Scholar

Presenting the Issue (What?): “People [can become] homeless because of their conditions of physical disability, unemployment, grave illness, mental health, drugs or alcohol abuse or other misfortunes in life”¹. Therefore, “homeless people are at high risk for a broad range of acute and chronic illnesses”². While homeless populations are more likely to need services, there are several barriers that keep them from attaining the services or following through with the appropriate referrals necessary for their health. During the months of June and July, I volunteered at the Greenville Community Shelter Clinic (GCSC) which is student-run free clinic which serves the homeless and underserved people of Greenville. While there, I observed that there was a system in place for a social worker from Health Access East which is a nonprofit program to help meet the medical needs of uninsured patients in Pitt and Greene county. The social worker provides referrals to the patients to address mental health needs, food insecurity, access to jobs, and establishing care with a primary care physician to name a few. There is also a student care manager who works with the social worker to generate and track the referrals. Though patients were offered these services, there was no system in place to follow up on the referrals they receive.

Understanding the Barriers (So what?): During these two months, several patients returned to the clinic without having completed their follow up appointments. When patients were asked why, they expressed concerns about several barriers which hindered them from attaining these services. Some of which included transportation, having the appropriate documentation, and inconvenience of the dates.

Addressing the concern (Now What?): There is a large gap between the patients receiving the referrals and their ability to get to their appointments. My goal is to lessen the gap for follow up appointments among the homeless population at GCSC. My intent for this project will be to create a survey to identify the rate of referral appointment completion, the barriers to completion of referrals and address these barriers while using our current resources without creating additional roles or adding volunteers to the clinic.

Greenville Community Shelter Clinic Resource Pilot Program

Ryan Hatfield, Duy Huynh, Dr. MARRISA Carraway, Dr. Susan Keen, Maudia Ahmad

Background: The Greenville Community Shelter Clinic (GCSC) is a free clinic that serves the homeless population of Greenville, NC. In 2018, the Care Manager program improved referral outcomes and clinic operations. In January 2019, the Greenville Community Resource Pilot Program (GCRPP) began mental & behavioral health screenings and connecting community health resources with the goal of ultimately improving chronic health outcomes. The project aimed to address these unmet healthcare needs in the Greenville community by providing mental health screening tools for the homeless population & referring to the appropriate mental, behavioral and social resources.

Methods: A convenience sample of homeless patients who presented to GCSC for medical care during the months of June and July were screened by medical students who were volunteering in the care manager position using the Screening, Brief Intervention and Referral to Treatment (SBIRT), PHQ-9 and GAD-7 screener tools. Patients who screened positive were referred to community resources after appropriate motivational interviewing and counseling.

Results: Eight patients were seen by care managers, seven were successfully linked to community resources and/or received brief interventions at the time of visit. One patient refused to participate in the screening process.

Conclusion: The SBIRT, PHQ-9 and GAD-7 screener tools were successfully implemented into the clinic flow and were able to identify unmet needs of the patients, ultimately leading to linking community resources to address those needs.

Benefits of Art Classes in Youth Summer Programs

Ethenyeri Maganga, SLDT Scholar

The Lucille W. Gorham Inter-Generational Community Center (IGCC) is located in the west Greenville community, a low-income area, and was established in 2007. IGCC provides physical fitness activities, apprenticeship programs for at-risk youth, and after-school/summer care. This summer, I participated in the Youth Excelling for Success (YES) summer program. Approximately 40 students enrolled and the cost of attendance was \$25 per child. During this 7-week program, students engaged in academic activities and cultural enrichment activities which included swimming, martial arts, arts and crafts, and technology classes. I focused on arts and crafts classes. Art is used to provide stress-relief for adults, but children can also experience emotional distress due to the challenges of growing up, especially in low-income communities. Art can be therapeutic for children and the art they produce can illuminate their subconscious thoughts (Valsan 2009). In addition to stress-relief, art can lead to improvements in overall development and academic achievement. A study conducted by Winsler, et al. found that students who participated in art electives in middle school earned higher GPAs, higher standardized test scores, and fewer suspensions than students who did not (2019). Because of the immediate and long-term benefits of art, it is evident why this is a mandatory component of the YES program. The art projects the students completed this summer included: model rockets, bean collages, and self-portraits. The students often remarked about how relaxing the art projects were, even calling the bean collages “bean therapy”. The instructor for these classes was also an effective leader. She asked the students to read the classroom rules before each session, which served as a reminder of what was expected of them. She also talked to students about their art and their lives, which showed an investment in them and established a strong rapport. In the future, I would like to see the program continue to place an emphasis on art. During the school year, this will be more difficult because of limited time. However, incorporating art as a stress-relief during the school year will be more beneficial since the students may experience more stress due to academics.

Mental Health Status and Intervention Among Eastern North Carolina Farmworkers

Natalie Malpass and Jaslina Paintal, SLDT Scholars

Background: Despite the emergence of mental health as a leading topic of concern for healthcare providers and public health organizations, there remain significant disparities among Eastern North Carolina's residents. Among the most underserved of ENC's population are migrant and seasonal Farmworkers. Many of these migrant farmworkers participate in the H-2A Temporary Visa Program, as North Carolina ranks 3rd among states with the highest number of enrollees (ncgrowers.org). Eastern North Carolina is home to more H-2A participants and non-H-2A farmworkers than other regions of the state, though a total population estimate is difficult to assess (NC Farmworker Institute 2007). Although ENC Farmworkers are significantly underrepresented in the literature, a 2012 study revealed that as many as 52% of migrant and seasonal farmworkers living in Eastern North Carolina reported depressive symptoms and 16% reported symptoms consistent with anxiety (Crain 2012). These results may be skewed due to participant mistrust and researcher bias, and further culturally-competent study is necessary. Contributing factors to poor mental health status may include cultural and social barriers, separation from family members, occupational and housing stressors, limited social support, and lack of access to adequate mental healthcare.

Project Implementation Plan: The future aims of this longitudinal Service-Learning project, in association with the NC Agromedicine Institute and AMEXCAN, are to: 1) develop a comprehensive list of mental health resources available to ENC Farmworkers, 2) create and disseminate healthcare provider education materials with regards to the unique mental health challenges faced by ENC Farmworkers, 3) conduct community based participatory research with ENC Farmworkers to gain further insight into their perceived mental health status and barriers, and 4) pilot a mental health intervention with a group of ENC Farmworkers.

Examining the Impact of Physical Activity on Children within West Greenville through The Lucille Gorham Intergenerational Community Center Youth Summer Camp

Rashieda Pugh, SLDT Scholar

Observation: Lucille W. Gorham Intergenerational Community Center Youth Summer Camp provides children from low income communities with academic mentoring, nutritious meals, physical activities, and STEAM resources. For my enrichment project I was able to observe the physical activity segment of the summer youth camp for 5 weeks. The physical activity segment consisted of an hour of outdoor and indoor activities, and swimming at the ECU student recreational center for two hours. Children ages 6-15 years old participated in outdoor activities such as kick ball, soccer, and recreational free time on the playground for 15 minutes. Following outdoor activities students were directed into classrooms where they used the remaining 45 minutes engaged in group activities such as Uno, Jenga, and Lego building. These activities promoted team building, leadership skills, and interpersonal skills. The Physical Activity Guidelines recommend that children and adolescents ages 6 to 17 years do 60 minutes or more of moderate-to-vigorous physical activity daily.¹ Regular physical activity in children and adolescents has brain health benefits for school-aged children, including improved cognition (e.g., academic performance, memory) and reduced symptoms of depression. Outdoor activities were limited to 15 minutes due to children complaints of heat exhaustion and minimal shading around playground.

Action Plan: At the end of my 5th week I was able to meet with leadership members to address the need for more indoor physical activities. The aim of my project will be to implement a physical activity segment which include indoor Yoga for 30 minutes after outdoor activities, followed by a 10 minute “cool down” period consisting of meditation and cool, wet peppermint towels to be placed on children’s faces while they meditate. Studies show that children participating in yoga reported using fewer negative behaviors in response to stress and better balance than a comparison group.² My project will assess the use of yoga on self-esteem, and children’s negative behavior response to peers.

