Kansas City University of Medicine and Biosciences

Research Symposium
KCU-Joplin
2019 Abstracts

Basic Sciences

BMS1: Handling of Thermal Paper: Implications for Dermal Exposure to bisphenol A and its Alternatives

BMS2: The Impact of Genetics on the Pharmacology of Alcohol Use Disorders

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10:35 - 10:50am: Cryopreserved Amniotic Membrane and Umbilical Cord Particulate with Manipulation for Arthrofibrosis after Total Knee Arthroplasty: A Retrospective Study

3:00 - 3:15pm: Presence of Spin in the Abstracts and Titles of Anesthesiology Randomized Controlled Trials

3:50 – 4:10pm: Psychiatry Residency Yoga Training Experiment

Basic Sciences

BMS1: Handling of Thermal Paper: Implications for Dermal Exposure to bisphenol A and its Alternatives

Meghan R. Bernier, OMSI, & Laura N. Vandenberg, PhD

Bisphenol A (BPA) is an endocrine disrupting chemical used in photoactive dyes in thermal paper. Studies show that dermal absorption of BPA occurs when handling these papers. Yet, regulatory agencies have dismissed thermal paper as a major source of BPA exposure. Exposure estimates provided by agencies such as the European Food Safety Authority (EFSA) are based on assumptions about interaction with this material, stating that 'typical' exposures involve only one handling per day for <1 minute, with limited exposure surfaces (three fingertips). The objective of this study was to determine how individuals handle thermal paper in one common setting. We observed thermal paper handling in a college-aged population (n = 698 subjects). Individuals handle receipts for an average of 11.5 min, that >30% of individuals hold thermal paper with more than three fingertips, and >60% allow the paper to touch their palm. Only 11% of the participants we observed were consistent with the EFSA model. Mathematical modeling based on handling times we measured and previously published transfer coefficients, concentrations of BPA in paper, and absorption factors indicate the most conservative estimated intake from handling thermal paper in this population is 51.1 ng/kg/day, similar to EFSA's estimates of 59 ng/kg/day from dermal exposures. Less conservative estimates, using published data on concentrations in thermal paper and transfer rates to skin, indicate exposures are likely significantly higher. Based on our observational data, we propose that the current models for estimating dermal BPA exposures are not consistent with human behavior and should be reevaluated.

BMS2: The Impact of Genetics on the Pharmacology of Alcohol Use Disorders

Aulina Chowdhury, MS, (DO/MA Candidate); Dr. Carrie Ferrario, PhD

Alcohol use has been a part of society dating back to ancient Greece, or perhaps even before. However, with time there is more research focused on increased usage and what impact that has on a person's lifestyle as there has been an increase in the prevalence of alcohol use and abuse. Increased usage has fostered alcohol tolerance and dependence, resulting in alcohol use disorders (AUD). While AUD, commonly referred to as alcoholism, has been addressed by many addiction specialists, the tools with which they can combat this problem are insufficient and few in number. This in-depth literature review begins by discussing what alcohol use disorders are and the mechanisms of current available treatments. It then discusses what these treatments are and why they are not always effective. This review also touches on the effect

that different polymorphisms in different subpopulations have on the alcohol bio-transformation process as these contribute to treatment disparities as well. Treatments aim to either eliminate cravings or increase aversion to drinking to combat dependence. However, targeting cravings seems to not be as effective as the aversion tactic, via which a user will avoid future alcohol use. This effect is seen with disulfiram, which works better than either of the other two drugs in most populations. Even then, it is seen to have very little long-term impact without the addition of both supervision and psychotherapy, thereby highlighting that it is not a solution – just a temporary bandage.

BMS3: Expression of Ligand CCL19 in Sprague-Dawley Rat Uterine Tissue and the Possible Action to Prepare for Implantation and Placentation in the Uterus

