THIRD ANNUAL STUDENT RESEARCH DAY

Friday, September 22, 2023

College of Osteopathic Medicine
SAM HOUSTON STATE UNIVERSITY

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GUEST SPEAKER
John C. Licciardone, DO, MS, MBA, FACPM

Dr. Licciardone's research focuses on the prevention and treatment of chronic pain. He is the first recipient of a Regents Professorship awarded by the Texas College of Osteopathic Medicine since it was established 50 years ago. He also holds the Osteopathic Heritage Foundation Distinguished Chair in Clinical Research in honor of Drs. David Richards and Benjamin Cohen, former President and Provost of the University of North Texas Health Science Center.

Dr. Licciardone presently directs the Osteopathic Research Center, including its PRECISION Pain Research Registry. The latter is the "first-in-the-nation" pain research registry, which studies precision medicine and biopsychosocial approaches to pain management.

He received a Midcareer Investigator Award from the National Institutes of Health (NIH), served as an expert panelist for NIH in the area of chronic pain, and completed a four-year term on its National Advisory Council for Complementary and Integrative Health. He directed the OSTEOPATHIC Trial, a five-year study funded by NIH that demonstrated substantial improvements in and recovery from chronic low back pain with osteopathic manipulation. He is presently a Co-Investigator in the $14 million Prevention of Acute to Chronic Back Pain Trial (PACBACK Trial) sponsored by NIH, and recently served on the Work Group that developed NIH's Federal Pain Research Strategy.

Internationally, Dr. Licciardone has served as a consultant to the World Health Organization on regulatory and safety issues relating to osteopathy in Europe and other nations. He gave the keynote address at Advancing Osteopathy 2008, a conference celebrating the 10th anniversary of recognition of osteopaths in the United Kingdom's National Health Service, including a preconference reception with His Royal Highness, The Prince of Wales. He has also met and advised two former United States Surgeons General on the role of osteopathic physicians within the American health care system. The American Osteopathic Foundation has honored Dr. Licciardone with its Gutensohn-Denslow Award for devoted lifetime service and contributions to research and education within the osteopathic profession.

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BIOMEDICAL RESEARCH (BIO)

These projects involve the application of the natural sciences, are performed in the laboratory setting, and will often require additional training (provided by the program) for working with animal tissue, human tissues, cultures, or biosafety protocols. Often, these projects seek to identify the underlying physiological, anatomical, and/or cellular process that influence health and disease.

BIO1

Implications of Median Nerve Variations and Surgical Management

Alfredo Torres Rodriguez, Jessica Nguyen, Norman Ramirez, Mario Loomis
Advisor: Jailenne I. Quiñones-Rodriguez

Introduction: The embryological path of the median nerve determines the variations that arise throughout the upper extremities. Several origins and distributions of the median nerve have been studied extensively. Based on previous studies, the anatomical differences of these variations relate to several clinical implications. Due to imperative concerns of iatrogenic injuries and postoperative complications, this study aims to comprehensively analyze median nerve variations to advance in accurate diagnosis and appropriate management.
Methods: Our implications were discovered through a literature review from the past six years using MEDLINE as the primary search database.
Results: We analyzed twenty studies that included an evaluation of 445 limbs to evaluate the relationship between variations and implications. Variations at different regions of the arm were associated with significant clinical implications. At the brachial plexus, damage to thick variant branches from pre-surgical axillary nerve blocks may lead to sensorimotor deficits in the anterior compartment of the forearm. Terminal nerve branches are crucial to identify proper post-operative regeneration after nerve transfer procedures and to avoid denervation. Persistent median arteries, often accompanying bifid median nerves, are significant for avoiding anastomosis complications like necrosis. In the same manner, compression syndromes can occur in various limb sites; therefore, understanding the variations can contribute to the solution through nerve releases.
Discussion: Successful management of median nerve anatomical variations requires an accurate diagnosis and appropriate treatment. Furthermore, awareness of anatomical variations will better assist physicians during evaluations and treatment options in diagnostic studies, nerve grafting, and nerve transfers.

BIO2

Characterizing Physical Interactions Between Early B-Cell Factor-1 (EBF1) and Multiple NF-kB Subunits

Anthony Avila, Alex Gutierrez, Theresa Nguyen
Advisor: Michael Griffin

The hypercaloric state of many Americans is directly associated with the incidence of comorbidities like insulin resistance, cardiovascular disease, and cancer. Chronic activation of the immune system has been reported in individuals with T2DM; specifically, increased cytokines and lipid biomarkers from adipocytes. The molecular mechanisms that regulate these processes remain incompletely understood. In the past, we have shown that the transcription factor EBF1 (Early B-Cell Factor-1) regulates inflammatory signaling in adipocytes and also physically interacts with several subunits of the well-known inflammatory transcription factor NF-kB.
Methods: GST Pull-down assays with transfected or in vitro transcribed and translated proteins were used to confirm the interactions of EBF1 with Nfkb2 and c-Rel and to determine if these interactions are direct. We also successfully produced several other NF-kB subunits by in vitro transcription and translation for future studies.

BIO3

Heavy Metal Effects on Zinc Binding to Biological Macromolecules: Implications for Durability of Indwelling Metal Implants Containing Nickel

Avery Michalk
Advisor: Dennis C. Wooten

The purpose of this project is to develop an assay that determines if an aqueous medium contains biologically relevant heavy metal contaminants that may affect the lifetime of a metal implant or identify heavy metal toxicity of contrast media. Agarose gel electrophoresis allowed for the assessment of the bioavailability of ionic forms of heavy metals. Bioavailability of heavy metals to biological macromolecules cannot be readily assessed with atomic absorption spectroscopy or inductively coupled plasma mass spectrometry. Therefore, there is a need to develop a simple method that assesses heavy metal interaction with biological molecules under physiological conditions, such pH and non-destructive temperatures. Heavy metal-dependent electrophoretic migration patterns were used to assess heavy metal ion interactions with selected biological macromolecules. The human metallothionein-II (MT-II) gene cloned in a plasmid (pUC57-MT) was used with commercially available metal-responsive transcription factor-1 (MTF-1) protein and a commercially available monoclonal antibody raised against MTF-1 protein. The MTF-1 protein binds specific nucleotide sequences within the MT-II gene. The pUC57-MT plasmid was used as a binding target for MTF-1 protein and anti-MTF-1 monoclonal antibody to assess plasmid electrophoretic mobility changes in the presence of different concentrations of heavy metals. Trivalent lanthanum was found to displace zinc, nickel, and cobalt ions entirely, such that only lanthanum specific plasmid migration pattern persisted. Further work is needed to characterize and functionalize this novel assessment of heavy metal binding.

BIO4

Heavy Metal Effects on Zinc Binding to Biological Macromolecules: Implications for Durability of Indwelling Metal Implants Containing Nickel

Cattareya Farrar
Advisor: Dennis C. Wooten

Surgical implants are combinations of the heavy metals, such as chromium, cobalt, nickel, and titanium. Heavy metals are metals that tend to have high atomic numbers, high atomic weights and may have toxic effects if allowed to freely occur in biological fluids, such as joint fluid. Heavy metal levels need to be monitored to understand surgical implant condition and lifespan. This study aimed to utilize a more cost-effective assessment of heavy metal bioavailability using a pUC57 plasmid containing the human metallothionein-II (MT-2) gene (renamed pUC57-MT plasmid), human metal-responsive transcription factor 1 (MTF-1) protein, a monoclonal antibody against MTF-1 protein, and ionic zinc in aqueous solutions. This combination of test items was used to detect nickel interaction with the selected macromolecules and to distinguish nickel ions from zinc ions by agarose gel electrophoresis. Nickel induces an electrophoretic mobility pattern that readily distinguishes it from the zinc pattern. The addition of MTF-1 protein did not significantly affect gel migration patterns upon addition of the anti-MTF-1 monoclonal antibody. Upon the mixture of the two ions in the same solution, the zinc pattern remained unchanged until nickel concentration was equivalent or higher than that of zinc. The detection system revealed two unique patterns for zinc and nickel, in aqueous solution. Detection of nickel ion leakage from surgical implants with this system may be informative about the timing of surgical implant revision procedures.

BIO5

Investigation/Identification of Pathologies found in the Sam Houston State University Southeast Texas Applied Forensic Science Facility

Courtney Kleindl, Amayah Brown, Jamie Bagely, Erica Frosch, Brandon Trevino, Melissa Hansen, Stephanie Baker
Advisor: Patrick Lewis

Some traumas and diseases are known to alter the human skeleton in characteristic ways; how these are distributed through various populations, sexes, and age groups, however, is less clear. The large skeletal collection housed at the Sam Houston State University (SHSU) Southeast Texas Applied Forensic Science Facility (STAFS) allows for population-level questions regarding pathologies and non-metric variants to be studied. Here we undertake the first step in answering these questions with a preliminary investigation of the skeletons housed at STAFS. Skeletons were randomly selected and evaluated for non-metric variants and pathologies. Half the authors examined the appendicular skeleton while half examined the axial. Photos were taken of any non-metric variant or pathology found and were documented. In total, 21 skeletons were analyzed. Preliminary results demonstrate that heel spurs (6), osteoarthritis (8), fused vertebrae (11), osteophytes (19), and tufting of the phalanges (4) were common. Rarer finds include Diffuse Idiopathic Skeletal Hyperostosis (DISH) (2), severe scapular degeneration (1), and fusions of both the lambdoid and sagittal sutures (4). A variety of pathologies and non-metric variant types were noted in the analysis of the SHSU STAFS collection. The examination of the collection is ongoing and the likelihood of expanding the known non-metric variants and pathologies is high. Once the entire collection has been examined additional studies will be able to assess how trauma and pathologies vary across age, sex, and ancestry. Such data will benefit both medical and forensic disciplines.