Health Science Course Incorporation Within STEM Curriculum at Lucille W. Gorham Intergenerational Community Center Summer-Bridge Day Program

Jasmine Robinson, SLDT Scholar

The Lucille W. Gorham Intergenerational Community Center (IGCC) provides community resources and events to the residents of West Greenville, NC year-round. One initiative known as the Youth Excelling for Success (YES) program delivers after-school and Summer Bridge activities at the center for youth in 2nd-7th grade. During the summer, the Summer Bridge day camp provides cultural enrichments activities, nutritional awareness, and science, technology, engineering, and math (STEM) activities for the camp participants for 7 weeks (“Programs”). Weekly STEM activities include use of technological devices and a course in basic robotics concepts. Each week, camp participants spend approximately 4 scheduled hours of screen time on iPad devices where they interact and play on recreational application games. It is recommended that children and teenagers above age 5 limit their recreational screen time to 2 hours a day. This aids in increasing a child’s overall productivity, decrease the risk of obesity, as well as promote sleep (Williams).

The National Science Teachers Association’s key principles that guide science learning among young children specifies the following: “that children have the capacity to engage in scientific practices and develop understanding at a conceptual level” and “that young children need multiple and varied opportunities to engage in science exploration and discovery” (Raven). In an effort to assist in incorporating a holistic STEM curriculum and reduce leisure technology usage, a health science course was implemented to introduce the children to basic anatomy concepts at an elementary level. Models demonstrating cardiovascular, respiratory, and renal anatomy were exhibited followed by a post-class survey to assess each participants’ basic understanding of the presented material. It is our goal to continue the health science curriculum within the Summer Bridge program by incorporating multiple organ systems and other health sciences topics within the STEM portion of the program’s curriculum to build a foundation of the internal and external structures of the human body using a hands-on, interactive-educational approach.

Implementing a Nutrition Program into a Local Community Center

K'Shylah Whitehurst, SLDT Scholar and Samantha McCleese, MD

Presenting the Issue (What?): Studies have shown that 30% of children within Eastern North Carolina (ENC) are overweight compared to 17% of children nationally.¹ Due to the many obstacles that African American and Latino children within ENC may face, the chances of being overweight or obese are higher within these populations.² This summer I had to opportunity to work with the Lucille W. Gorham Intergenerational Community Center (IGCC), which offers a summer camp, afterschool program, and community outreach programs to engage with members of the West Greenville community.³ The summer camp is offered from students in between second and seventh grades IGCC's Fit mission states that one of the goals of IGCC is to promote health and wellness in the community by focusing on physical activities, nutrition, education, and community support.³ At IGCC campers are provided with breakfast and lunch daily from Pitt County Schools. Snacks such as chips, cookies, and granola bars are also provided by the camp.

Understanding the Barriers (So What?): By working with the nutritional support staff at Pitt County School who provides the food for IGCC, the nutritional content of the meals will be studied to determine if they are meeting current recommended guidelines for childhood nutrition. Options for healthy snacks will be investigated with the Pitt County School nutrition team to better educate the staff on options that better meet the guidelines.

Addressing the Concern (Now What?): Based on the nutritional analysis of the current food and snack program, it would be ideal to incorporate healthier snack options at camp at least once a week next summer along with education on healthy snacks, and then possibly everyday as the years progress.

Medical Education and Teaching Distinction Track

The Medical Education and Teaching Distinction Track Summer Immersion Teaching Experience: Hands-on Training for Future Clinician Educators

Mensah E², Campbell O², Arafat A², Parrish M², Mathew A², Elizondo D², Priester A³, Jester M³, Reyes O⁴, Patel K⁴, Harrell K¹

1-Department of Anatomy and Cell Biology, BSOM, Associate Professor

2-Summer Program for Future Doctors, Office of Diversity Affairs, BSOM, MS2

3-Gross Anatomy for Health Professionals, BSOM, MS2

4-RISE Pre-College Program, Office of Diversity Affairs, BSOM, MS2

The Medical Education and Teaching Distinction Track (MET) at the Brody School of Medicine (BSOM) is a longitudinal program that prepares medical students to be effective clinician educators. This track guides students in developing their teaching skills and interest in academic medicine through the application of learning theory and instructional strategies during a Summer Immersion Teaching Experience (SITE). SITE occurs during the summer months preceding the second year of medical school. Teaching opportunities include involvement in the 8-week Summer Program for Future Doctors (SPFD), 9-week Gross Anatomy for Health Professionals (PTHE 8008) or the 6-week RISE Pre-College Program. MET scholars apply to the program(s) of choice and are selected into the role of teaching assistants by faculty program or course directors. The collective goal of SITE is to engage scholars in the entire curricular process, including designing and delivering course content, creating, evaluating, proctoring, and analyzing student assessments, receiving and providing student feedback, and participating in tutoring activities. In summer 2019, ten MET scholars (BSOM class of 2022) were selected for SPFD (n=6), RISE (n=2) and PTHE 8008 (n=2). Scholars taught across three different learner levels: junior high school students interested in medicine (RISE); undergraduate/postgraduate students interested in medicine (SPFD); and graduate students enrolled in physical therapy and nurse anesthetist programs in the College of Allied Health Sciences (PTHE 8008). SPFD course topics included anatomical sciences, biochemistry, neuroscience, and physiology. PTHE 8008 covered gross anatomy topics, while RISE content was focused on introducing basic science topics as they relate to common diseases in eastern North Carolina. Across all programs, scholars participated in approximately 176 hours of 1:1 tutoring, 155 hours of group tutoring, 59 hours of direct lecturing, 35.5 hours of review sessions, 233 hours of laboratory teaching, 585 hours of content development, and 395 hours of preparatory time, in addition to assigned program hours. Additionally, all scholars completed two online graduate-level courses that introduced them to educational and research topics in medicine. Self-reported graduate course time totaled approximately 480 hours. Overall, participation in SITE reinforced not only the scholars' desire to pursue academic medicine, but also significantly increased their skill set and the quality of these educational programs.

Summer Scholars Research Program

Racial Disparities Persist in the Treatment of Pancreas Cancer Despite Insurance Status

Tijesuni Babalola¹, Dr. Alexander Parikh¹

¹Brody School of Medicine, East Carolina University

Background: Pancreatic ductal adenocarcinoma (PDAC) is the fourth-leading cause of cancer-related death in both men and women in the United States. Surgical resection followed by adjuvant chemotherapy (ACT) remains the standard of care in the treatment of resectable pancreatic ductal adenocarcinoma (PDAC). Despite this approximately 50% of patients fail to receive adequate treatment. Significant health insurance disparities exist in the treatment of resectable PDAC with a larger number of both uninsured *and* Medicaid patients failing to receive potentially curative treatment compared to those with Private and Medicare. Additionally, African American patients with private, Medicaid, or Medicare insurance were less likely to receive surgery compared to their white counterparts with the same insurance. Lastly, when the insurances were controlled for, African American patients had a lower survival outcome than other races.

Objective: The purpose of this study is to explain the decreased survival outcome for African American patients in the Vidant Health System.

Methods: Patients in the Vidant Health System, that have been diagnosed with Stage 1 and 2 PDAC were compiled into a Redcap database. A retrospective cohort study will be performed, and Multivariable (MV) logistic regression models controlling for demographic and tumor-related confounders will be used to test the association between survival outcome and race.

Conclusions: As the health insurance climate continues to evolve, understanding other health disparities will be critical to assure that patients with PDAC are afforded the best chance for survival.