Ashleigh Elbert, Mallory Gibbson, & Dr.Virginia Rider

Activation of the T cell homing receptor, CCR7, regulates multiple aspects of adaptive immunity. Deletion of CCR7 reduced T regulatory cell (Treg) migration into the uterus and decreased embryo implantation. We hypothesized that the CCR7 ligands, CCL19 and CCL21, attract Treg cells into the uterus and provide local immune suppression prior to implantation. Sprague-Dawley rat uteri were isolated from pregnant rats (Days 3-6, implantation Day 5) and RNA was isolated. Spatial distribution of the ligands was assessed using immunocytochemistry and ligand expression quantified by real time PCR. At Day 3 of pregnancy, CCL21 expression was limited to the glandular epithelium. Expression appeared in the antimesometrial uterine stroma at Day 4. Expression of CCL21 peaked at Day 4 of pregnancy (Mann Whitney, $p < 0.05$). The distribution of CCL21 was similar between Days 4 and 5 but was less robust at Day 5. CCL21 expression was lost from the glands at Day 6 but maintained in the antimesometrial stroma. CCL19 was expressed in the luminal and glandular epithelia of ovariectomized rat uteri. Progesterone pretreatment (2 mg daily, 3 days) stimulated expression of CCL19 in the periluminal stroma. Estradiol (0.2 µg) administration to progesterone-pretreated rats increased the expression but not the distribution of CCL19. CCL19 and CCL21 were hormonally controlled in a rat uterine stromal cell line. Unlike the constitutive expression of these ligands in lymphoid tissue, female sex steroids regulate uterine CCL19 and CCL21. An intrinsic program of immune-mediated events appears to operate in the mammalian uterus prior to implantation.

BMS4: Effects of Dopamine D1 and D2 Receptor Agonists on Environmental Enrichment Attenuated Sucrose Cue Reactivity in Rats

Edwin Glueck, MS., Darren Ginder, B.A., Jeff Hyde, B.A., Katherine North, BA., & Jeffrey W. Grimm, PhD.

Rationale: Acute or chronic environmental enrichment (EE) reduces sucrose cue reactivity in rats. This effect may be mediated by dopamine receptors. Objectives: We examined whether dopamine D1 or D2 receptor agonism could reverse the EE effect. We also examined whether any reversal effects would vary with the incubation of sucrose craving. Methods: Following 10 days (2 h/day) of sucrose self-administration, rats experienced either 1 or 30 days of forced abstinence and either overnight (acute) or 29 day (chronic) EE. D1 (SKF 81297; 0, 0.3, or 1 mg/kg) or D2 (quinpirole; 0, 0.1, or 0.3 mg/kg) agonist was administered systemically immediately prior to a subsequent 2-h cue reactivity test the next day (n = 9–12 per group). Results: Dose-dependent effects were limited to the day 1 test. High doses of the agonists increased day 1 acute EE cue reactivity to levels comparable to control animals. On the day 30 test, SKF 81297 increased cue reactivity in acute EE, chronic EE, and control rats. In contrast, quinpirole resulted in similar cue reactivity for control and enriched rats, more from a reduction in responding by controls vs. a recovery of responding by EE-experienced rats. Conclusions: Both D1 and D2 receptors may be involved in the acute EE-mediated decrease in cue reactivity observed following 1 day of forced abstinence. In contrast, at 30 days of forced abstinence, D1 receptors may be critical in cue reactivity as SKF 81297 was effective at both restoring responding of enriched animals and potentiating responding of controls.

BMS5: Protein-Triggered Sustained Drug Release from Alginate Microspheres

D'Arcy Turner & Laura Wells, PhD

Sustained drug release systems provide many advantages over traditional delivery methods such as an extended therapeutic window, and increased patient. Recent research using polyacrylamide crosslinked by oligomers containing an aptamer sequence, has demonstrated a pulsatile release triggered by a 2mM adenosine target concentration. This work will build off this concept, by engineering a system that delivers in a triggered-sustained manner using micromolar target concentrations (reflective of disease in vivo), with macromolecular targets. For example, the disease wet age related macular degeneration (wetAMD) is associated with increased concentrations of the protein VEGF. Patients with wetAMD could benefit from the implantation of devices that release in a sustained manner in response to local VEGF concentrations. In this work, we engineered microspheres, coated with oligomer crosslinked alginate, designed to decrosslink and release model drugs (FITC-dextran) when in the presence of its target: lysozyme (proof-of-concept). The release of FITC-dextran from oligomer

crosslinked alginate increased from 0.01µg/hour to 0.138µg/hour with the addition of 3µM of lysozyme at 48 hours. FITC-loaded alginate microspheres coated by oligomer-crosslinked alginate released 26% more FITC-dextran over 120 hours when placed into 3µM of lysozyme than without. Controls of alginate crosslinked with PEG or control oligomers had no changes in release with lysozyme. The incorporation of a lysozyme aptamer onto oligomers used to crosslink alginate microspheres resulted in a triggered-sustained release when lysozyme was present. This approach could be adapted for the delivery of drugs to diseases with specific protein profiles such as wetAMD.