BIO6

Heavy Metal Effects on Zinc Binding to Biological Macromolecules: Method for the Assessment of Trivalent Chromium Ion Leakage from Metal Implants

George Youssef
Advisor: Dennis C. Wooten

The aim of this project is to develop an assay that determines whether an aqueous specimen contains heavy metal contaminants that may be useful in determining the lifespan of an indwelling medical device (e.g., joint replacement). A non-linearized pUC57 plasmid containing the 837 base-pair human metallothionein-II (MT-II) gene was used as a metal-responsive transcription factor-1 (MTF-1) protein and monoclonal antibody binding target. The MTF-1 protein is a metal binding transcription factor that specifically binds heavy metals, such as chromium, Nickel, Cobalt, Tungsten, Lanthanides, and Zinc, causing MTF-1 to change conformation and bind specific sequences within the human MT-II gene known as metal-responsive elements (MREs). This investigation aims to develop a biosensor capable of detecting relevant heavy metal contaminants present in aqueous samples, such as joint fluid. The assays were run at varying Chromium (III) Chloride and Zinc-Sulfate concentrations. Gel electrophoresis was used to gauge the ability of MTF-1 protein and the pUC57 plasmid to bind trivalent Chromium ions compared to other heavy metals. It was found that Chromium (III) was able to displace zinc from the protein and plasmid and created characteristic gel band migration patterns. These results may be useful for the detection and bioavailability assessment of Chromium (III) ions and the determination of the need for replacement of indwelling metal implants.

BIO7

Using mCT to Analyse Asymmetries From Trauma To The Nasomaxillary Suture

Jamie Bagley, Amayah Brown, Erica Frosch, Courtney Kleindl, Brandon Trevino, Melissa Hansen, Stephanie Baker
Advisor: Patrick Lewis

Even mild trauma to the head can result in long-term health complications or death. Prior research suggests that head trauma alters the major cranial sutures in predictable patterns. As such, understanding how trauma impacts sutures more broadly may have both medical and forensic applications. Here we expand on previous research by quantifying the effects of trauma on sutures of the face. Five skulls from the Southeast Texas Applied Forensic Science facility (STAFS) at Sam Houston State University were CT scanned at The University of Texas at Austin CT lab. Two crania had blunt force trauma, two had trauma from car accidents, and one was a control with no known trauma. We tested for asymmetry in right and left nasomaxillary sutures. The nasomaxillary suture images were analyzed with 3Dslicer software. The suture widths were measured in three successive slices in the coronal plane and those measurements were averaged. Measurements were taken at regular intervals along both the right and left sutures and compared statistically. Preliminary results from the t-tests exhibited highly significant differences between the nasomaxillary suture's right and left sides ($p>0.001$) in blunt force trauma crania. However, no significant differences between the sides were found in the car accident and control crania. Ultimately, mCT imaging is a valuable tool for evaluating the bony anatomy of postmortem specimens exhibiting trauma. Further research on a larger sample, using the method developed here, will better characterize the microanatomy of trauma on the facial sutures.

BIO8

Involvement of Median Nerve Anatomical Variations and Surgical Implications among Population

Jessica Nguyen, Alfredo Torres-Rodriguez, Norman Ramirez
Advisor: Jailenne I. Quiñones-Rodriguez

Introduction: Variations in the median nerve, such as the origin and distribution, have been well documented. Due to significant differences in the reported prevalence of such anatomical variations, we aimed to provide a detailed comprehension of the median nerve using demographic variables such as ethnicity and sex to evaluate occurrence and incidence between populations. Knowledge of the median nerve variations can contribute to interpreting clinical manifestations, such as compression syndromes, nerve displacements, and sensory deficits.
Methods: A systematic search of all major databases was performed from 2017 – 2022 to identify studies on the prevalence of median nerve variations. Twenty studies (n = 445 arms; 94 females, 139 males) from several ethnicities were included in the systematic analysis.
Results: The pooled prevalence rates of the variations in the forearm and thenar muscle courses were approximately 42.6%. The variations of the median nerve courses at the wrist (58%) were more commonly found compared to the neck and forearm (42%). The median nerve presented significant variations in its thenar branch course, classified into Poisel and Lanz classifications of the evaluated studies. It was suggested that there have been rare appearances of trifurcations and preligamentous variations. Thus, the presence of more variations at the wrist may suggest a higher prevalence of clinical implications at the site with variations at the forearm that follows afterward.
Discussion: Awareness of anatomical variations regarding hand innervation is essential, particularly when considering physical examination, prognosis, diagnosis, and surgical treatment to explain patients' paradoxical motor and sensory loss.

BIO9

De novo missense variants in AMOTL1 present with novel phenotypic characteristics

Leslie Hudson
Advisor: Sureni Mullegama

Angiomotin-like binding protein 1 (AMOTL1) belongs to the Motin family of proteins that regulates cell adhesion, polarity and adhesion, bone formation, and angiogenesis. The phenotypic consequence of germline AMOTL1 missense variants remains unclear. We report missense variants in AMOTL1 in 12 unrelated individuals referred for clinical exome sequencing. We conducted exome sequencing, phenotype, and genotype studies on this cohort. Individuals present with overlapping phenotypic manifestations, including dysmorphic facial features, cardiac abnormalities, cleft lip or palate, developmental delay, and auricular dysfunction. The identified variants are de novo in the 11 individuals and comprise four distinct missense changes, including a p.R157C variant recurrent in seven individuals. These variants affect evolutionarily conserved amino acids and are located in key functional domains. The variants are predicted to affect protein structure based on protein modeling studies. Bioinformatic calculations reveal that AMOTL1 I gene has pLI score of 0. This score supports that these variants function in a gain-of-function manner. Our findings suggest that variants in AMOTL1 are pathogenic and contribute to the development of human disease. The results of this study will be used to inform clinicians about a novel disease gene with overlapping physical manifestations. This study will assist in developing standardized diagnostic and care procedures for patients harboring variants in AMOTL1. We recommend adding AMOTL1 to cleft lip and palate genetic testing panels. Further studies on AMOTL1 function and recruitment of more individuals with AMOTL1 variant for clinical characterization is vital for guidance in care and appropriate screening for comorbidities.

BIO10

Early Experience Managing Intravascular Coagulum Using Polidocanol Endovenous Foam: Risk Factor Analysis

Mariam Mesa, Francisco J. Melesio, Rafael D. Malgor, Limael E. Rodriguez
Advisor: Jailenne I. Quiñones-Rodriguez

Introduction: Polidocanol endovenous microfoam 1% (PEM) has gained widespread acceptance for treating venous insufficiency. Clinical trials of PEM report adverse events in 60% of trial participants, the most common being retained intravascular coagulum (IC). This study aims to identify risk factors that lead to increased incidence of IC observed in clinical practice.
Methods: From December 2021 to June 2023, a retrospective cohort study identified all patients that received PEM treatment for venous insufficiency. Baseline demographics and duplex ultrasound studies at their initial visit were compared amongst the IC and non-IC groups. Post-ablation data specific to the IC group was also evaluated.
Results: Seventy-six patients were treated with PEM. Overall, 16% developed an IC in the early post-ablation period. Compared to the non-IC group, IC was more frequent in the Latino race ($P = 0.03$). When reflux times were compared, IC was associated with higher reflux times at the great saphenous vein ($P = 0.04$). Presence of at least one below knee perforating vein ($P = 0.04$) was more frequent in the IC group. Moreover, there was a trend that the left extremity was more frequently affected ($P = 0.09$). Lower PEM injection volume ($P = 0.03$) was also associated with developing IC.
Discussion: Latino patients were at a higher risk for developing IC. High venous reflux times, presence of a perforator vein, and lower PEM injection volume were additional risk factors for developing IC. Identification of these perioperative risk factors may alter treatment approach and reduce the incidence of IC.

BIO11

Heavy Metal Effects on Zinc Binding to Biological Macromolecules: Implications for Cobalt Ion Leakage from Metal Implants

Meghasree Ganapuram
Advisor: Dennis C. Wooten

Heavy metals are considered heavy metals due to their characteristic high atomic weights and high atomic numbers. Heavy metals such as cobalt are commonly used in indwelling metal implants to replace joints (knee and hip) or other areas of the body. However, orthopedic implants may experience varying amounts of corrosion and may release metals in the form of particles or ions that may be hazardous to surrounding tissues over time. This set of experiments was designed to develop a method to assess the bioavailability of released heavy metals in fluids associated with metal implants. This information may be useful in ascertaining when to perform a metal implant replacement. A non-linearized pUC57 plasmid containing the entire 837 bp human metallothionein-II (MT-II) gene was utilized with a zinc-binding metal-responsive transcription factor-1 (MTF-1) protein and a monoclonal antibody, specific for the MTF-1 protein. The plasmid, MTF-1 protein and the monoclonal antibody interactions were tested on agarose gel electrophoresis in the presence of selected heavy metal ions with a focus upon cobalt and its effect on zinc ion binding. The ability of different concentrations of cobalt to displace zinc from macromolecules was demonstrated by the formation of specific plasmid migration patterns on agarose gels as the plasmid transitioned from supercoiled to relaxed conformations. Specific plasmid migration patterns may be useful in the assessment of free cobalt bioavailability and interaction with tissues surrounding a metal implant.