Semen Viscosity and Liquefaction: Effect on Clinical Pregnancy Rates after Intrauterine Insemination

Ashley K. Barbour, BA, MA¹, Jennifer E. Mersereau, MD, MSCI^{2,3}, Jamie Stanhiser, MD^{2,3}

¹Brody School of Medicine at East Carolina University, Greenville, North Carolina

²UNC School of Medicine, Chapel Hill, North Carolina

³UNC Fertility, Raleigh, North Carolina

Background: Intrauterine insemination (IUI) continues to be a low tech, low cost option to improve fecundity for patients with mild male factor or unexplained infertility. While each sample undergoes extensive prewashing preceding IUI treatment, the question remains as to whether initial parameters such as viscosity and liquefaction have an impact on clinical pregnancy rates (CPR).

Hypothesis: We hypothesized that viscosity and liquefaction are contributing factors in IUI outcomes as measured by CPR.

Methods: This was a retrospective cohort study of women undergoing IUI between 7/16 to 1/17 in a University-based clinic performed under Institutional Review Board (IRB) approval. 210 IUI samples were observed. IUI samples are methodically assessed for characteristics such as color, viscosity, agglutination, and liquefaction before they undergo sperm washing. In the process of sperm washing, semen is placed in a test tube, sent through a centrifuge, and concentrated sperm collects as a pellet at the bottom of a test tube. Concentrated sperm is pretreated with Quinn Sperm Washing Medium according to lab protocol which contains gentamicin and 5.0mg/ml of Human Serum Albumin. The concentrated sperm sample is then placed directly into the uterus via a catheter. The primary outcome measure was CPR, as defined by cardiac activity on maternal ultrasound. Statistical tests such as t-test and chi-2 analysis were preformed using STATA, where appropriate.

Results: When looking at viscosity, there was no difference in CPR between normal/mild and moderate/extreme viscous pre-wash IUI sperm parameters ($p= 0.878$). Similarly, there was no difference in CPR between men with complete versus incomplete liquefaction on pre-wash IUI parameter ($p= 0.416$). Other factors such as agglutination and post wash total motile sperm did not impact CPR with IUI. The only factor that predicted improvements in CPR was maternal age ($p=0.0204$).

Conclusions: Pretreatment of sperm with Quinn Sperm Washing Medium is effective in treating highly viscous semen before IUI treatment. Characteristics of pre-wash viscosity and liquefaction had no effect on CPR after IUI. In order to confirm this finding, we hope to expand the sample size and conduct a similar study using IVF patients.

Environmental Regulation of Midbrain Dopamine Neuron Phenotype

Spencer Bell, Makenzie Nutter, Collin Johnson, Heath Partington, Jeffery Eells, PhD

Dopamine is a neurotransmitter used by neurons in the brain that has been closely linked to a variety of conditions, most notably Parkinson's disease (PD). It has been shown that the phenotype of dopamine neurons located in the midbrain can change in certain environmental conditions, including day/night cycles and the amount of stimulation in the mice's environment. Gaining a better understanding of this phenomenon could allow for earlier detection of PD or similar conditions based on the presence/absence of certain transcription factors that are only evident when a neuron has the dopamine phenotype. The number of dopamine neurons in the midbrain is thought to be dynamic. Environmental stimuli activate latent dopamine neurons to take on the dopamine phenotype via expression of dopamine neurotransmission transcription factors (ex. Nurr1, TH). The latent population are the dopamine neurons that may not be expressing markers evident in active dopamine neurons but have the potential to express these markers under certain environmental conditions. It is hypothesized that dopamine neurons will be more active at end of night than day because dopamine is expressed more when active and mice are nocturnal. Mice models were used to test these hypotheses. Two separate experiments are used to test different environmental conditions: 1) day/night cycle where some mice are euthanized at the end of the day cycle and others at the end of the night. 2) mice in a stimulating environment are compared to mice in an environment that is not as stimulating (ex. wheel, hoop). Using immunohistochemistry, three stains are used to determine the level of dopamine expression in sectioned midbrain samples. The YFP stain will be expressed in any neuron that is currently or has ever been a dopamine neuron (Nurr1). The DAT and/or TH stain will only be expressed in current dopamine neurons. These experimental results hope to show that dopamine neurons either change their phenotype and/or become latent under certain environmental conditions.

Changes in Hba1c Levels in Non-diabetic Patients 1 Year Post Bariatric Surgery

Buccini P., Elliot Z., Yang J., Pories W.

Bariatric surgery is commonly recognized by the general population as an effective intervention for weight loss¹. Although this is true, the surgery has more importantly been found to improve various other aspects of health. This includes lower cancer rates, reduced cardiovascular disease (CVD), diabetes remission, and more^{2,3,4}. This has led to the belief that bariatric surgery can reverse the effects of metabolic syndrome, which is a collection of conditions that lead to increased risk for CVD and diabetes⁵. However, the implementation of bariatric surgery to reverse these effects is still limited. While bariatric surgery has been found cause remission of type 2 diabetes, there has been little investigation as to how non-diabetic patients' Hba1c levels change following surgery⁶. Investigating the levels of Hba1c levels post-surgery can help discern the possible metabolic changes from the bariatric surgery. For this study, the HbA1c levels of patients were measured 30 days prior to surgery and one-year post-surgery through the Longitudinal Assessment Study (LABS) which was a multicenter observational study from 10 hospitals throughout the United States. The study was performed from 2006 to 2009 and included 2458 participants. Patients with diagnosed diabetes and/or taking diabetic medication, such as metformin, were excluded from this study. Normal Hba1c was considered to be 5.7 or below, and any higher was considered elevated. The data for this study is still being extracted and will be analyzed in the upcoming months. The results of this study will help provide further insight into how bariatric surgery alters the metabolic mechanisms. If the study finds that the Hba1c levels are significantly lowered following surgery this will help support the current findings that bariatric surgery reverses the mechanisms of metabolic syndrome. Moreover, it suggests that bariatric surgery may be a possible preventable intervention for diabetes mellitus and could help prevent CVD by lowering Hb1ac levels. If the study does not find significant lowering of Hba1c levels one-year post-surgery it shows that further examination into how and when these changes occur is necessary. One possible reasoning for there being no change in Hba1c levels is that a certain threshold of insulin insensitivity must be reached before it can be reversed.

The Impact of Childhood Trauma on Dorsal Anterior Cingulate Cortex, Sleep and Adolescent Behaviors

Simone Boney^{1,2}, Sarita Silveira^{1,2}, Jyoti Mishra^{1,2}

¹Department of Psychiatry, University of California San Diego, La Jolla, CA;

²NEATLabs, University of California San Diego, La Jolla, CA

Background: Prior research suggests that childhood trauma increases the risk for psychopathologies such as internalizing and externalizing behaviors. However, very little is known about the developmental trajectory of trauma-linked disorders during adolescence, or the relationship of these disorders to functional connectivity (FC) in brain networks or to disturbances in important basic daily life functions such as sleep.

Objective/Hypothesis: We hypothesized that childhood trauma will be associated with negative impacts on FC of the dorsal anterior cingulate cortex (dACC) region to other regions of the cingulo-opercular network (CON), that are developing during adolescence. Additionally, daily life factors, such as sleep problems may aggravate the impacts of trauma on brain function.

Methods: Data from 830 adolescents were analyzed (mean age (y) at study baseline 17.36 (range 12-22)) from the multi-site NCANDA (National Consortium on Alcohol and Neurodevelopment in Adolescence) cohort. “Internalizing” (social withdrawal, anxiety, depression) and “externalizing” (aggressive and destructive behavior) behaviors were assessed using the Child Behavior Checklist (CBCL). Severity of childhood trauma in the form of child abuse and neglect was measured using the Childhood Trauma Questionnaire (CTQ). The Pittsburgh Sleep Quality Index (PSQI), which indicates sleep disturbances, was assessed in a subsample of adolescents (n=110). Resting state functional neuroimaging data were used to compute FC from the dACC to other regions of the CON. The impact of childhood trauma on FC and internalizing and externalizing behaviors was analyzed using generalized linear mixed models with repeated measures from study baseline and three follow up years.