Clinical Sciences

CS1: Fluoroscopy and Dynamic Pressure-based Foot Orthoses for Children with Flatfoot

Xue-Cheng Liu, MD, PhD; Robert Rizza, PhD; Scott Van Valin, MD; Jehad AL-Ramahi, BS; Roger Lyon, MD

Introduction: A variety of foot orthoses have been designed to alleviate pain and restore biomechanical function in pediatric flatfoot, but their effectiveness in producing long term improvements is questionable. Additionally, typical flat foot orthoses designs follow a subjective approach, which depends heavily on the orthotists intuition. In this study, we evaluate the efficacy of an objectively designed customized foot orthoses after 12 months of use. Materials and Methods: A customized orthoses was designed based on the integration of bony alignment morphology, plantar pressure distribution, center of pressure trajectory (COP) trajectory data, and 3D computer aided design models. After 12 months of foot orthoses treatment, the patient returned to the clinic to compare pre and post treatment COP trajectories, plantar pressure distribution, segmented foot and ankle kinematics, ankle kinetics, and multiple clinical functional assessment scores. Results: After the 12 months, there was an improvement of temporal-spatial data. Clinical functional outcomes demonstrated an improvement or stabilization in all measured assessments. COP trajectory was shifted laterally. There was a reduction in premature plantarflexor moment, normalized external rotation of the hindfoot, and a reduction in a premature plantarflexor moment during the 2nd rocker. The initial excessive external rotation of the ankle restored to normal range. Conclusion: The customized flatfoot orthoses was able to improve on most gait parameters in the long term, as well as improve the distribution of plantar pressure in flatfeet.

CS2: Prevalence of Opioid Misuse and Associated Illicit Substance Use

Jacob T. Andrews, MS

The prevalence of opioid use in America has been a burden to public health for over two decades. CDC data from the 90s showed rapidly increasing trends in opioid poisonings and opioid-related mortality. After the turn of the century, opioids became a leading cause for injury-related death, and yet between 2010 and 2017 heroin-specific deaths have increased 5-fold. This project investigates the current prevalence of opioid misuse and the link between illicit substance use. The literature review presentation includes compiled trends from the CDC, surveillance data from the Substance Abuse and Mental Health Services Administration, and peer-reviewed journals. Only peer-reviewed sources from the past five years are included. Database statistics include information exceeding five years only to denote trends. Current narcotic prescription guidelines accept the risks of misuse and tolerance. Best practices include

the lowest dose and shortest duration. There is great utility in this medication, but in order to decrease the burden of opioid use disorders in America, opioid medications should still be treated with prudence. This presentation stresses the importance of avoiding narcotic medication to opioid naïve patients in acute and mild pain, as a means of decreasing opioid exposure.

CS3: Exploratory Laparotomy in the Case of Accidental Nail Gun Injury

Charles Eichstaedt, OMSIII & Matthew Brown, M.D.

Introduction: Penetrating abdominal trauma, with a bullet or knife, is a relatively common occurrence. Penetrating abdominal trauma with a nail can fall within this category of injuries. This type of trauma has the potential to cause injury to bowel, urinary, and vascular structures. Peritoneal signs during the initial physical exam can raise the suspicion of injury to vital structures, but in the absence of these manifestations, imaging and exploratory laparotomy are crucial for patient management. Case Presentation: A 32-year-old male presented to the Emergency department (ED) following an accidental, self-inflicted nail gun injury to the left lower abdominal quadrant. The patient presented and remained in stable condition, with no peritoneal signs, while in the ED. A CT of the abdomen/pelvis was taken to assess the extent of visceral injury and location of the nail. CT imaging revealed the nail embedded in his left psoas muscle and did not show noticeable free air or bowel injury. The decision was made to perform an exploratory laparotomy to retrieve the nail and assess abdominal structures for traumatic injury. The abdomen was explored and irrigated and showed no bowel or mesenteric damage. The nail was removed from the left psoas muscle and the abdomen was closed. The patient was seen for follow-up with no complications. Discussion: This case illustrates the importance of exploratory laparotomy in the setting of penetrating abdominal trauma. In this case, the patient was fortunate to have no bowel or vascular injury, which is rare in penetrating injuries to the abdomen.