BIO12

Atomic Force Microscopy Evaluation of Tau Protein and Thymoquinone

Samantha Doskocil, Rakez Kayed, Hui Fang
Advisor: Hosam Abdelhady

Tau protein aggregation has been established to contribute to development of neurodegenerative diseases like Alzheimer's Disease. In this aggregation process, tau forms masses that cause neurons to degenerate. Thymoquinone, a compound found in black seed oil, is being investigated for its potential therapeutic effects in Alzheimer's disease. It possesses anti-inflammatory and antioxidant properties, potentially reducing brain inflammation and oxidative stress. Thymoquinone's neuroprotective effects and its ability to influence tau protein accumulation are also under scrutiny. However, its use in Alzheimer's is still in the research phase, and clinical trials are needed to determine its effectiveness and safety in treating the disease. To evaluate the aggregation structure of tau protein and effects of thymoquinone, we employed Atomic Force Microscopy (AFM). AFM utilizes atomic forces between atoms to generate a 3D image showing incredible structural detail. We investigated the emergence of aggregation structures in tau monomers and oligomers, identifying diverse structures that provide insights into the mechanism underlying the formation of tau aggregates, filaments, and tangles. These formations hold significance in understanding disease progression, all the while observing the extensive and distinct morphologies that the protein can adopt. Additionally, we examined alterations in the structure of tau protein after treatment with 100 µg/mL of thymoquinone for 48 hours. Our initial imaging analysis has detected significant modifications in tau's structures with the employed treatment method. We plan to study the effect of different incubation periods of tau with thymoquinone to investigate the possibility of inducing controlled structural disruptions in the protein.

BIO13

Identifying Heavy Metals in Biological Samples Using the Statistical Classification of QCM Overtones

Temoore Raja, Thenahandi De Silva, Dennis C. Wooten
Advisor: Shawn M. Staudaher

Introduction: When heavy metal exposure reaches toxic levels, vital organs such as the heart, brain, and kidneys are disrupted. Heavy metal exposure in patients is measured by inductively coupled plasma mass spectrometry, which ionizes a sample by heating it to extreme temperatures, an energy inefficient and costly process. A more efficient and accessible method would use a quartz crystal microbalance (QCM), which can detect heavy metals in gaseous samples and other substances in liquid samples by analyzing overtones, but it is not yet known if QCM can detect heavy metals in liquid biological samples. This study's goal is to create a statistical classification model to determine if QCM overtones can reliably detect heavy metals in liquid biological samples.
Methods: While waiting for results from the QCM experiment, simulated samples of QCM overtones were created by sampling from five normal distributions representing five heavy metals. The model consisted of principal components analysis {PCA) for dimensionality reduction and collinearity removal, then linear discriminant analysis (LDA) for multiclass classification. A 4:1 train-test split with an accuracy score was used to evaluate- the model.
Anticipated Results: The PCA-LDA model trained with simulated data correctly classified 85% of the test data. When the QCM experiment is completed, this model will be used to detect and classify heavy metals in non-biological liquid samples.
Conclusions: After successfully creating a classification model for heavy metal elements using simulated QCM overtones, we plan to test this model with real world data before applying the model to biological samples.

CLINICAL MEDICINE/COMMUNITY HEALTH RESEARCH (CC)

These projects aim to produce knowledge valuable for understanding human disease, preventing, and treating illness, and promoting health. These projects embrace a continuum of studies involving interactions with patients, diagnostic clinical materials or data, or populations.

CC1

Heavy Metal Effects on Zinc Binding to Biological Macromolecules: Implications for Hexavalent Tungsten Ion Leakage from Metal Implants

Allyson Flippo
Advisor: Dennis C. Wooten

Heavy metals are metals with high densities, high atomic weights, and high atomic numbers. Tungsten is a heavy metal that has been used in the development of medical implants (for example, joint replacements). As medical implants age, they may release heavy metals into the surrounding fluids and tissues. There is not currently a cell-free method by which to determine whether tungsten is present in bodily fluids in forms that allow tungsten to directly interact with tissues, cells, and macromolecules. Therefore, it is important to test for heavy metals in forms that may influence bioavailability. The timing of the release of ionic forms of heavy metals, such as tungsten, may influence the decision to perform a medical device revision procedure. A cell-free assay was designed to determine the behavior of tungsten in the presence of zinc, an anti-MTF-1 protein monoclonal antibody and a plasmid that contains the gene that codes for the heavy metal-protective, human metallothionein-II protein. It was found that Tungsten has a characteristic effect on DNA binding, as assessed by electrophoretic migration patterns, that may have implications for future use.

CC2

Case Report: Symptomatic Improvement of Fibromyalgia Symptoms with Atomoxetine

Amayah Brown, Josephine Chiu, Jason Nikirk
Advisor: Megan Woolford

We present the case of a 33-year-old female patient with chronic generalized musculoskeletal pain and fatigue. Physical examination and lab work revealed no abnormalities. Therefore, fibromyalgia was suspected as the source of her chronic pain and fatigue. Of note, the patient did reveal a daily consumption of 550 mg of caffeine on the first visit. A recommendation to reduce her intake was made; however, the patient developed severe ADHD symptoms after this reduction which significantly impacted her daily life. The patient revealed she had a history of inattentive type symptoms since early childhood but was never formally diagnosed with ADHD. Atomoxetine, a selective norepinephrine reuptake inhibitor, was prescribed as the primary treatment intervention to target these symptoms. Interestingly, her symptoms dramatically improved related to both ADHD and fibromyalgia within the first 2 weeks. She experienced continuous relief over the next 9 months on atomoxetine. The patient also reported marked improvement in her quality of life with regards to mood, sleep, and physical activity. While ADHD and fibromyalgia are distinct disorders with different symptom profiles, there are some shared underlying mechanisms, which are not fully understood but may possibly involve dysregulation of neurotransmitters and altered pain processing pathways. This case report suggests that atomoxetine may be a promising adjunct treatment for patients with comorbid ADHD and fibromyalgia. Further research to understand the potential mechanism of action of atomoxetine in targeting both disorders could have profound implications for the treatment of comorbid conditions involving chronic pain and cognitive deficits.

CC3

Impact of Renal Artery Variations on Endovascular Aneurysm Repair: A Comprehensive Review

Andrew Tran, Omar A. Ramos-Mas, Limael Rodriguez
Advisor: Jailenne I. Quiñones-Rodriguez

Introduction: The renal artery (RA) typically arises from the lateral aspect of the abdominal aorta supplying blood to the kidneys. With the increasing rate of endovascular aneurysm repair (EVAR) being performed on individuals suffering from an abdominal aortic aneurysm over traditional open abdominal aortic repair, RA variations represent a technical challenge for surgeons that could lead to increased morbidity of patients. Therefore, this study aimed to investigate recent advances in surgical and pre-operative evaluation criteria of accessory renal arteries (ARA) and their impact on patients treated with EVAR.
Methods: A systematic review was performed from 2017– 2022 about RA variations and their effects on EVAR using MEDLINE as our primary search engine. Overall, four retrospective studies and one prospective study were identified.
Results: The medical literature reported 195 patients with ARA treated with EVAR. ARA arising from the abdominal aorta was the most common anatomical variation. When evaluating EVAR with patients treated with ARA, rates of renal infarction, acute kidney injury, and decline in estimated glomerular filtration rate were significantly higher than those without ARA. In contrast, there were no significant findings regarding the development of chronic kidney disease in patients with ARA coverage compared with those with uncovered ARA or without ARA. Finally, there was no difference in 30-day mortality between patients with and without ARA.
Discussion: The presence of ARA may be correlated to renovascular consequences in patients undergoing EVAR. The development of ARA preservation techniques can potentially improve postoperative outcomes.

CC4

Various Factors Contributing to the Decision to Participate or Not Participate in Umbilical Cord Blood Banking Either in the Public or Private Realm

Cayla Wagstaff, Cydnee R. Smith, Kimberly B. Clark
Advisor: Peggy H. Taylor

Despite proven benefits, only 3% of women that reside in the US opted to collect their newborn's umbilical cord blood in 2020. This prompts us to evaluate why women decide to opt in or out of Umbilical Cord Blood Banking (UCBB). Prior studies have investigated these factors in other countries, but insights cannot be extrapolated to mothers within the US. Therefore, the purpose of this study is to explore the specific components that contribute towards US women deciding whether or not to participate in UCBB. A sample of 272 random mothers who reside in the US were recruited from social media. The eligible participants completed an anonymous, self-administered online survey. Collected data showed 44% of participants indicated they were not aware of what UCBB was at the time of their delivery. Furthermore, only 5% opted for umbilical cord blood collection. Of these, 80% of public donations were for the public's benefit, while 75% of private collections were for the baby's benefit or that of a family member. Of those who did not donate, 54% indicated that they were uninformed by their healthcare provider, while 31% stated it was too expensive. From this data, investigators can reasonably conclude that lack of information and cost are the primary reasons US women are not banking umbilical cord blood. While this study offered an investigation into the opinion of US mothers on UCBB, the results show that more research may be warranted to determine the factors creating this gap in patient education.

CC5

Neurodevelopmental Disorders as a Predictor for Dementia Diagnoses Later in Life

Cole Blemings
Advisor: Patrick Davis

Background: Dementia affects a significant portion of the aging population, causing debilitating morbidity and early mortality. Any predisposing factors allowing individuals to modify their lifestyle or elect for prophylactic treatment would significantly improve clinical outcome. Using the All of Us (AOU) database provided by the National Institute of Health (NIH), we are able to find how neurodevelopmental individuals are affected by dementia disproportionally.
Methods: We analyzed the AOU database using the 'cohort' function to easily group together individuals with desired traits. Cohorts were then compared with the AOU general population, composed of 409, 420 individuals. Neurodevelopmental disorders (NDDs) were sorted using condition codes representative of diagnoses within the AOU system, while excluding anything deemed not idiopathic (e.g., trauma, genetic aberration, substance induced). Resulting cohorts were then input into an odds ratio to view any predispositions to dementia in our selected NDD population.
Results: It was found that individuals with NDDs as defined by the DSM-TR-V are 1.70 times more likely to receive a dementia diagnosis later in life.
Discussion: This finding is significant for those whose families have a history of NDDs, as the many prophylactic options for prevention of dementia or delaying onset revolve around lifestyle changes that must be implemented early. Our data aims to assist in prompting physicians to early prophylactic action based on family history and individual past medical history.