Results: Analyses show that CTQ negatively impacts dACC-CON FC. CTQ as well as dACC-CON significantly predicts both internalizing and externalizing adolescent psychopathology as measured on the CBCL. Furthermore, on a small subset of the population, in which all measures were available, there was a significant interaction between trauma (CTQ) and sleep problems (PSQI) in predicting internalizing and externalizing behaviors. This second finding supports the hypothesis that sleep disturbances moderate the effects of childhood trauma on internalizing and externalizing behaviors. However, notably, sleep disturbances do not moderate the effect of childhood trauma on FC of the developing dACC-CON.

Conclusion: These results advance the mechanistic understanding of how childhood trauma impacts psychopathology during adolescence. The results further suggest specific patterns of brain connectivity and sleep behaviors as possible intervention and prevention targets.

Does Caries Risk Assessment Impact Non-Operative Treatment of Adults in the ECU School of Dental Medicine?

Joshua Cook¹, Dr. Roopwant Kaur², Gerard Camargo, Dr. Mark Moss³

1. Student, ECU SoDM
2. Division of Operative Dentistry, ECU SoDM
3. Department of Foundational Sciences, ECU SoDM

Background: The Caries Risk Assessment is an informative tool to help manage caries in adults, and encourage positive change in oral health. Current usage of the form within the SoDM and CSLCs is only at 15.3% among the past patient population.

Hypothesis: The percentage of patients with treatments of 0.12% Chlorhexidine Gluconate mouth rinse (CHX), PreviDent 5000 toothpaste, and/or fluoride varnish will be higher for adult patients deemed to be at high risk of caries according to the Caries Risk Assessment (CRA), than for those at a moderate or low risk, and higher than for patients that did not have a CRA form filled out.

Methods: Data were extracted using the COHORT database which was then analyzed comparatively for procedural and patient rates of treatments of CHX, PreviDent 5000, and fluoride varnish using SPSS crosstabulation, multiple response, and chi square testing software.

Results: Among procedure and patient treatment rates of CHX, PreviDent 5000, and fluoride varnish, the high-risk patients, on average, received more anti-caries therapies than the other four categories, and there was a statistically significant difference between the categories, indicating CRA status affects clinical, non-operative care.

Conclusions: Future work should involve raising both usage of the CRA tool and the usage of anti-caries therapies and emphasizing the importance and usefulness of the CRA tool to both provider and patient.

The role of the right temporo-parietal junction in social communication: A preliminary study

Ke'Asia Craig¹, Atticus Toriello², Kathrin Rothermich³

¹Brody School of Medicine, East Carolina University, USA

²Department of Psychology, East Carolina University, USA

³Department of Communication Sciences and Disorders, East Carolina University, USA

Background: The rTPJ is thought to be closely related to theory of mind (ToM) and cognitive empathy, two processes linked to the ability to attribute other's mental states, such as beliefs and intentions (Frith & Frith, 2001). Nonliteral language such as sarcasm or teasing represents an interesting challenge for humans because it involves making pragmatic inferences, but also complex cognitive skills such as the inference of mental states (ToM). (Dennis et al., 2013; Whyte & Nelson, 2015). Our study will examine the causal relationship between the engagement of a particular brain region, the right temporo-parietal junction (rTPJ), and making pragmatic inferences.

Hypothesis: Depression of the rTPJ in healthy undergraduate students using cathodal transcranial direct stimulation (tDCS) will alter participants abilities to perceive nonliteral language and decrease their ability to make social pragmatic inferences.

Method: Thirty healthy undergraduate students will view 160 videos over two sessions of young adults interacting sincerely or using sarcasm and teasing in short conversations. Participants will answer Likert scale question to assess social-pragmatic inference making. Prior to viewing the videos, the participants will receive either cathodal tDCS to the rTPJ or sham stimulation. Eyetracking and pupillometry data measuring visual attention, accuracy, and reaction time will be obtained while the participants are completing the task.

Results: Our research is currently in the pilot phase. Preliminary results from the pilot study displayed that after receiving tDCS, reaction time is slowest in videos that display sarcasm [n=2].

Conclusions: This investigation will be useful for forming theories of non-literal language perception and social cognition. There is currently no standard of care for evaluation or treatment of social communication dysfunction in patients with social communication deficits, such as Parkinson's Disease, Autism Spectrum Disorder or Schizophrenia. Results of this research may benefit clinicians who work with these individuals and provide a new method for improving patient's social communication.

Lipopolysaccharide drives CD25 expression on murine dendritic cells

Jamie O. Creed, Alexander G. Bastian, and Mark D. Mannie; Department of Microbiology and Immunology, Brody School of Medicine at East Carolina University

Background: Dendritic cells (DCs) are powerful antigen presenting cells and activators of T cells. Activation of DCs by a cocktail of immunomodulating agents including lipopolysaccharide (LPS), tumor necrosis factor alpha (TNF α), and prostaglandin E₂ (PGE₂) elicited expression of CD25, which is the alpha chain of the heterotrimeric IL-2 transmembrane receptor. CD25 on T cells is needed for IL-2 dependent growth, whereas the regulation and function of CD25 on DCs is understudied and poorly understood. CD25 expression on DCs most likely mediates a significant role in immunoregulation.

Objective: Our objective was to identify the primary mediator and function of CD25 expression on DCs.

Methods: DCs were obtained by culturing mouse bone marrow with granulocyte-macrophage colony stimulating factor for eight days and with IL-4 during the final five days. All combinations of PGE₂, TNF α , and/or LPS were added for the final two days of culture at concentrations of 1 μ g/mL, 20 ng/mL, 50 ng/mL, respectively. DCs were kept at a density of 50,000 cells/ mL. Cells were stained with fluorochrome-conjugated antibodies and analyzed by use of flow cytometry. T cells were obtained by CD4 negative selection of mouse splenocytes. T cells were cultured with DCs and antigen for three days. T cell activation was assessed by incorporation of [³H]thymidine over the final day.

Results: LPS was the key modulator that elicited high levels of CD25 on DCs. LPS treatment of DCs significantly increased the efficiency of antigen presentation to T cells (p<0.05). TNF α , another activator of DCs, did not significantly increase CD25 expression or antigen presentation activity.

Conclusion: LPS drives DC expression of CD25, and CD25^{High} DCs cause greater T cell proliferation compared to control non-treated DCs. CD25 on DCs may enable trans-presentation of IL-2 to selectively stimulate T cell growth. Additional studies are required to characterize functionality of CD25 on DCs. DCs with high expression of CD25 may play a significant role in the pathogenesis of autoimmune disease.

Thoracoscopic Lobectomy after Neoadjuvant Chemoradiation

Sahil Dayal, MS; James Speicher, MD

Department of Cardiovascular Sciences, East Carolina University Brody School of Medicine, Greenville, NC, USA.

Background: Non-small cell lung cancer remains the most prominent source of neoplastic mortality in the US. Later stage cancers often are treated with neoadjuvant chemotherapy and radiation prior to surgical resection. Preoperative radiation and to a lesser extent chemotherapy, increases the difficulty of surgical resection through scarring and other means. While minimally invasive thoracoscopic approaches have become the standard of care with standard lung resections, the increased difficulty in post chemoradiation therapy (CRT) patients has resulted in slow adoption of minimally invasive techniques for neoadjuvant CRT resection.

Hypothesis: We hypothesize that there is no statistically significant difference between patients having undergone neoadjuvant CRT and those not receiving CRT before thoracoscopic lobectomy when evaluating post-operative readmission and mortality.

Methods: An IRB-approved, retrospective analysis of a RedCap database was conducted of 317 patients who underwent lobectomy between the years 2014 and 2019 at a single institution. Baseline variables, demographics, surgical procedure data and pathology findings, and postoperative outcomes were collected. Statistical analysis of continuous and categorical data was conducted to compare outcomes of patients undergoing thoracoscopic lobectomy with and without history of neoadjuvant CRT. This was done using a standard unpaired t-test for the continuous data and Fischer's Exact chi square test for the categorical data in GraphPad.