CS4: Endometrial Cancer Metastatic to Brain: A Case Report

Nandita Ganne, OMS III & J. Tyrone Adcock, D.O.

Uterine cancer is the most common gynecological malignancy in the United States, with 60,000 new cases and 10,000 deaths reported annually (1). Metastatic sites typical include the pelvis, adjacent nodes, peritoneum, and lungs. However, atypical metastasis can occur in extra-abdominal lymph nodes, liver, adrenals, or, as in this patient, the brain and bones. Our patient was a 53 year-old female who presented with a headache, weakness, neuropathic symptoms of the right extremity, and irregular menorrhagia. MRI of her brain revealed multiple metastatic

lesions, with surrounding vasogenic edema. Neurosurgery started Decadron but no surgical intervention was recommended due to the size and location of the lesions. To determine the primary tumor site, a CT scan was performed, which showed an abnormally enlarged uterus. A pelvic ultrasound, hysteroscopy and dilation and curettage were also performed and the patient was diagnosed with stage IV endometrial carcinoma. She underwent daily targeted brain radiation and chemotherapy but subsequently developed bone metastasis and passed away, post cardiac arrest. Brain metastases from female genital tract malignancies are rare, with only 0.3-0.9% of metastatic endometrial cancer cases spreading to the brain (3). Also, most brain metastasis are seen in widely disseminated disease and 90% are detected after the endometrial cancer (6). However, this case is unique as the patient's brain metastasis caused her presenting symptoms, bringing her to clinical attention. Furthermore, while brain metastasis generally indicate a poor prognosis, multimodal therapy with chemotherapy, stereotactic radiosurgery and whole brain radiation shows promise (5, 6).

CS5: Examining the Utility of a Laser Device for Measuring Height in Free-Living Adults and Children

Sandra N. Mayol-Kreiser, PhD, RD, Vanessa M. Garcia-Turner, MS, & Carol S. Johnston, PhD, RD

Background: Height is an important health assessment measure with many applications. In the medical practice and in research settings, height is typically measured with a stadiometer. Although lasers are commonly used by health professionals for measurement including facial imaging, corneal thickness, and limb length, it has not been utilized for measuring height. The purpose of this feasibility study was to examine the ease and accuracy of a laser device for measuring height in children and adults. Findings: In immediate succession, participant height was measured in triplicate using a stadiometer followed by the laser device. Measurement error for the laser device was significantly higher than that for the stadiometer (0.35 and 0.20 cm respectively). However, the measurement techniques were highly correlated (r2 = 0.998 and 0.990 for the younger [<12 y, n = 25] and older [≥12 y, n = 100] participants respectively), and the estimated reliability between measurement techniques was 0.999 (ICC; 95 % CI: 0.998,1.000) and 0.995 (ICC; 95 % CI: 0.993,0.997) for the younger and older groups respectively. The average differences between the two styles of measurement (e.g., stadiometer minus laser) were significantly different from zero: +0.93 and +0.45 cm for the younger and older groups respectively. Conclusions: These data demonstrate that laser technology can be adapted to measure height in children and adults. Although refinement is needed, the laser device for measuring height merits further development.

CS6: Characterizing Patients Receiving Responsive Neurostimulation for Refractory Epilepsy

Olivia Jang, Neenu Sukumaran, & Mahendra Bhati

Refractory epilepsy is a debilitating neurological condition characterized by episodes of unprovoked seizures that are not well-controlled by medication. Recent advances in medical technology have designed new therapies to alleviate seizure severity and frequency in patients with this condition. One such method utilizes Responsive Neurostimulation (RNS®) Therapy. It involves implantation of electrodes into an affected individual's seizure foci; areas of the brain where epileptic activity originates. The electrodes are connected to the RNS® device, manufactured by Neuropace, Inc., that delivers stimulation when seizure-generating electrocorticography patterns are detected. This closed-loop design allows the device to prevent seizures in response to predictive neurological signals. At Stanford University Medical Center, 35 patients underwent surgery to receive the RNS® device implant. Patients were an average of 39.8 (+/- 12.1) years old. Prior to receiving RNS®, they experienced seizures ranging from multiple per day to several per year at an average of 152.6 (+/- 263.2) seizures per year. Patients with improved outcomes after undergoing implantation surgery (n = 32), reported experiencing an average of 116 (+/- 221) fewer seizures per year. Four patients who had the same number of seizures described them as less severe and shorter in duration. Two patients were prescribed an additional anti-epileptic medication (AEM) after their surgery while 5 patients decreased their number of AEMs by 1 or 2. The other 30 patients remained on the same number of AEMs. RNS® Therapy is a novel, promising therapeutic option for individuals with epilepsy who do not respond to medication.