CC6

Impact of Specialized Summer Camps on Mental Health Outcomes in Young Type 1 Diabetes Patients

Dharak Patel, Zakariya Yazdani, Casey Faichtinger, Rikki Ray, Lauren McManus, Matthew Stokell, Jacob Vinson, Radhika Patel
Advisor: Petra Rocic

Introduction: Type 1 diabetes mellitus is an autoimmune condition associated with increased risk of mental illness. Recently, specialized summer camps have emerged for children and adolescents with type 1 diabetes, aimed at normalizing life with diabetes and building skills to manage the condition. This project focuses on one such camp, Camp Sweeney, with intent to analyze the effects of the camp on mental health and glycemic control. We anticipate improved glycemic control (campers) and mental wellbeing (campers and their parents) following completion of their camp session.
Methods: Pre- and post- camp questionnaires were distributed to parents and campers to complete at home and return to us 2 months after completion of camp. Questionnaires contain a standard questionnaire for evaluation of mental wellbeing overall and as it relates to diabetes management, as well as self-reported HbA1c values. Collected information was deidentified and entered into Excel for analysis.
Results: We handed out 110 surveys total. Preliminary results (n=5 returned surveys) show evidence that Camp Sweeney has helped increase the campers' ability to manage their diabetes (improved HbA1c) and feelings of preparedness for ongoing diabetes management. Several parents confirmed that Camp Sweeney has improved quality of life and diabetic management for the campers.
Discussion: We believe that the remaining Camp surveys will lend credence to the currently available evidence. While there is some evidence that these types of camps improve the mental wellbeing of participants, ours is the first study to evaluate the important combined impact on mental wellbeing and glycemic control.

CC7

Rural Health Experience for COM Students in Bangladesh – Observations of Clinical Practices and Research Infrastructure

Douglas Deng, Samyukthaa Saiprakash, Sabrina Haque, Payam Mohammadi
Advisor: Khalid M. Khan

Introduction: As Bangladesh undergoes an epidemiological transition, the prevalence of non-communicable diseases (NCDs) significantly increases, particularly in rural and underserved communities. In the summer of 2023, students from the College of Osteopathic Medicine (COM) visited two rural hospitals to experience healthcare and biomedical research in a low-resource setting, with a focus on global cultural immersion. *Methods:* COM students collaborated with physicians and public health researchers from Population Health, Research, and Training Society (PHeaRTS) and Matlab hospitals, involved in an ongoing NIH-funded brain health study in Bangladesh. Information was recorded in MS Word or Excel to 1) examine a disparate electronic medical records system 2) conduct health screenings with community medical workers, and 3) observe outpatient care practices under the supervision of local physicians.
Results: In a sample of 1426 general medicine patients, 11.6% reported generalized itching and 6.4% had cough and cold. Among 342 patients with systolic blood pressures above 120 mmHg, general body pain and knee pain were each prevalent in 5.6% of cases. Of 446 ob/gyn patients, 15.7% presented with pregnancy-related issues, and 10.8% had lower abdominal pain. Itchy eyes and headaches each accounted for 7.7% of 1446 ophthalmology patients. *Discussion:* Healthcare in Bangladesh is influenced by sociocultural, economic, and geographic factors which restrict patient accessibility and physician capability. Limited documentation and resources hinder attempts to achieve the longitudinal care necessary for NCD prevention, diagnosis, and treatment. Local mentorship is crucial to foster an understanding of global medical inequities and to collaborate on future solutions.

CC8

The Interplay of the Opioid Epidemic and the COVID-19 Pandemic: A Descriptive Study

Emily Simmons, Elena Boms, Nora Ammar, Rebecca Andrews Dickert, Hosam Abdelhady
Advisor: Sahar Soliman

Introduction: In 2020, the U.S. witnessed a significant rise in opioid overdose death rates compared to the previous year, which coincided with the onset of the COVID-19 pandemic. This study characterizes shifts in opioid prescription patterns in Texas, examining variations by gender, geography, and payment *methods*. *Methods*: Using patient-deidentified data from the Texas State Board of Pharmacy, we assessed prescription volume and dispensed morphine milliequivalents (MMEs) of 11 opioid substances in Texas during the initial COVID-19 pandemic quarter (April-June 2020). Data was compared to pre-pandemic patterns from April 2019-March 2020.
Results: Opioid prescriptions during the pandemic's first quarter dropped by 13.4% from pre-pandemic rates. However, total MMEs only fell by 3%, reflecting a 12% surge in MMEs per prescription. Of the opioids studied, only buprenorphine showed an increased MME dispensation. Examining gender-specific opioid use, women received 44% more prescriptions than men pre and post-pandemic, but just 8.5% higher MMEs, indicating higher MMEs/ prescription for men compared to women. Opioid prescriptions were notably prevalent in North Texas, Houston, and San Antonio, with the distribution unchanged post-pandemic, matching Texas's population and pharmacy distribution.
Discussion: Post-pandemic, Texas saw a shift in opioid prescribing patterns in the State of Texas into smaller volume, higher MME prescriptions. Additionally, our results reveal a gender-disparity in opioid prescribing. The interplay of sociodemographic health determinants and the long-term effects of the COVID 19 pandemic on opioid utilization needs to be examined.

CC9

Extensive Class E Hyperostosis Frontalis Interna: A Case Report Abstract

Jason Nikirk, Josephine Chiu
Advisor: George Prada III

Introduction: Hyperostosis frontalis interna (HFI) is a condition that most commonly affects postmenopausal women characterized by benign thickening of the frontal bone. Its clinical manifestations include headache and other neurological symptoms. While the exact cause of HFI is unknown, it is believed to be associated with hormonal imbalances.
Case presentation: A case of HFI was revealed during a routine dissection of a 91-year-old female who died of systolic heart failure. A sagittal cut was made through the skull, and both hemispheres of the brain were removed for further histopathological image analysis. The brain showed clear compression of the frontal, temporal, and inferior parietal lobes.
Discussion: We report unique findings of Class E HFI with coalescing nodular bony overgrowths, ranging from 0.5 to 1 cm in thickness, along the inner table of the frontal bone extending into the sphenoid, parietal, and temporal regions, which is quite rare. The growth advances inferiorly into the right middle cranial fossa with complete ossification of the foramen rotundum, foramen ovale, and foramen spinosum. In addition, the inferoanterior left parietal bone (Broca's area) has a large nodular growth measuring 1.5 cm in thickness and width.
Results: Pending histopathological analysis, a suspected diagnosis of HFI has been made, but meningiomatosis and chordoma cannot be ruled out. We believe this report exhibits a novel presentation of advanced HFI that may be able to assist clinicians in further evaluation of patients impacted by this condition.

CC10

Nutrition Questionnaire to aid in Effective Dietary Intervention

Joshua Varghese
Advisor: Owen Kelly

Introduction: When holistically treating patients, physicians must navigate the challenge of understanding a patient's dietary habits within a short interaction. Improving patient nutrition is relatively time consuming. Although screening tools that categorize patient food diaries, eating habits, and dietary attitude exist, there is no universally utilized mechanism in which physicians can effectively screen core aspects of a patient's diet. This study will create a patient-centered questionnaire that can aid physicians in determining dietary interventions that can be followed-up.
Methods: A literature search was performed to find current validated questionnaires for analysis and included the Mediterranean Diet Adherence Screener (MEDAS), Rapid Eating Assessment for Participants (REAP-S), and Nutrition Screening Protocol (NSP). Analysis consisted of determining the types of responses that could be accurately recorded by patients in clinical settings to reduce the burden on physicians. It was determined that a 17-question screening-type tool coupled with visual aids to understand standard USDA food group serving sizes may result in an efficient, reliable questionnaire.
Anticipated Results: It is expected that patient responses to this questionnaire will provide physicians with the dietary insights necessary to advocate for positive changes to dietary habits. However, a limitation to this study is that this questionnaire has not yet been implemented in clinical settings to determine effectiveness.
Conclusion: This study has developed a draft patient-centered nutritional questionnaire which can be used at every patient encounter. Future work will include testing, refining, and validating this questionnaire for use in practice and following patient nutrition trends over a year.

CC11

Point-of-Care Ultrasound at SHSU-COM Clinical Rotation Sites: Third-Year Medical Students' Perceptions of Access and Barriers to Utilization

Kyle Stitle, Ryan Garrison, Austin Reynolds
Advisor: Rebecca Andrews-Dickert

Introduction: Ultrasound offers multiple modalities depending on the setting and specialty it is used. but less is known about utilization in community and rural settings. Differing POCUS educational needs in these settings may exist. This study aims to assess third-year medical students· perceptions of access and barriers to POCUS utilization at SHSU-COM sites, which may inform educational needs of medical students. *Methods:* During third-year clerkships, SHSU-COM OMS-Ill's were located at 5 clinical sites, including community and rural settings. Priory to clerkships, OMS-Ill's participated in EFAST-focused POCUS curriculum. Participants were anonymously surveyed regarding third-year clerkship POCUS utilization. Results were analyzed using qualitative and quantitative measures. IRB exemption was granted. *Results:* 19 of 69 participants responded to survey questions regarding POCUS utilization, with respondents from all five SHSU-COM sites. POCUS machines were most commonly available on Emergency Medicine, Inpatient/Adult Medicine, and Women's Health clerkships. POCUS exams most performed were pregnancy-related, ultrasound-guided procedures, vascular access, EFAST, and cardiac. 89.4% of respondents observed clinicians perform POCUS at least once, with 84.2% reporting personal POCUS use. Identified barriers to the EFAST POCUS exam were lack of personal or preceptor familiarity, lack of ultrasound machines, and time constraints. Results are preliminary as this survey is in progress. *Discussion:* Our data suggests that while this cohort of third-year students had access to POCUS in some clinical settings, challenges to utilization such as limited learning opportunities and equipment availability exist. Further examination into these barriers may allow tailoring of POCUS education prior to clinical rotations.