Results: There were no differences between the no CRT vs neoadjuvant CRT groups when compared to demographics of age, BMI, and past smoking history. Operative data analysis showed there were no significant differences between the groups for estimated blood loss, hospital stay, chest tube duration, nor air leak. Postoperative outcomes analysis showed no significant differences between the CRT and non-CRT groups in pulmonary complications, other complications, 30 day readmission, 30 day mortality, nor 60 day mortality.

Conclusion: Our results suggest that minimally invasive lobectomy after neoadjuvant chemo/radiation is a safe option for patients with advanced regional non-small cell lung cancer. More outcomes and details of CRT can be measured to exact a new standard of care for regional small-cell lung carcinoma. This could lead to improved patient care, longevity of life, and application to other types of surgery and cancers.

Endobronchial Valves in The Management Of Persistent Non-Operative Air Leaks: A Single-Center Experience

Patrick M. Dugom, Villa Hernandez F, Mozer AB, Speicher JE

Brody School of Medicine at East Carolina University, Department of Cardiovascular Sciences, Greenville, NC 27834

Persistent air leak (PAL) can arise from numerous etiologies and is associated with significant morbidity and mortality, prolonged hospitalization, and increased treatment costs. Conventional management consists of prolonged chest tube drainage with escalation to surgical intervention if necessary. However, limited options exist for patients with PAL from complications of chronic lung disease who have failed conservative therapy and are poor surgical candidates. Currently, endobronchial valves (EBVs) are only approved in the management of postoperative air leaks. We report our investigational application of EBVs in the management of patients with PAL arising from chronic lung disease in whom surgical intervention was contraindicated. Currently, we have a sample size of 13 patients in which one of our surgeons placed EBVs to treat PAL. Having Institutional Review Board-approval, EBVs were placed at our single-center for patients with persistent air leaks arising from non-operative causes. A retrospective review was conducted to assess outcomes. Using our EHR, we looked at many variables to compare pre-op to post-op, such as length of stay, length of chest tube dependence, location of the EBVs, whether there was resolution of the air leak upon discharge, and whether the patient survived. It was observed that average length of stay (LOS) before and after EBV placement was 22 +/- 12.35 days and 13 +/- 7 days, respectively. Furthermore, average LOS post EBV placement was 13 +/- 14 days in the success group compared to 61.7 +/- 71.3 days in the failure group. The overall success rate was 75%. Aside from very minimal outliers in our data that causes some skewedness, it is apparent that the use of one-way EBVs as a treatment option for PAL is a probable solution; however, more participants are needed to ensure statistical accuracy.

Racial and Geographic Disparities in Stage of Presentation in the Colorectal Cancer Hotspot Region of North Carolina

Tyler Hinshaw, BS, MS;¹ Suzanne Lea, PhD;² Justin Arcury, MS;³ Alexander A. Parikh, MD, MPH;¹ and Rebecca A. Snyder, MD, MPH.^{1,2}

¹ Department of Surgery, East Carolina University Brody School of Medicine, Greenville, NC, USA.

² Department of Public Health, East Carolina University Brody School of Medicine, Greenville, NC, USA.

³ North Carolina Central Cancer Registry, N.C. Department of Health and Human Services, Raleigh, NC, USA.

Background: Despite improvements in overall colorectal cancer (CRC) care, recent studies have demonstrated that geographic disparities in CRC persist. Distinct hotspots of increased CRC death rates have been identified, including 11 counties in Eastern North Carolina (ENC).

Objective: The primary aim of this study was to (1) measure CRC incidence by stage in the NC hotspot and non-hotspot regions, and (2) determine if any racial disparities exist.

Methods: CRC diagnosis and death data from 2008-2016 were obtained from the NC Central Cancer Registry and analyzed by hotspot and non-hotspot regions. The non-hotspot region was defined as 71 NC counties outside of eastern NC. Death rates (95% CI) were expressed per 100,000 person-years and age-adjusted to the 2000 U.S. standard population. Regional rates were calculated for the 8-year interval.

Results: Within the ENC hotspot region, the overall incidence rate of CRC is higher than non-hotspot NC [43.7 (95% CI 39.2-48.8) vs 38.4 (95% CI 37.6-39.2)]. Within the hotspot counties, overall incidence rates are higher among African American (AA) compared to White patients [51.1 (95% CI 43.4-59.9) vs. 39.1 (95% CI 33.6-45.4)], and this disparity persists across all stage categories. The incidence among AA and White patients with localized disease is 18.4 and 14.4, respectively; for regional disease, 16.7 vs. 13.9; and for distant disease, 11.4 and 7.8. Racial disparities in CRC incidence are also observed within the non-hotspot counties (localized 16.1 vs. 13.5, regional 15.2 vs. 13.5, and distant 11.3 vs. 7.8). CRC mortality rates in the hotspot counties are higher among both AA and White patients (21.7 and 15.5, respectively) compared to non-hotspot NC (19.1 and 12.8, respectively), although the absolute difference by race is similar (6.2 vs. 6.3, respectively).

Conclusion: Patients residing within the 11 rural hotspot counties in NC have higher age-adjusted incidence of localized, regional, and distant CRC and higher mortality rates than patients in non-hotspot counties. Racial disparities exist in both stage at presentation and mortality rates; however, absolute racial disparities appear similar in both geographic regions. Future work should investigate the underlying etiology for both increased CRC incidence and mortality among AA and White patients in this area.

Clinical Factors that Affect Fiducial Tracking in Stereotactic Ablative Radiotherapy (SABR) Against Lung Tumors

Duy M. Huynh BS¹, Akash R. Patlolla BS¹, Ethan Patel, Kunj Patel, Sunil Sharma PhD¹, Mark Bowling MD², Hyder Arastu MD¹, Andrew Ju MD¹

¹Department of Radiation Oncology Brody School of Medicine at East Carolina University

²Department of Internal Medicine Brody School of Medicine at East Carolina University

Background: Stereotactic ablative radiotherapy (SABR) is a treatment option for patients with early stage non-small cell lung cancer (NSCLC) and recurrent or oligometastatic disease who are not surgical candidates. Successful tracking of target lesions is critical during treatment due to tumor motion during the breathing cycle. Robotic SABR uses placement of fiducial markers near the tumor which can be tracked by the robotic SABR system during treatment. Currently, there is not much data on impacts of patient clinical characteristics on fiducial tracking and outcomes.

Objective: Analyze correlations between patient clinical data fiducial tracking and outcomes of SABR on lung tumors.

Methods: A retrospective review with IRB approval was done on patients that received robotic SABR for lung tumors at Vidant from 2016 to 2019. Clinical data collected included demographics, past pulmonary medical history, prior lung procedures, pulmonary function tests, technical treatment data, tumor control and survival. Correlations between smoking history, COPD, lung surgeries, tumor location and PFTs to number of fiducials tracked were determined using Chi-square test on MedCalc. Correlations between tumor location and specific errors preventing at least 3 fiducials from being tracked on the robotic SABR system were also done.

Results: 77 patients were identified, 48 with PFTs. COPD was associated with having 3 or more fiducials tracked during SABR ($p=0.034$). Specific tests from PFTs did not correlate with the number of fiducials tracked. Smoking history and prior lung surgeries did not affect the number of fiducials tracked. Tumor location between upper and lower lobes did not affect number of fiducials tracked, however, tumors located in either lower lobe were correlated with higher rates of uncertainty errors ($p=0.015$), but not spacing or rigid body errors. There was no correlation between numbers of fiducials tracked with local tumor control or overall survival.

Conclusion: More fiducials may have been tracked in patients with COPD due to reduced elastic lung tissue and motion. Greater motion in lower lobes can contribute to certain errors that prevent more fiducials from being tracked. Increased number of patients in a data set may result in stronger correlations between patient and tumor factors and outcomes.