CS7: Adult-onset Type 1 Diabetes Mellitus in a 61 Year-old Female: A Case Study

Harsh Sharma, OMS III

A 61 year-old female with past medical history of vitiligo and hypothyroidism presented to the ED for abdominal distension, diffuse abdominal pain, loss of appetite, decreased energy, fatigue, and constipation. The patient had not had a bowel movement in 6 days. Abdominal/pelvis CT scan showed no clear obstructive signs but did show the patient to be full of stool. Additionally, patient noted a 30lb weight loss in 1.5 months and a single episode of brown liquid emesis earlier on the day of presentation. Lab results revealed hyperglycemia (297), ketonuria, and anion gap metabolic acidosis. She was in DKA, for which she was placed on an insulin drip. Patient was manually disimpacted for her constipation and admitted to the hospitalist service for further workup and treatment. Regarding her loss of appetite, the patient notes that everything just 'tastes bad'. She was rinsing her mouth this morning and coughed up a 'stringy/bloody' substance. During the course of her hospital stay, islet cell antibodies, C-peptide levels, and hemoglobin A1c were ordered. Antibodies were negative but C-peptide was

found to be .43 (normal range .8 to 3.85) and A1C measured at 15.9. These findings, in combination with the patient's history of autoimmune disorders, led to the diagnosis of type 1 diabetes mellitus.

CS8: A Rise in Alpha-gal Sensitivity Requires Heightened Hospital Protocols and Screening Measures: A Case Study

Kelsey Soppet, OMS III & J. Tyrone Adcock, DO

The prevalence of Amblyomma americanum, the “lone star tick”, in southwest Missouri has resulted in increased IgE responses to mammalian oligosaccharide galactose-alpha-1,3-galactose (alpha-gal). Patients consequently experience life-threatening anaphylaxis to red meat and its byproducts. This is of particular importance for gel capsules and chemotherapeutic regimens. New hospital protocols must be established to educate staff about this allergy and eliminate possible exposures. A 68 year-old Caucasian female presented to the hospital in December 2018 for a scheduled cystocele and rectocele repair. On preoperative blood work, the patient had elevated creatinine, hypokalemia, acidosis, and chronic anemia. Three years prior she was diagnosed with alpha-gal sensitivity after an inciting tick bite. Her metabolic abnormalities were suspected to be due to dietary insufficiency and deficient GI absorption, a common effect of alpha-gal sensitivity. A week later, her lab values returned to baseline with IV hydration and oral supplements and she underwent surgery. During her hospital stay, the patient reported a lack of knowledge about her condition amongst staff. This included an incorrect allergy annotation in her chart, meals that were prepared with red meat, and medications that came in gel capsules which are frequently made with pork-based gelatin. With the prevalence of alpha-gal sensitivity rising in the Midwest, there is a responsibility to instate protocols and guidelines of care at our hospital. Along with special dietary considerations, we need to monitor the medical interventions offered to these patients. In particular, we will emphasize the dangers of gel capsules and cetuximab chemotherapy and offer solutions.

CS9: The Impact of Depression on Short-Term In-Hospital Outcomes in Patients Undergoing Endovascular Coiling for Ruptured and Unruptured Cerebral Aneurysms

Karen Tong, BS; Tatum B. Colburn, MS; Angela Wang-Selfridge, BS; Barth Wright, PhD