CC12

A 55-year-old male with chronic fatigue, microcytic anemia, and restrictive lung disease

Melanie Zschappel
Advisor: Candace Walkley

Introduction: Our case describes a rare diaphragmatic abnormality as cause for chronic fatigue and highlights the importance of continued investigation when the first diagnosis does not adequately explain symptomatology. *Case description:* A 55-year-old healthy male complained of fatigue. Vital signs and physical exam were normal. Laboratory testing revealed a chronic, microcytic anemia; normal ferritin and Fe/TIBC (%-saturation); and an increase in hemoglobin A2 diagnostic of beta-thalassemia minor. Melenic stools and persistent fatigue resulted in endoscopy that revealed H. pylori gastritis and evidence of external gastric compression. A Bochdalek hernia was diagnosed from abdominal CT (images A and B), but no hernia was discovered on laparoscopy. Eventration of the diaphragm was diagnosed, and PFTs showed evidence of restriction. The patient is awaiting plication. *Discussion:* Diaphragmatic eventration (DE) is a rare, often asymptomatic, condition due to muscle or phrenic nerve dysfunction that results in cephalic displacement of the hemidiaphragm into the thoracic cavity. Poor exercise tolerance, dyspnea, and sleep disturbances are occasional complaints. PFTs can confirm reduced total lung capacity due to compression. Observation is adequate for asymptomatic patients, but patients with pulmonary restriction are referred for surgery to fold and staple the diaphragm into a position of maximal inspiration. Plication results in normal lung expansion and improvement in exercise capacity in many patients. Premature closure bias is the tendency to accept a diagnosis based on incomplete data or initial impression. Thorough investigation of this patient’s problem list helped us to avoid premature closure bias and to make this rare diagnosis.

CC13

Blood Transfusions: Unintended Consequences and Alternative Strategies

Rhoda Hijazi, Jackson Wahman, Monzer Alatrach, Arelys Hernandez
Advisor: Hosam Abdelhady

Blood transfusions are life-saving therapies, but they carry risks of infectious disease transmission, cell-free DNA (cfDNA) transfer, and adverse reactions. This review focuses on the effects of cfDNA, which has proven valuable for prenatal testing, transplantation monitoring, and disease diagnosis. However, the presence of cfDNA in blood products poses risks during transfusion, potentially causing unintended consequences when taken up by host cells. White blood cells (WBCs) contribute significantly to cfDNA volume, despite efforts to remove them. Concerns also arise regarding foreign DNA from the donor's diet, including genetically modified organisms (GMOs), and gene transfer risks. cfDNA fragments can persist in the host, leading to acute and chronic risks. Alternatives to blood transfusions, such as autologous transfusion, erythropoietin stimulating agents, and bloodless surgery, have shown success in reducing the reliance on allogeneic transfusions. These alternatives, along with iron supplements, cell salvage, and hemodilution, optimize patient care while minimizing infection, disease, and clerical error risks. Studies on Jehovah's Witness patients highlight the feasibility and safety of these approaches. This review aims to comprehensively evaluate blood transfusions, their unintended consequences, and the utilization of alternative strategies. By shedding light on these topics, it provides insights into optimizing patient care and reducing transfusion-related risks.

CC14

Evaluating the Impact of a Two-Week EFAST Curriculum on Third-Year Medical Students' Utilization of EFAST

Ryan Garrison, Kyle Stitle, Austin Reynolds
Advisor: Rebecca Andrews-Dickert

Introduction: As Point-of-Care Ultrasound (POCUS) education is increasingly incorporated in undergraduate medical education, the study of the effectiveness of different content and formats of ultrasound-related curriculum is a developing field. The Extended Focused Assessment with Sonography (EFAST) is a POCUS exam widely used in emergency clinical care. This project examines OMS-Ill' s perceptions of the impact of a 2-week EFAST training curriculum on their performance ability and utilization of EFAST during third-year clinical rotations.
Methods: The EFAST curriculum was delivered in July 2022 to OMS-Ill students. The curriculum involved didactics, hands-on ultrasound practice with standardized patients, and a comprehensive OSCE assessment, in which students performed the EFAST examination. In July/August 2023, curriculum participants were anonymously surveyed. Results were analyzed using qualitative and quantitative measures. IRB exemption was granted for this project.
Results: Seventeen of 69 participants completed the survey, with respondents distributed across 5 clinical rotation sites. All 17 respondents reported increased knowledge and confidence in performing and interpreting EFAST, with 82.4% indicating increased likelihood of performing EFAST. 76.4% of respondents performed EFAST at least once during third-year rotations, with 11.8% performing it 15 times or more. Respondents reported hands-on practice to be the most useful component of the EFAST curriculum. Results are preliminary as this survey is in progress.
Discussion: Our data suggest the EFAST curriculum increased students' performance ability and likelihood of utilization of EFAST during third-year rotations. Further research directions include identifying limitations to the current curriculum and assessing barriers to EFAST utilization at rotation sites.

CC15

Associations of nutritional metal exposure with neurocognitive performance and thyroid hormone biomarker in adolescents – Preliminary data from an ongoing epidemiological study

Sabrina Haque, Samyukthaa Saiprakash, Douglas Deng, Payam Mohammadi
Advisor: Lesley Gardiner

Introduction: Deficiencies in nutritional metals (NM) can have negative implications on neurodevelopment and thyroid hormones (TH), which is critical in early life brain development. However, epidemiological evidence regarding the associations between NM, brain development, and TH during adolescence is limited. To address this research gap, we conducted a pilot study using a subset of adolescents in Bangladesh. *Methods*: Adolescent participants (n=39) aged 13-17 years from a NIH-funded adolescent cohort living in rural Araihazar, Bangladesh were randomly recruited to complete the computer-based Behavioral Assessment and Research System (BARS), a neurobehavioral test battery. Blood was collected to assess Zinc (Zn), Copper (Cu), Selenium (Se), Magnesium (Mg), and Iron (Fe) as well as serum thyroid stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4). *Results:* Adolescent girls demonstrated non-signifiantly higher Zn and Cu exposure and lower Fe exposure than the boys. Additionally, girls had significantly better performance in Symbol Digit (SDT) and Match-to-Sample (MTS) tests. Zn exposure was associated with higher scores in Continuous Performance Test (CPT)($p<0.05$), whereas Fe exposure was associated with better scores in CPT and Simple Reaction Time (SRT) tests (p≤ less than/equal to ≤0.05). A negative impact of Cu on CPT test score was also observed. Serum TH biomarkers are being assessed at this time. *Discussion:* The preliminary data suggests potential effects of Zn and Fe on brain function, more specifically on sustained attention and response speed. The implications of this data warrant further exploration to determine the full extent of nutritional deficiencies in neurocognition.

CC16

Associations of toxic metal exposure with neurocognitive performance and thyroid hormone biomarkers in adolescents – Preliminary data from an ongoing epidemiological study

Samyukthaa Saiprakash, Douglas Deng, Pavani Chilamkuri, Sabrina Haque, Payam Mohammadi
Advisor: Lesley Gardiner

Introduction: Childhood exposure to toxic metals (TM) has been shown to have detrimental effects on thyroid function. In turn, thyroid hormones (TH) themselves are crucial for early brain development, mediating neurogenesis, synaptogenesis, and neuronal and glial cell differentiation and migration. However, epidemiological evidence regarding this TM—TH—neurodevelopment pathway has not been well documented. To address this research gap, we conducted a pilot study in Bangladesh using a subset of adolescents from an ongoing NIH-funded study. *Methods:* A random sample of 39 rural adolescents, between 13-17 years of age from Araihazar, Bangladesh, was included in our study. Participants completed a computer-based neurobehavioral test battery, Behavioral Assessment and Research System (BARS) that measures an array of neurocognitive functions such as memory, attention, motor function, and response speed. Blood was collected to assess arsenic (As), manganese (Mn), lead (Pb), and cadmium (Cd) and serum levels of thyroid hormones (TSH, T3, T4). *Results:* Male and female participants did not show any significant differences in average age and BMI. Adolescent boys had non-significantly higher Pb, Mn, and Cd, whereas girls had non-significantly higher As. However, girls showed significantly faster Symbol Digit Test (SDT) ($p=0.005$) and Match to Sample (MTS) ($p=0.03$) correct latencies. Mn exposure was significantly associated with slower SDT response ($p=0.05$). Serum TH assessment is ongoing. *Discussion:* The preliminary data suggests that increased exposure to Mn may have negative impacts on neurocognition during adolescence. Due to the sample size, further investigation is necessary to fully conceptualize the TM—TH—neurodevelopment pathway.