Nurr1 In Peripheral Blood Mononuclear Cells as a Potential Biomarker for Parkinson's Disease

Collin Johnson, Spencer Bell, Heath Partington, Makenzie Nutter, Dr. Jeffrey Eells

Nurr1 is a key transcription factor that regulates dopamine production in midbrain nigrostriatal dopaminergic neurons. In Nurr1-null heterozygous mice, dopamine levels are significantly reduced, leading many to believe that Nurr1 dysregulation may be implemented as a major player in the development of Parkinson's disease (PD) as a result of a decreased number of nigrostriatal dopaminergic neurons in those patients (Zetterström *et al.*, 1997). It has also been shown that Nurr1 expression is significantly decreased in peripheral blood mononuclear cells (PBMCs) of Parkinson's patients when compared to non-disease controls (Le *et al.*, 2008). We believe that Nurr1 expression in PBMCs may be predictive for Nurr1 expression and function in midbrain dopamine neurons. To test this hypothesis, we analyzed mRNA levels from PBMCs and nigrostriatal dopaminergic neurons of both old and young populations of wild type and Nurr1-null heterozygous male mice to quantify the amount of Nurr1 and related proteins, such as TH, DAT, and VMAT, as well as pro-inflammatory cytokines like TNF, IL-1b, and IL-6 which are influenced by Nurr1, to determine whether a correlation between PBMCs and midbrain neurons is present. If so, the goal is to develop an assay using Nurr1-null heterozygous mice that predicts genotype and age, and test this approach with PD patients and patients at risk for PD. If this assay can better predict which patients will develop PD, neuroprotective treatments can be tested to determine the most effective mechanisms to delay or prevent the onset of PD motor symptoms.

15-Deoxy D^{12,14}-Prostamide J2 Displays Anti-Melanoma Activity In Vitro and In Vivo: Potential Role of Endoplasmic Reticulum Stress and Damage Associated Molecular Patterns

Daniel A. Ladin¹, Ahmed Elhassanny², Rene Escobedo², Rukiyah Van Dross^{2,3}

¹ Department of Medicine, ² Department of Pharmacology and Toxicology, The Brody School Medicine, East Carolina University, Greenville, NC

³ Center for Health Disparities, East Carolina University, Greenville, NC

Melanoma is the deadliest form of skin cancer causing over 10,000 deaths annually. Treatments for melanoma include surgical resection, radiation, and immunotherapy. Checkpoint inhibitors are immunotherapeutics known to stimulate anti-tumor immunity, however, severe autoimmune effects limit their use. As such, immunogenic agents capable of selectively eliminating melanoma are needed. Immunogenic cell death (ICD) is a subtype of tumor-cell apoptosis whereby activation of damage associated molecular patterns (DAMPs) initiates anti-tumor immunity. This process is characterized by induction of cytotoxic endoplasmic reticulum (ER) stress which results in cell surface expression of DAMP proteins such as calreticulin. Recognition of DAMPs by dendritic cells induces maturation, phagocytosis, antigen presentation, and development of anti-tumor Tcell response. 15-deoxy- Δ 12,14-prostamide J2 (15dPMJ2) is a novel molecule discovered and synthesized by our lab that demonstrated potent and selective cytotoxic effects in non-melanoma skin cancer. Hence, we sought to evaluate the activity of 15dPMJ2 in melanoma. B16F10 melanoma and non-tumorigenic Melan-A cells were treated with 15dPMJ2 for 24 hours and cell viability (MTS) and apoptosis (caspase-3 cleavage) was evaluated. At 5 μ M, 15dPMJ2 drastically decreased B16F10 viability and induced significant caspase-3 cleavage while Melan-A cell viability and caspase-3 cleavage was not perturbed. Since DAMP expression is known to rely on cytotoxic ER stress, we evaluated whether ER stress was induced by 15dPMJ2 by evaluating CHOP10 and p-PERK by Western Blot. B16F10, but not Melan-A cells exhibited a notable increase in CHOP10 and p-PERK expression. Pretreatment with ER stress inhibitors, GSK2606 (PERK inhibitor) and 4-PBA (chemical chaperone) reversed cytotoxicity and apoptosis in B16F10 cells. To determine if 15dPMJ2 causes selective activation of DAMPs, we examined cell surface calreticulin and release of ATP in both cell lines. 15dPMJ2 increased DAMP expression in tumorigenic, but not non-tumorigenic melanocytes. To determine the anti-melanoma activity of 15dPMJ2 *in vivo*, B16F10 allografted tumors grown in C67BL/6 mice were dosed subcutaneously with 0.5 mg/kg 15dPMJ2 for 5 days. Tumors treated with 15dPMJ2 exhibited reduced growth and tumor weights compared to vehicle and untreated. TUNEL and immunohistochemical analysis indicated induction of tumor cell apoptosis and ER stress. These findings suggest that 15dPMJ2 is a potential immunotherapeutic agent for melanoma.

Retrospective Evaluation of Maxillary Sinus Pathology in Patients with Subsinus Edentulism using Cone Beam Computed Tomography

Nathan Mitchum¹, David W. Paquette², Alex Gillone², Andres Flores², Acela Martinez Luna²

¹Foundational Sciences, ECU SoDM, ²Surgical Sciences, ECU SoDM

Background: Ridge remodeling after tooth extraction and pneumatization of the maxillary sinus often leads to insufficient bone availability for placing dental implants in the posterior maxilla. Sinus floor elevation surgeries compensate for atrophied bone by adding grafting material between the Schneiderian membrane and the floor of the sinus. Pathological conditions such as maxillary sinusitis, mucous retention phenomenon, polypoid lesions, and accumulation of fluid may contribute to surgical complications and increase the likelihood of Schneiderian membrane perforation.

Objectives: The aim of this study is to retrospectively analyze cone beam computed tomography (CBCT) scans of patients with total or partial subsinus edentulism to identify the prevalence of sinus pathology and assess correlations with age, gender, type 2 diabetes mellitus, osteoporosis, and smoker status.

Methods: The study population consisted of patients from East Carolina University School of Dental Medicine (ECU SoDM) with subsinus edentulism that had CBCT scans performed for implant placement. Demographic data and radiology reports were extracted from the electronic health record (EHR), and pathological conditions were categorized and stratified according to demographic variables.

Results: Results are pending final analysis.

Conclusions: The assessment of pathologies and other variations of the maxillary sinus is critical when planning for dental implant and sinus floor elevation surgeries. In addition to findings regarding pathology, the data set used in this study will be subsequently analyzed in SIMPLANT implant planning software for the presence of intraosseous posterior superior alveolar artery, sinus septa and other anatomical variations that are clinically relevant.

Integrating Mindfulness Meditation into Inpatient Rehabilitation for Patients with Devastating Neurological Damage

Stephen Orr,¹ William Guiler,² Rita Gillis PhD,³ Hannah Florida MD,³ Kori Brewer PhD,¹
John Norbury MD¹

¹Brody School of Medicine at East Carolina University

²East Carolina University Honor's College

³Vidant Medical Center

Mindfulness-based interventions in the form of short, regular meditation have been shown to significantly enhance attention, memory, mood, and emotional regulation in non-experienced meditators.¹ Furthermore, mindfulness training has been shown to improve functioning in patients with traumatic brain injury.² We predicted that smartphone-based meditations can be successfully incorporated into inpatient rehabilitation for patients with neurological damage, and that the use of guided meditations will provide measurable improvements in functional independence measures (FIM) of neurologically impaired rehab patients compared to historical controls. The patient population in rehab at Vidant Medical Center is ideal for a meditation study because it consists of non-experienced meditators, many with neurological damage. Recruitment and follow-up are greatly simplified in the setting of inpatient rehab because patients are onsite for the duration of the study. Patients matching the study criteria are approached for enrollment upon entering rehab and are given a brief overview of the study before consent is obtained. The mindfulness meditation app *Insight Timer* is then downloaded onto the patient's smartphone, which they will use for daily meditation. Patients are grouped according to their chief complaint: 1) chronic pain, 2) anxiety or depression, 3) trouble focusing. Patients fill out surveys before and after the study to gauge their perceptions regarding efficacy. We enrolled a total of 15 patients out of 43 approached. Of these, 9 were in the group for chronic pain, 3 for anxiety or depression, and 3 for focus. Survey questions were answered on a scale from 1 to 5 (1 = not at all; 5 = completely). We found that patients were "very" likely to continue using the app (4.2) and to recommend the app to a similar patient (4.1), and that most patients "completely" enjoyed the daily meditations (4.8). We found that patients in rehab were able and willing to meditate daily, and that the healthcare staff was accommodating and enthusiastic in the implementation of the project. Moving forward, we plan to expand our sample size as we analyze patient FIM scores to objectively determine the effects of meditation on functional recovery following neurological injury.