Endovascular coiling (EC) is a procedure used to treat cerebral aneurysms. This study aims to compare short-term outcomes between patients with cerebral aneurysms after EC intervention, diagnosed with or without depression. This retrospective cohort study utilized data from the 2012-2014 Nationwide Inpatient Sample (NIS). ICD-9 codes identified adult

patients (ages 18+) with the primary diagnosis of cerebral aneurysm (unruptured and ruptured) who underwent EC intervention, and then further isolated patients with depression. Data for patients missing important clinical identifiers (age, gender, cause of death) and for those who did not undergo EC were excluded. Data analyses assessed hospital length of stay (LOS), inpatient charges, average age of admission, and mortality rate. Of the 5,459 encounters with cerebral aneurysm that underwent EC, 627 cases had the diagnosis of depression. • LOS in patients with cerebral aneurysm and depression who underwent EC was significantly decreased (5.64 days depression vs. 8.62 days no depression, $p < 0.0001$). • Total hospital charges were significantly decreased ($155,561.43 depression vs. $201,411.38 no depression, $p < 0.0001$). • Mean mortality rate of patients was significantly decreased (5.7% depression vs. 11.8% no depression, $p = 0.001$). Patients diagnosed with depression who underwent EC experienced shorter LOS, decreased total hospital charges, and decreased mortality rate. This finding could be due to the care received from an interdisciplinary healthcare team versus simple post-op observational care. Future research should aim to delineate the differences of care for patients with depression and for patients without after EC in order to determine which factors improve outcome.

Medical Education

ME1: Cost Effective Videography for Modern Anatomy Education

Parker G Adams, Jennifer F Dennis PhD, Colin Farritor MBA, & Gregory G Motzkus

Human Anatomy is a hallmark subject of medical school and presents a significant challenge for student learning. Classic anatomical instruction relies on significant time completing cadaveric dissection, supplemented by anatomical atlas study. However, atlases are often criticized for being too simplistic in their illustrations, and inadvertent destruction of anatomical structures is an unfortunate byproduct of dissection. Instructional cadaveric videos overcome these limitations by providing clear depictions of the anatomy on well-dissected cadavers in one-on-one instruction that can be played back repeatedly. We sought to develop a portfolio of clinically-integrated anatomy videos to reinforce difficult anatomical concepts. Cadaveric videos were recorded using a mounted iPhone 7+, for ideal camera stability and angle, and edited with iMovie software. Three-way lighting was achieved via a Fovitec 3x 20"x28" Softbox Lighting Kit. We identified structures of interest and clinical integrations using the required course textbooks and structure lists. The COM 2022 students were provided initial access to the videos in the Cardiopulmonary course via Blackboard. Qualitative student feedback has been overwhelmingly positive. It has been unrealistic to provide a comprehensive tool for the current first-year students, due to the timing of the dissections versus recording of specific anatomical content for the project. Thus, the focus has shifted to the long-term goal of a completed portfolio. We advocate for the increased use of anatomical instruction videos and suggest this inexpensive use of video technology can improve the quality of education offered in both undergraduate and graduate level medical education settings.

ME2: Frailty: A Consideration when Treating Cancer Patients

Julia Marie Filo B.A.

This review identifies a frailty index that oncologists can use to their benefit when assessing if chemotherapy is an appropriate treatment option for a patient. Within the medical literature, Dr. Rockwood and colleagues have established an index that can be used in determining a patient's functional status and mortality. These components are critical when speculating individual chemotherapy toxicity, especially in a geriatric population. Since the incidence of cancer increases with age and the percentage of age 65+ individuals in the United States is rapidly growing, oncologists must be able to treat this vulnerable population. The health status of two elderly persons can vary widely and a frailty index can help guide treatment planning.

This review highlights research focused on frailty evaluation and its implications when treating cancer patients.

ME3: Effects of Interventions for Infant and Young Child Feeding (IYCF) Promotion on Optimal IYCF Practices, Nutrition, Growth and Health in Low and Middle- income Countries: A Systematic Review