CC17

Significance of Pudendal Nerve Variations in the Management of Pelvic Disorders

Vanessa Molina, Radhika Patel, Peggy Taylor, Jaime Hinojosa
Advisor: Jailenne I. Quiñones-Rodriguez

Introduction: A comprehensive understanding of pelvic anatomy is crucial for properly diagnosing and managing gynecological procedures. The pelvic neurovasculature is one of the regions with the most anatomical variations. This research aims to identify the significant variations in the origin of the pudendal nerve and the gynecological management of clinical implications. Bilateral or unilateral variations of the pudendal nerve may exist and appear in the extrapelvic or intrapelvic portions along its route to the perineum. Anatomical variations of this nerve may have an increased risk of entrapment depending on its location, and pudendal nerve dysfunction may arise due to this entrapment.
Methods: A systematic search of all major databases was performed from 2017 – 2022 to identify anatomical variations of the pudendal nerve in females (n=126: 100 living patients and 26 cadavers). The variations were categorized according to the nerve origin, distribution, and location of the sacrospinous ligament.
Results: An understanding of variations from the origin and course of the pudendal nerve is imperative to evaluate if there is a distinction between variations and pathologies such as pudendal canal syndrome and vulvodynia. While many established causes of vulvodynia exist, an idiopathic group remains with unknown etiology and variable treatment results.
Discussion: Awareness of anatomical variations in pelvic neurovasculature are essential for understanding pelvis anatomy and enhancing the safety of interventional procedures and accurate diagnoses for treating pelvic diseases.

CC18

Non-clinical Factors Affecting High C-Section Rates in the United States

Zainab Sherwani
Advisor: Peggy Taylor

Introduction: The United States is well-known for having one of the highest rates (around 1 in 3 women, 33%) of c-sections globally with the majority being qualified as “unnecessary” or “potentially avoidable” (Montoya-Williams et al., 2017). Non-clinical influences occur from the hospital, insurance, and provider perspectives that affect decision making patterns. The goal of the study is to evaluate and address the reasons for high rates of cesarean sections in the United States and identify the role of non-clinical factors such as institutional biases and provider biases in cesarean section decisions.
Methods: A literature review was conducted with the PubMed and NCBI search engines. Keywords included "c-section rates in the US", "non-clinical c -section reasons", "provider biases in OBGYNS", "non-clinical birthing factors", "c-section biases”, and "the liability environment and c-sections”.
Results: A variety of studies concluded non-clinical factors possibly leading to high c-section rates including delivery time (day, weekend), insurance type (private/public), physician practice type (private/clinical), physician gender, provider scheduling (shift work/on-call models), and the medical malpractice liability environment.
Discussion: This topic is of grave concern due to the current physician shortage and need for OB/GYNs in urban, rural, and underserved settings. An overall environment change is vital to focus on the actual medical and emotional needs instead of letting institutional factors dictate care. Future efforts should focus on analyzing the decision- making processes behind delivery methods and policy should be implemented to minimize the effect that non-clinical factors have on cesarean section rates.

Osteopathic Medicine & Medical Education Research (OME)

Osteopathic projects aim to understand how specific osteopathic medicine influences health and physiology. Additionally, they seek to understand the use and practice of osteopathic techniques. Medical Education projects aim to advance the knowledge, skills, and professionalism of medical students by understanding and evaluating educational ecosystems. These ecosystems include policies related to admissions and curriculum, people who serve as teachers and mentors, instructional technology and other resources, the attitudes that pervade a given institution or educational experience, and even the medical students themselves.

OME1

Analyzing the correlation of formative preparedness quizzes and final exam performance in a medical school immunology course

Amanda Atanasson, John McDonald, Hatem Elshabrawy
Advisor: Yuan Zhao

Background: Formative preparedness assessments provide students with the opportunity to self-assess their understanding of the subject matter before a formal lecture. They encourage pre-learning which is proven to be an important and effective study habit that is largely overlooked by students. Previous research studies demonstrate the positive impact of such type of assessments in improving the students' learning of complex biomedical science disciplines such as physiology, pathology, and microbiology. However, their impact on immunology learning remains unexplored. This study aims to assess the impact of formative preparedness quizzes on medical students' immunology learning.
Methods: Students who were enrolled in MEDS7803 Microbiology and Immune System in year 2022-2023, at Sam Houston State University, College of Osteopathic Medicine, were provided with ten formative preparedness immunology quizzes. Each quiz was made available to students, on Blackboard, one week before the formal lecture. Students were instructed to complete the assigned pre-reading chapter before taking the formative quiz to assess their knowledge gap. In this study, a Pearson correlation coefficient will be utilized to determine the correlation between the timestamp of the first attempt, number of attempts, and scores of the quizzes and final exam grade pertaining to the sessions that contain a preparedness quiz. *Results:* We anticipate a positive correlation between the performances in quizzes and the final exam grade. *Conclusions:* We believe that this study will bridge the research gap and promote the use of formative preparedness assessments. The use of such tools would foster better learning strategies and enhance immunology education in medical schools.

OME2

Using Familiar Simplicity to Teach Unfamiliar Complexity

Elizabeth Matthews, Kelby Kosel
Advisor: Mario Loomis

Intro: Laryngeal anatomy is a difficult subject area for many students. The wide array of extrinsic and intrinsic muscles with similar-sounding names, the nuances of cartilaginous structures, and the interplay with the pharynx and tongue make for a deposit of information that, if ever learned in the first place, is generally quickly forgotten. Our hypothesis was that an online educational module using the familiar action of swallowing to teach the unfamiliar complexity of laryngeal structure would improve student comprehension of the subject.
Methods: This novel online module used the visual impact of cadaver simulations aligned with live endoscopy and fluoroscopy. The module was interactive; students clicked on answers to questions designed to help them associate the structures with their functions. It was also individualized; those clicking on wrong answer choices were led back through the process with additional guidance.
Results: The module will be available to all first year osteopathic medical students on September 11, 2023, when they will be covering the material in their lectures. The students will be asked to rate their confidence in their knowledge of the material before and after completing the modules. The control participants will be given access to a PowerPoint® of 20 atlas pictures of the laryngeal anatomy in the place of the interactive module.
Discussion: A novel educational module was built using the apparent simplicity and familiarity of swallowing to teach the unfamiliar complexity of the laryngeal structure and function.

OME3

An Innovative Three-Dimensional Model for Early Human Development

Gilberto Gonzalez Kistner, Larry Ciscon, Robert Rice
Advisor: Jailenne I. Quiñones-Rodriguez

Introduction: Embryology comprehensively explains how the human body develops from a single fertilized cell into a complex, multicellular organism. This knowledge is crucial for understanding the typical anatomical and physiological structures that form the basis of medical practice. Many medical conditions and diseases have their roots in embryological development. Knowledge of embryology helps medical students understand the origins of congenital anomalies, birth defects, and developmental disorders, essential for accurate diagnosis and effective treatment. Embryology deals with developing tissues, organs, and structures at a microscopic scale. Students need to understand cellular processes and interactions that drive embryonic development, which can be challenging to visualize and comprehend. Thus, we aimed to incorporate innovative three-dimensional models to showcase the early human development from fertilization to implantation.
Material and Methods: Utilizing existing literature on embryology, we designed a series of seven three-dimensional models from fertilization to late implantation within the uterine lining. These models were then 3D printed to produce the final physical model set.
Results: This model set will be validated for didactic effectiveness as an active learning tool within the clinical anatomy course given to SHSU COM MS1 students in August 2023.
Discussion: Integrating embryology with other relevant subjects and using technology to create dynamic and interactive learning resources enhance students' comprehension and appreciation of this essential aspect of medical education.

OME4

XRCISE: Extended Reality Clinical Interactive Simulated Education

Isaac Ballard, Josephine Chiu, Brianna Castro, Kevin Lord, Dennis Rau
Advisor: Robert Rice

Introduction: Extended Reality (XR) has created opportunities to enhance health professions education. Students using XR learning have improved retention and engagement compared to traditional lectures. These advances will support both new students and trained clinicians with mastery of palpatory techniques. We hypothesize that an anthropometric virtual patient demonstrating effective applications of palpatory techniques will afford better learning and retention.
Methods: The user will enter the virtual clinical setting, as captured through stereoscopic imaging, using haptic feedback gloves and a virtual reality headset. When practicing the target skill, the user wearing the headset and gloves will receive both haptic and visual feedback that provides guidance for correct performance. As a proof of concept, our trial virtual patient can simulate actual patients having an osteopathic triplanar vertebral diagnosis procedure. To establish the therapeutic parameters for this procedure (force, direction, duration), 4 DO faculty members will perform the procedure three times each through a 2D pressure sensor placed on a patient volunteer. The faculty physicians will perform the technique normally, as lightly as possible, and as firmly as reasonable without causing discomfort. The variability of therapeutic delivery between physicians will be quantified by the sensor software, thereby defining training metric ranges.
Results: Pressure/time data will be captured and analyzed. Statistical analysis of these three iterations will establish a target correct, minimum, and maximum threshold of pressure for XR users to practice matching. Using this program, osteopathic students will be able to use the system to enhance their osteopathic patient care skill competency.

OME5

Developing Innovative Financial Literacy Learning Modules for Medical Students

John McDonald, Amanda Atanasson
Advisor: Yuan Zhao

Introduction: Medical school prepares students for early patient interaction; however, not all medical schools incorporate financial management education into their curriculum at an early stage. Many students exiting medical school will have incurred a high debt. The debt load is a source of stress and could alter their specialty choice. Given the intense medical school curriculum schedule, creative, brief, informative activities that fit in with students' busy schedules outside the classroom are needed to help them learn about this important subject. We hypothesize that short-form financial literacy content in engaging videos and graphic designs can capture medical students' attention and provide them with a foundation of financial literacy.
Methods: A financial literacy organization at SHSU-COM collaborated with local financial advisors to create a series of high-yield and short modules covering financial planning, investing essentials, and the financial implications of medicine to help students develop a healthy relationship with money. These will be presented in seven modules via a 1-3 minute video and a flyer over seven weeks. A pre- and post-survey will be administered via Qualtrics to evaluate the effectiveness of the design of the modules on students' knowledge gain. Data will be analyzed using descriptive statistics.
Expected Results: We expect students who engage with the content to improve their financial knowledge and attitude toward financial education, understand the importance of investing, and learn how to find professional advice. Researchers will complete the curriculum design by September and all short-form content by October 2023.