Placement Criteria for Improved Fiducial Tracking in Stereotactic Ablative Radiotherapy for Treatment of Lung Tumors

Akash R. Patlolla BS¹, Duy M. Huynh BS¹, Ethan Patel, Kunj Patel, Sunil Sharma PhD¹, Mark Bowling MD², Hyder Arastu MD¹, Andrew Ju, M.D.¹

¹Department of Radiation Oncology, Brody School of Medicine at East Carolina University

²Department of Internal Medicine, Brody School of Medicine at East Carolina University

Introduction: Among lung cancer patients for whom surgery is contraindicated, stereotactic ablative radiotherapy (SABR) is considered the standard of care. Lung tumors exhibit continuous motion due to breathing cycles. Fiducials can be placed around the tumor for treatment targeting via the robotic SABR system. However, errors commonly cause some fiducials to remain untracked which may reduce treatment accuracy. Common errors include rigid body errors (RBE) indicating relative deviance in fiducial location throughout the breathing cycle and spacing errors due to excessive fiducial proximity.

Objective: Tracking errors in the SABR system often occur due to non-ideal fiducial placement, such that developing criteria for the ideal distance between fiducials may limit these errors and improve tracking.

Methods: A retrospective review with IRB approval was performed. 87 SABR treatments were studied to determine error frequencies with fiducial centroid data obtained for 28. Centroid data was obtained using 4DCT threshold contouring of tumor and fiducials for all available breathing cycle phases. Analysis was performed on data for either phase 0, 90, or scans indicating average inspiratory pressure. Minimum and maximum inter-fiducial distances were obtained for spacing errors and RBEs respectively (RBEs may occur due to distantly placed fiducials) and the data was analyzed for significance using a Mann-Whitney-U test. A chi square analysis was also performed on treated lobes producing each type of error.

Results: RBEs were the most common error followed by spacing. Uncertainty error were significantly localized in the left lower lobe (LLL). RBE and RBE-negative fiducials had an average maximum distance of 4.041cm and 3.000cm respectively ($p = 0.022$), while spacing error and spacing error absent fiducials had an average minimum distance of 0.976cm and 1.661cm ($p=0.017$) respectively.

Discussion and Conclusion: Spacing errors were absent when fiducials were placed at least 2cm apart while rigid body errors were 57% more likely in treatments with fiducials greater than 3cm apart. Therefore, placing fiducials 2cm and 3cm apart reduces errors. We speculate that overexpression of uncertainty errors in LLL treatments may be due to proximity to the heart. The continued development of criteria for ideal fiducial placement will allow for improved tracking of lung tumors and may contribute improved outcomes in SBRT treatments.

Baseline Factors Influencing Participation in Peer Coach Intervention Arm

Jacqueline Poston, Alyssa Adams MPH, Doyle M. "Skip" Cummings, Pharm. D, FCP, FCCP

Background: Hypertension (HTN) control is particularly problematic for the low-socioeconomic African American population in the Black Belt (rural Alabama (AL) and North Carolina (NC)) due to various barriers to health. This population is more likely to face HTN-related complications and death compared to their white counterparts. The Southeastern Collaboration (SEC) is an ongoing cluster-randomized trial aimed to improve HTN control in the described population. The SEC is comparing the effectiveness of three distinct interventions: (1) patient-level peer-coaching (PC), (2) practice-level practice facilitation (PF), and (3) a hybrid of PC+PF. Despite standardized study protocols, patient participation in the PC intervention is significantly different in NC vs AL, with NC patients completing fewer sessions and dropping out of the intervention more frequently ($p < 0.005$).

Objective/Hypothesis: This study examines baseline factors influencing patient participation in the PC intervention. We hypothesize that participant education and employment, co-morbidities, stress levels, risk for depression, social support, and their knowledge of HTN may influence decisions to participate.

Methods: We analyzed baseline data from 274 participants in the PF and PF+PC study arms who completed the 12-month intervention period. Participants were divided into two groups based on implementation state (NC vs. AL), and we conducted analysis to examine group similarities and differences. Crosstab analysis (using chi-square) was used for categorical variables and group means analysis (using an independent samples T-Test) was used for scale numeric data.

Results: The two patient groups were significantly different ($p < 0.005$) in that NC patients were more likely to: have higher income, be employed, have lower mean systolic blood pressure values at baseline, report adherence to taking medications and setting health-related goals, and feel more confident approaching their physician with concerns, maintaining lifestyle changes and following treatment plans. However, NC patients were also statistically at a higher risk for depression compared to those in AL.

Conclusion: Preliminary analysis shows that decreased NC patient participation in the PC intervention could be due to being busier (higher rates of employment), healthier relationships with their physicians, better medication adherence, more confidence following through with goals and treatment plans, and less concern for HTN.

CVS Testing Prolongs the Return-To-Play of Concussed Athletes and This Delay is Correlated to Demographics and Specific Test Categories

Ahmed Samy¹, Megan Ferderber², Lisa Hager²

¹ Brody School of Medicine at East Carolina University

² East Carolina University Department of Family Medicine

Background: The Concussion Vital Signs (CVS) is a neurocognitive test used to evaluate concussed high school athletes for symptoms that often escape Return-To-Play (RTP), a procedure recommended by established concussion guidelines. Since the CVS has limited evidence and clinical utility in concussion management, there is a need to measure its time delay on RTP and identify clinical correlations that can assist in the interpretation of the test.

Hypothesis: The CVS prolongs the completion of RTP in concussion-diagnosed high school athletes, who would otherwise be approved to advance according to established guidelines; this delay is correlated to demographic factors, specific CVS test categories, and defined time-points within the recovery process.

Methods: UMC-IRB 18-002973 approved study design: retrospective cohort study of patients who were (1) diagnosed with a concussion at ECU Department of Family Medicine, (2) injured from January 2016 to December 2018, (3) 13-19 years old, and (4) Pitt County, NC high school athletes.

Outcome: the following clinical criteria were reviewed in electronic health records and assessed for a delay on RTP due to CVS testing: (1) demographic factors, (2) CVS test results, and (3) defined concussion recovery time-points, utilizing the samples t-test and Pearson's correlation.

Results: 70% of athletes sustained a delay on RTP due to CVS testing, and approximately 1-in-5 were delayed by at least 10 days. CVS testing may result in a significant delay on RTP in athletes with documented learning disabilities ($p < 0.017$). Both female athletes ($p < 0.036$) and athletes who did not play football ($p < 0.002$) may have a significantly longer overall recovery time. Visual Memory, Simple Reaction time, and Verbal Memory are the CVS test categories that most commonly resulted in abnormal testing (57%). 44% of athletes incurred a prolonged RTP due to a single CVS test category.

Conclusion: Despite being an easily-accessible test which has potential to detect missed symptoms, the questionable application of the CVS may unjustifiably prolong the RTP of concussed athletes. The correlations are significant in assisting healthcare professionals to develop a more accurate post-concussion plan and better gauge the performance of an athlete's CVS testing throughout recovery.