Zohra S Lassi, Omar Irfan, Rabia Hadi, Jai K Das, Zulfiqar A Bhutta*

Global health research emphasizes the increasing numbers of child malnutrition in low-and-middle-income countries (LMIC) leading to severe and detrimental health concerns. Research also shows implementing proper breastfeeding and complementary feeding practices can significantly improve the prevalence of child malnutrition. Many of the studies conducted on this topic are narrowed to a specific population or experimental design. Therefore, it is important to perform a comprehensive review of past primary research on the effectivity of interventions that promote IYCF practices. The objective of this review is to systematically assess the effectiveness of interventions focused on promoting proper breastfeeding, complementary feeding practices and programs that prevent moderate and severe acute malnutrition in LMICs. Primary studies of large-scale program evaluations using randomized control trials and quasi-experimental study designs were included with a targeted population of mothers/caretakers of children under two years of age or expecting mothers living in LMICs. The study focused on child health as the primary outcome. Interventions implemented by healthcare workers, community health workers and through mobile technology platforms were assessed and compared to no intervention or standard of care. A “summary of finding table” was constructed for all the primary outcomes. Eighty trials published between 1980 and 2018 met the inclusion criteria for this review, exploring the primary and secondary outcomes as mentioned in the published protocol. All in all, in conclusion, this systemic evidence-based review will be critical in facilitating the design of comprehensive IYCF programs and improving child health and nutrition globally.

ME4: Spatial Visualization of Human Anatomy through Art

Youjin Na & Sarah Keim Ph.D

Art has a long history with anatomy education, from the drawings of Leonardo da Vinci to the atlases and 3D anatomy programs used today. Prior research has explored the relationship between art and anatomy. However, most studies in this area focused on how interpretation of art betters observational skills, and not on how engaging in art affects spatial visualization. The purpose of the current study is to examine the impact of technical drawing exercises in

improving spatial visualization and ultimately enhancing anatomy lab education. In this study, first year medical student volunteers were placed into a control or art-training group, where the students in the art-training group work through technical drawing worksheets during four instructor-led art sessions. A pre- and post-Mental Rotation Test (MRT) will be used to assess change in spatial visualization. The neuroanatomy topography practical score and anatomy-based questions on the neurology written exam will be used to assess understanding and conceptualization of anatomy. Greater improvement in the MRT scores, and better performance on the neuroanatomy practical and neurology written exam is expected for the students in the art-training group. Spatial visualization skills are utilized in orientating oneself and understanding relationships within the human body when learning anatomy, and may be beneficial in certain surgical fields, particularly minimally invasive surgeries involving laparoscopy, or radiology. Results of this study could provide insight into a simple way of improving one's spatial visualization using art.

ME5: Understanding and Utilizing Hierarchical Condition Categories and Risk Adjustment Coding

Ashkon Nehzati, MS, Callie Torres, MS, & Janis Coffin, DO, FAAFP, FACMPE, PCMH CCE

As payment models change and financial risk is shifted to physicians, it is vitally important to understand and use proper medical coding habits. First utilized by The Centers for Medicare and Medicaid Services, hierarchical condition categories and risk adjustment are important billing practices. Physicians today need to understand these coding methods as they are increasingly being implemented by health insurance companies. Hierarchical condition categories and risk adjustment help insurance companies to estimate future patient costs and additionally allows physicians to better understand the health status of their patient population. There are several important nuances and guidelines that must be followed. Risk adjustment and the correct utilization of hierarchical condition categories can affect physician reimbursement, so it is vital to understand, properly document, and accurately code.

ME6: An Investigation on the Impact of Resource Overutilization on Medical Student Burnout in The Preclinical Years

Callie E.Torres, M.S., & Angela N. Pierce, D.C., Ph.D.

Burnout is now so well recognized that it now has an International Classification of Diseases 10th edition (ICD-10) code, Z73.0. As more research is completed on the development of burnout in physicians, investigators are starting to realize that it is prevalent as early as the preclinical years of medical school. According to a meta-analysis by Frajerman et al., almost one

out of every two students worldwide (44.2%) will experience burnout (N=17,431). Variables that have been found to impact burnout include: pass/fail grading systems, mental health and wellness programs, updated curriculum, and mentoring programs. Unfortunately, even with all the new adjustments made, burnout still remains an issue. Currently, little research has been done on the impact of extracurricular resource utilization on burnout during M1 and M2. We hypothesize that self-motivated students may attempt to incorporate several extracurricular resources into their studying habits which can lead to improper or incomplete utilization of resources, as well as use of subpar resources that over promise and underperform. This may cause feelings of dissatisfaction and exhaustion that contribute to burnout. Policies and educational methodologies cannot be improved to reduce burnout unless more research is completed on the topic. If it is established that resources overuse or utilization of certain subpar resources negatively impacts student burnout then universities can take a more active role in advising students on which resources are most beneficial and advise them in a manner that works to avoid resource overload and maximize productivity.