OME6

Evaluate Perceived Learning and Confidence Levels in Delivering Difficult News Using Artificial Intelligence-Based Activity

Josephine Chiu, Brianna Castro, Isaac Ballard, Dongge Song, Oluwaseun Olaiya
Advisor: Yuan Zhao

Introduction: Effective communication between patients and physicians is fundamental to establishing trust and ensuring quality health care. Patient-physician communication training has traditionally relied on the use of standardized patient encounters and objective structured clinical examination. With the emergence of artificial intelligence (AI), some studies have proposed that AI chatbots, such as ChatGPT, can be used in medical education to teach medical students communication skills and professionalism. Our study aims to evaluate students' perceived learning and confidence levels in delivering difficult news through engagement with ChatGPT. *Method:* Ten OMS-II students will be recruited for this study. A pre-survey containing questions which assess participants' confidence level, overall trust in AI, and perceived learning will be conducted. Each student will then undergo a brief interaction with ChatGPT where they will be given a pre-designed clinical scenario to navigate through. Responses will be recorded and evaluated by ChatGPT as well as a clinical faculty based on the SPIKES (Setting up, Perception, Invitation, Knowledge, Emotions with Empathy, and Strategy or Summary) framework. A post-survey will be utilized to evaluate changes. *Discussion:* We will analyze the survey data using descriptive statistics and analyze the responses between students and ChatGPT through classical comparison. We expect the encounter with ChatGPT to increase students' confidence levels and strengthen their communication skills in regard to delivering bad news to patients. While many students may be skeptical of what they can learn from AI, we hope their experience increases the likelihood of using ChatGPT to aid in the development of communication skills.

OME7

Adult Learning and the Art of Reason: how all students can learn to think

Kathryn Thomas, Rylie Wackerly
Advisor: Mario Loomis

Introduction: Attempts to foster adult learning in medical students can be hindered by the use of readily available artificial intelligence, or by select members of a small group leading the others who simply follow along. Our hypothesis was that an impactful, interactive, and individualized educational module, designed to foster the art of reasoning in clinical anatomy, would lead to improved performance on related high order questions.
Methods: The module covered cranial nerve anatomy and parasympathetic pathways in the head and neck, a historically difficult area for students. This online module was visually impactful, using live-action simulations of ocular palsies and videos of detailed anatomical dissections. It was interactive; students clicked on answers to questions designed to lead them through the process of reasoning to complex solutions. It was also individualized; those clicking on wrong answer choices were led back through the process with additional guidance, allowing all students to eventually reason their way to the answer.
Results: The effectiveness of this module will be assessed with a pre and post-test compared to a control PowerPoint® module, and qualitative feedback. Results will be available after 8/31/23 looking at overall differences between pre and post tests for a standard PowerPoint® recording covering the same material over the same amount of time as the novel module.
Discussion: In an effort to foster adult learning in medical students, a visually impactful, interactive, and individualized online module was created to help all students learn to reason their way to complex anatomical understanding

OME8

Structure and Function of Laryngeal Anatomy: bringing complex anatomy to life

Kelby Kosel, Elizabeth Matthews
Advisor: Mario Loomis

Intro: Laryngeal anatomy is often a very challenging topic for medical students. The extrinsic and intrinsic muscles, complex cartilaginous structures, and the functions associated with both is difficult to learn and even harder to retain. Our hypothesis was that a novel educational module correlating cadaveric dissections with live endoscopy and fluoroscopy would improve student comprehension of the subject.
Methods: A series of interactive videos were created, breaking down the familiar action of swallowing into its essential component parts. Foundational concepts underlying airway protection, such as epiglottic inversion, laryngeal elevation, and closing of the vocal cords were illustrated with cadaveric simulation, endoscopic visualization, and fluoroscopy. The video was the basis of an interactive module designed to facilitate the learning of laryngeal anatomy through the visualization of its function.
Results: The effectiveness of this interactive video module, built as an online supplemental activity, will be assessed with pre and post-tests, a control PowerPoint® module, and qualitative feedback on September 11, 2023, when the students will be covering the material in class. The students will also be asked to rate their confidence in their knowledge of the material before and after completing the modules.
Discussion: To facilitate the learning of laryngeal anatomy, an interactive video module was built around the familiar action of swallowing for an impactful illustration of the structure and function of the larynx.

OME9

DO + MD = A Formula for Precepting Success in Rural Medicine Clerkships

Mahaa Siddiqui, Ouida Collins
Advisor: Shiney Koshy

Since community-based rural instruction is critical in shaping the medical student, it is instrumental that the preceptors be given tools to provide the best education. This is especially true in rural settings where many MD preceptors may be hesitant about teaching the osteopathic philosophy and training. They also may be unsure about osteopathic assessment techniques. Our goal would be to provide a number of instructional videos to community-based preceptors to widen their breadth of knowledge on osteopathy. A literature review was conducted to assess the latest relationship between rural health preceptors and their comfortability with teaching osteopathic medical students. This will help close the gap of missed educational opportunities DO students may have with their MD preceptors. Through the literature review, it was concluded that providing MD preceptors with increased knowledge about osteopathic principles and practice, they will gain a better understanding of the student they are precepting.

OME10

A Video Journey Through Cranial Nerve Anatomy

Rylie Wackerly, Kathryn Thomas
Advisor: Mario Loomis

Introduction: Cranial nerves and parasympathetic pathways have historically been challenging topics for students. We hypothesized that a novel educational module that traced neural pathways in-situ from their origins in the brain, through bony canals, foramina, and ganglia to their final destinations, would lead to improved performance on related exam questions.
Methods: An interactive educational module was produced correlating videos of specially prepared in-situ dissections and live-action simulations with clinical scenarios. Critical relationships were highlighted such as those between the superior cervical ganglion and the internal carotid artery, the posterior communicating artery and the oculomotor nerve, and the geniculate ganglion and the facial nerve. Convoluted parasympathetic pathways were visualized using detailed in-situ cadaveric dissections of the four facial ganglia, and nuances of ocular palsies were explained with live models and split-screen video editing.
Results: The effectiveness of this interactive video module, built as an on line supplemental activity, will be assessed with pre and post-tests, a control PowerPoint® module, and qualitative feedback. Results will be available and analyzed after 8/31/2023.
Discussion: Cranial nerves and parasympathetic pathways can be difficult for students to learn. An interactive educational module was built around a video journey through physical signs and anatomical pathways to facilitate student understanding.

OME11

The Utilization of Osteopathic Manipulative Therapy as an Adjunct Treatment for Chronic Migraines: A Systematic Review

Erica Frosch, Rachel Quintanilla, Swetha Prakash, David Cervantes, Gabriel Hapenciuc
Advisor: Luther Quarles IV

Introduction: Headaches are a common and debilitating ailment, and Osteopathic Manipulative Medicine is a non-invasive alternative treatment that could be effective. This literature review's goal was to evaluate the efficacy of OMT as an adjunct treatment for chronic migraines.
Methods: An in-depth review was performed on the incorporation of Osteopathic Manipulative Techniques (OMT) as a treatment for migraines and/or headaches. The databases Pubmed, Google Scholar, and OSTMED.DR were employed for the search, with priority given to Randomized Controlled Trials (RCT) specific to migraines, headaches, and OMT. Inclusion criteria for articles included a publication date after 2013, RCT pertaining to OMT, migraines, and headaches. With this criteria, seven studies were included. *Results:* Overall, it was found that OMT is an efficacious adjunct treatment for chronic migraines. General consensus is that OMT improved symptoms involved with migraines, including an increase in quality of life on several standardized questionnaires, and significant decrease in headache frequency. In addition to those above, the analyzed studies evaluated headache impact with the Headache Impact Test-6 (HIT-6) and monitored the usage of over-the-counter pain medication. *Discussion:* Though it is clear that OMT is efficacious when employed as an adjunct treatment for migraines, more research is still needed in order to determine how to best utilize OMT. Directions for research include which techniques are most efficacious, and how to best combine them with current standardized therapies. Due to limited research available on this topic, we hope to establish new standardized treatment protocols and provide a direction for further targeted research.

OME12

Awareness and Interest in Osteopathic Manipulative Treatment among Bangladeshi Physicians and Physiotherapists – A Pilot Study

Payam Mohammadi, Douglas Deng, Sabrina Haque, Samyukthaa Saiprakash, Khalid M. Khan
Advisor: Luther Quarles IV

Introduction: Osteopathic Manipulative Treatment (OMT) can offer a low-cost alternative or supplement to standard medical care in developing countries. While shadowing physicians at Population Health, Research, and Training Society (PHeaRTs) Arsenic Hospital, a rural clinic in Bangladesh, students noticed limited understanding of OMT among the physicians. The goal of our pilot study was to document the levels of awareness and interest in OMT in a group of Bangladesh physicians and physiotherapists.
Methods We developed a 20-minute presentation on the basics of OMT followed by a hands-on demonstration of a spinal and/or wrist diagnosis with muscle energy treatment. Participants completed a 17-question survey assessing their knowledge and interest in OMT after the demonstration.
Results: A total of 16 responses from 14 physicians, 1 physiotherapist, and 1 researcher were collected. Only 25% participants were aware of osteopathic medicine before the presentation. After the training, 14 participants were “Very interested” or “Moderately interested” in developing competency in performing OMT, and 15 participants were “Very interested” or “Moderately interested” to complete an OMT course developed by the SHSU College of Osteopathic Medicine. Overall, our findings suggest a lack of awareness in OMT. However, participants demonstrated a strong interest and high levels of enthusiasm in building competency and performing OMT in Bangladesh. *Discussion:* Results of this study will be utilized as evidence to seek funding for implementing an international osteopathic education program in Bangladesh. Our OMT capacity building effort would help address healthcare challenges faced in developing countries with limited resources, fostering healthier populations.