Start to Breathe Pilot: A Study to Quantify Knowledge Transfer from AHA’s Layperson Opioid Overdose eModule to an Opioid Overdose Simulation

Bryson B. Shelton¹; Walter C. Robey III, MD^{1,2}; Rebecca M. Gilbird, MPH¹; JL Parker Cote, MD²

¹East Carolina University Brody School of Medicine Office of Clinical Simulation

²ECU Emergency Medicine

Background: The Interprofessional Clinical Simulation Program at The Brody School of Medicine is developing a community based “Start to Breathe” program to educate laypeople on how to recognize and respond to an opioid overdose. The American Heart Association’s Opioid Overdose Response Training for Laypersons online module was used for the didactic portion of this study. The research question examined how much of that knowledge would be retained when applied by learners in a reality-based high-fidelity simulation. The hypothesis was that learned didactic knowledge and skills would translate to participant performance during an opioid overdose simulation.

Methods: Fifteen pre-medical students enrolled in the eight-week Summer Program for Future Doctors participated in this pilot study. The participants completed the AHA Opioid Overdose Training eModule, then were individually presented with a simulated overdose victim that each was asked to manage. Performance in the simulation was graded and timed by independent emergency medicine faculty using a seven-point checklist based on the learning objectives of the AHA training module. Participants also completed a post-survey to gauge their personal evaluation of the effectiveness of the online module.

Results: Participants achieved an average of 13.2 out of 14 total points on the simulation performance checklist. On average, the first dose of naloxone was given to the simulated patient at 1’26” from the scenario start. The post-survey used a 5-point Likert scale ranging from poor to excellent; participants answered an average of 4.53 when asked “To what degree did the AHA online module prepare you to respond to a simulated opioid overdose?” and an average of 4.60 when asked “How well do you feel this experience prepared you to respond to a real opioid overdose?”

Conclusions: Study results suggest that knowledge and skills acquired by students from a self-directed online learning program can be effectively applied to a simulated patient in a realistic opioid overdose simulation. These results suggest an educational potential of the AHA’s Layperson Opioid Overdose eModule for use in our “Start to Breathe” training program targeting laypersons.

Effect of a parent and teacher agreement on return rates of Vanderbilt assessments and treatment adherence in pediatric Attention-Deficit/Hyperactivity Disorder patients

Matthew Torres, BS;1 Leslie Miller, MD;2 Elizabeth Payment, MD;3 Khushbu Patel, BS;4 Callie Pawlowski;4 Lindsay Cortright, MA;4 Jennifer Moore, RN;4 Dmitry Tumin, PhD; 4 Amanda Higginson, MD;4

1 Brody School of Medicine at East Carolina University, Greenville, NC

2 Tulane University School of Medicine, New Orleans, LA

3 Feinberg School of Medicine at Northwestern University, Chicago, IL

4 Department of Pediatrics, Brody School of Medicine at East Carolina University, Greenville, NC

Objective: The National Institute for Children’s Health Quality Vanderbilt Assessment Scales are a validated tool for monitoring Attention-Deficit Hyperactivity Disorder (ADHD) symptom control. Non-return of parent or teacher forms can impair symptom management. We implemented a Parent Teacher Vanderbilt Agreement Program to increase assessment return rates and aid treatment plans. To evaluate the impact of this initiative, we compared the assessment return rate before and after agreement signature.

Methods: We conducted a retrospective chart review of children diagnosed with ADHD and having a signed Vanderbilt agreement who were under continuous care at our rural primary care clinic between August 2016 and March 2018. Return rates were recorded one year before and one year after the agreement date. Vanderbilt return rates were analyzed as dichotomous variables (none versus any return in each period) and compared using McNemar tests of paired proportions.

Results: The analysis included 192 children (median age 10 years; 76% male). Prior to the agreement, 71% returned teacher assessments, compared to 76% in the post-agreement period ($p=0.225$). Fifty-nine percent returned parent Vanderbilt assessments prior to the intervention, compared to 65% the post-agreement period ($p=0.185$). However, the median number of returned assessments increased after the agreement, suggesting increased return rates among patients already returning at least some forms.

Conclusions: Lack of documented parent and teacher Vanderbilt assessments remain a barrier to appropriate management of ADHD. Improving the rate of teacher Vanderbilt assessments returned is an important outcome for projects aimed to improve ADHD treatment in the primary care setting.

pH-sensing GPR68 Increases Vascular Smooth Muscle Growth

Alexander Trei, Michael Bullock, Jake Francisco, Joshua Morgan, Dr. David Tulis

Department of Physiology, Brody School of Medicine, East Carolina University

Cardiovascular disease (CVD) is the main cause of morbidity and mortality in the United States and worldwide. A leading field of study in cardiovascular research is pathologic growth of vascular smooth muscle (VSM). In vascular tissue that is exposed to ischemia and reduced oxygen supply, due largely to metabolic alterations the microenvironment experiences lowered pH which could contribute to vascular pathogenesis. However, the cellular signaling pathways by which acidosis affects injured VSM in the context of CVD is not understood. The aim of our study was to determine the regulatory role that the pH-sensing G protein-coupled receptor GPR68 plays in cellular signaling behind VSM migration and proliferation. Our hypothesis was that acidosis activates VSM GPR68, thereby stimulating cyclic AMP-driven Epac and inhibiting the growth protective kinase AMPK, thereby promoting VSM growth as a foundation of vascular pathology in CVD. To test this hypothesis, we used the left and right carotid arteries as vessels of interest in male and female wild type (WT) and GPR68 knockout (KO) mice. We produced two cohorts of experimental male and female WT and KO mice, one exposed to arterial ischemic injury and one exposed to sham surgery. After four weeks we assessed neointimal and medial wall growth and lumen diameters in order to determine differences in vascular remodeling between the populations. In support of our hypothesis, vessel wall remodeling in the GPR68 KO mice was significantly reduced compared to WT controls at this time point. In complement to our *in vivo* surgeries, we performed primary VSM cell culture and *in vitro* growth analysis. Interestingly, preliminary data suggest that there were significantly increased cell numbers in the KO cells compared to the WT controls after 48 and 72 hours. To closer mimic our *in vivo* data, we will next assess cell proliferation of these groups when exposed to acidic or control conditions. Though our investigation is still ongoing we have gathered evidence that implicates a proliferative role of GPR68 in VSM in the context of CVD.

Sexual Dimorphism Does Contribute to Differences in Levator Length, Velar Thickness, And Posterior Nasal Spine to Posterior Pharyngeal Wall in Nine-Year-Old Children

Smrithi Valsaraj¹, Taryn Casillas², and Jamie L. Perry²

¹Medical Student, Brody School of Medicine

²Department of Communication Sciences and Disorders, East Carolina University

Failure of fusion of the facial processes during embryological development results in cleft palate--the most prevalent congenital craniofacial defect ¹. Surgical correction can repair this defect. Having a foundational understanding of the anatomy can help cater the surgery to the individual of a particular age. Sexual dimorphism of the velopharyngeal musculature has been studied extensively among adults ^{2,3}. However, such sexual dimorphism or lack thereof in nine-year-old children have yet to be explored thoroughly in a large sample. Insights into effects of sex on velopharyngeal anatomical measurements can provide that foundational basis for comparisons, especially among the child population who would require craniofacial surgery such as the cleft population. In this study, we hypothesize that various craniofacial and velopharyngeal structures (velar length, levator length, and velar thickness) are different among nine-year-old male and female children. To test this, two hundred nine-year-old healthy children (119 males and 128 females) with normal velopharyngeal anatomy who met the inclusion criteria and successfully completed the magnetic resonance imaging scans were included in this study. We found that levator length, velar thickness, and posterior nasal spine to posterior pharyngeal wall were different when comparing males and females in this population. However, velar length and effective velar length showed no difference. Based on these findings, we conclude that sex does affect select velopharyngeal anatomies in nine-year-old children. This information can serve as a reference for future comparison studies as well as nine-year-old patients who undergo craniofacial surgery for cleft palate.