Podium

O1

Effect of Chronic Spontaneous Urticaria on quality of life in rural populations

Bradley Engel, Aashay Kothari, Dharak Patel, Joshua Varghese, Oluwaseun Olaiya
Advisor: Natasha Shah

Introduction: As the gap between rural and urban healthcare disparities widens, patients living in remote regions experience poorer healthcare options than those living closer to providers. Although tools to measure quality of life in patients with chronic urticaria exist, none elucidate the differences between perceived quality of life in rural versus urban populations. This cross-sectional study will analyze the perceived quality of life in chronic urticaria patients of both backgrounds.
Methods: The quality of life assessment questions come from a qualitative tool, CU-Q2oL, a 23-item self-reported assessment. 100 adults aged 18 to 65 half living in rural areas and half living in urban areas in the U.S. diagnosed with chronic urticaria will be recruited. Participants will complete the CU-Q2oL to provide insight regarding the troubles faced due to chronic illnesses via a 9-point likert scale.
Anticipated Results: It is expected that patient responses will help distinguish differences in quality of life in rural and urban areas. The questionnaire is currently implemented and has 30 of the expected 100 responses. Preliminary data indicates a significant (p=0.049) trend between the change in CU-Q2oL score before/after treatment and miles traveled to the patient's specialist. However, more data for the rural population is required to run statistical analysis.
Conclusion: This study has begun implementation of a questionnaire to determine differences in quality of life for patients with CSU in rural and urban areas. Future work involves further data analysis and questionnaire refinement.

O2

Demographic and Socioeconomic Determinants of Urinary Arsenic Concentration for Elementary School Children in Bangladesh

Shelbin Mattathil, Raisa Sara, Munachimso Nwankwo
Advisor: Khalid M. Khan

Introduction: Arsenic (As) in drinking water is a global environmental health concern as millions of people are chronically exposed to levels exceeding the World Health Organization's safety standard of 10 µg/L. Chronic exposure increases the risk of adverse health effects, such as cancer, skin lesions, cardiovascular disease, and neurodevelopmental deficits. Rural villages in Bangladesh face significant repercussions as they receive groundwater contaminated with As. In addition, environmental factors and diet have been identified as sources of As exposure in Bangladesh and beyond. *Objectives and Methods*: To further address the social determinants of As exposure, we analyzed data from a prospective As intervention study conducted in Bangladesh. Our goal was to test the hypothesis that age, gender, and socioeconomic factors, such as parental education, predict water and urinary arsenic (UAs) concentrations in children. To recruit participants aged 8-10 years from Araihazar, Bangladesh, our field staff visited 30 villages and recruited 773 healthy children from an equal number of households. Sociodemographic information was collected through structured parental interviews. Water samples were collected from the local wells used by the participating children, and urine samples were collected from a subsample of 391 children. *Results and Discussion:* We found that younger, female children with fathers who have less than a primary school education were more likely to have higher levels of UAs after accounting for geographic variation. These findings are likely due to an increase in susceptibility for younger participants, gender norms influencing exposure patterns, and the father's education determining the household's socioeconomic status.

O3

Role of AMPD3 in AMPK Mediated Glucose Uptake During Energetic Stress

Weston Aymond
Advisor: Patrick Davis

Introduction: Type 2 Diabetes associated muscle atrophy has been shown to decrease ability to perform activities of daily living and increase all cause mortality. During muscle atrophy, AMPD3 (AMP ->➞ IMP + NH3) is highly upregulated, which has been shown to impair signaling involved in glucose uptake via AMP Activated Protein Kinase (AMPK). This study will investigate the potential of AMPD3 to influence glucose uptake via the AMPK pathway.
Methods: Adenoviral vectors encoding AMPD3 or GFP were used to transfect mouse C2C12 myotubes. The myotubes were then treated with DNP, insulin, or left untreated. Glucose uptake was measured using 2-deoxyglucose and was normalized to protein content.
Results: Insulin significantly increased glucose uptake by 17% over untreated myotubes (p=0.020, 7552.7 ± 918.1 vs. 6445.2 ± 362.4 lum/ug). A significant reduction in glucose uptake was seen in AMPD3 samples compared to GFP (p = 0.0071, 5054.3 ± 518.3 vs 5929.0 ± 435.3 lum/ug). A significant reduction in glucose uptake in DNP treated samples (p=0.0013) was observed.
Discussion: The observed reduction in glucose uptake in cells overexpressing AMPD3 suggests a potential novel mechanism by which insulin independent glucose uptake can be modulated. However, DNP concentration of 0.1 mM or duration of 45 minutes resulted in some cell death, explaining the reduction in glucose uptake. The findings of this study are encouraging, but more research is needed to link AMPD3 overexpression to AMPK mediated glucose uptake.

O4

Spatial Context of Glioblastoma Cellular Tumor Immune Microenvironment

Aliya Khan, Jahedi Afrooz, Simon Castillo, Kasthuri Kannan, Krishna Bhat
Advisor: Patrick Davis

Glioblastomas (GBMs) are the most prevalent form of primary malignant brain tumors, known for their lethality, resistance to treatment and characteristically aggressive invasion into the brain parenchyma. Most patients with primary GBM fail to respond to treatment and develop a rapid recurrence. The tumor immune microenvironment (TIME) of GBMs can be infiltrated by immune cells, yet it often shows immune evasion with a characteristic immunosuppressive microenvironment with dominance of microglia. However, the spatial context of TIME in primary and recurrent GBMs is not well understood. We hypothesize that TIME is structurally organized in the cellular tumor (CT) histological region and that treatment induces a more homogeneous TIME in recurrent tumors, eliminating interpatient heterogeneity present in primary tumors. Tumors resected from 7 matched primary and recurrent GBM patients were processed using CODEX to obtain images with glioblastoma and immune cell specific markers. Afterwards, quality control methods were performed. Relative fluorescence intensities were used as a preliminary demarcator of cell positivity. Heatmaps of markers were generated to determine differences in marker co-expression in primary and recurrent cellular tumor (CT) samples (n=5). Dimensionality reduction techniques (Uniform Manifold Approximation and Projection) was applied to better visualize the heterogeneity of marker expression profiles. There is an enormous amount of heterogeneity in marker expression across primary and recurrent tumors. Interpatient variability in primary CTs were distinct in marker expression while recurrent CTs were highly overlapped. Additionally, we found several cell clusters that had aberrant marker expression. In conclusion, we found that our findings validated our hypothesis.

O5

Delays in Chest Compressions During EMS CPR: A Retrospective Review of Prehospital Cardiac Ultrasound Vs. Carotid Views During Out-0f-Hospital Cardiac Arrest

Joshua Rasco, Casey Patrick, James Seek, Nick Smith, Kevin Crocker, Himanshu Gupta, Robert Dickson
Advisor: David Moeller

Background: Prehospital point-of-care ultrasonography (POCUS) is gaining popularity in ground-based and helicopter emergency medical services (EMS) practice. Manual pulse palpation during cardiopulmonary resuscitation (CPR) for cardiac arrest is known to have poor reliability in both the hospital and prehospital settings. POCUS can detect a pulse earlier and more accurately than palpation. However, in previous studies, POCUS use during CPR has been associated with prolonged pulse checks. We aimed to assess paramedic image capture accuracy and compression delay rates when obtaining carotid as compared to standard cardiac ultrasound views during CPR in out-of-hospital (OHCA) by a high-volume, ground-based EMS agency.
Methods: This is a retrospective, before and after, review of ultrasound video clip images from patients who underwent CPR following OHCA during a 13-month period between January 2022 and February 2023. The Butterfly iQ device was used throughout. During the initial study phase (January 2022- May 2022), subxiphoid or parasternal long-axis cardiac views were solely utilized to evaluate for perfusion. Then, in June 2022, carotid ultrasound was introduced, in addition to traditional cardiac views. Paramedics evaluated for carotid pulsatility utilizing the 2-D vascular mode. An independent abstractor reviewed all video clips to identify image accuracy and time delays during acquisition. We defined a compression delay as any visualized pause greater than 10 seconds. Descriptive statistics were calculated.
Results: During the study period, 177 patients in total were analyzed, with 98 undergoing cardiac and 79 carotid POCUS imaging. From these patients, there were 144 cardiac and 90 carotid video clips. A compression delay of greater than 10 seconds was noted in 75/144 {52%) of cardiac, but only 29/90 (32%) of carotid ultrasound videos. Adequate image accuracy was obtained in 109/144 (76%) and 79/90 (88%) of cardiac and carotid cases, respectively.
Conclusions: Utilization of prehospital carotid ultrasonography In OHCA to assess for perfusion during CPR resulted in 20% fewer chest compression delays during pulse checks than during traditional cardiac view capture. Additionally, POCUS image accuracy was not compromised. The small, single-service, retrospective data set limits generalizability.

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NOTES/REMARKS/TAKE AWAYS

Sam Houston State University
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