Oral Presentations

10:35 - 10:50am: Cryopreserved Amniotic Membrane and Umbilical Cord Particulate with Manipulation for Arthrofibrosis after Total Knee Arthroplasty: A Retrospective Study

Naem A. Mufarreh, OMS I, MS, & Sarkis M. Bedikian, DO

Background: Arthrofibrosis develops in ~7-10% of patients who undergo total knee arthroplasty (TKA), leading to patient pain, loss of knee motion, and disability. In these cases, manipulation under anesthesia (MUA) is commonly performed to increase range of motion and reduce knee stiffness. In this study, we evaluate the effectiveness of MUA with adjunctive cryopreserved amniotic membrane umbilical cord particulate matrix (AMUC) due to its known anti-scarring and anti-inflammatory properties. Methods: A retrospective study of patients that developed joint stiffness (≤ 90° flexion) 6-weeks after primary TKA and received MUA with adjunctive AMUC. The patient's range of knee motion, level of pain, and pain medication consumption were evaluated before and 4 weeks after MUA. Results: A total of 46 cases (45 patients) were included in the study. Prior to MUA, the average initial ROM was 80.2º ± 10.3º and patients experienced discomfort with an average pain score of 5.3 ± 1.8. In addition, a total of 25 (55.6%) patients were taking narcotic medication. Four weeks after MUA with AMUC, the average ROM was 93.8º ± 12.1º ($p<0.01$), which represented a 16.9% increase. Patient's pain decreased 28.6% to 3.8 ± 2.0 ($p<0.01$) and only eight (17.8%) patients were still taking narcotic medication for their pain. Conclusions: This data suggests MUA with adjunctive AMUC reduces pain and improves patient's ROM in patients suffering arthrofibrosis post-TKA. Further studies are warranted.

3:00 - 3:15pm: Presence of Spin in the Abstracts and Titles of Anesthesiology Randomized Controlled Trials

Michael Weaver, Nick Kinder, Cole Wayant, & Matt Vassar

Relevance: Spin, defined as the misrepresentation, intentionally or unintentionally, of research findings has been shown to impact clinician decision making. To date, spin in randomized controlled trials has been identified in some fields of medicine. Objective: To determine the level of spin in abstracts of randomized controlled trials found in published anesthesiology literature. Study selections: Studies were included if they were randomized controlled trials with well defined primary endpoints and statistically nonsignificant results ($p > 0.05$). Data extraction: Two authors scanned each article for inclusion criteria using a pilot-tested Google Form. Results: The search string returned 631 articles for screening, 138 of which met full inclusion criteria and were analyzed for spin. Of the included randomized controlled trials, 32 of 138 (23.2%) were found to contain spin. Spin was found in the results section of 14 of 138

(10.1%) and the conclusions section in 27 of 138 (19.6%) of the abstracts. Conclusion: Spin was found within randomized controlled trials in top anesthesia journals. Spin has been shown to affect the interpretation of randomized controlled trials from treatment to public perception. Future research should be aimed at finding ways to limit the presence of spin in abstracts.

3:50 – 4:10pm: Psychiatry Residency Yoga Training Experiment

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Background: The goal of the PRYTE (Psychiatry Residency Yoga Training Experiment) Project was to "transform our residency workplace into a healing environment by helping residents learn how to move, how to think, how to breathe, and how to eat." Skills development included: relaxation techniques, diaphragmatic breathing, mindfulness, and plant-based food management. The overarching goal was to reduce self-reported stress. Method: A twelve-week Yoga and Holistic Health Course was offered to all residents every week after didactic lectures for sixty minutes per week. Residents' stress and wellbeing were assessed via a pre, post, and two month follow up questionnaire. The questionnaire (RSS, Resident Stress Scale) was original, and constructed through a modified Delphi technique. The established Perceived Stress Scale (PSS) was given simultaneously to evaluate concurrent validity. Results: Overall, the residents' physical health practices and diet improved. Residents' morale improved and outside group activities increased. Analysis of results from pre to post to two month post assessments, demonstrated a bimodal trend in stress (increasing/decreasing), which was influenced most heavily by the work rotation. The RSS demonstrated excellent concurrent validity with the PSS. Discussion: Our study helped identify residents' sources of stress, especially in regards to work rotations. Night float and internal medicine were associated with increased stress. Our new scale (RSS) demonstrated utility and strong construct validity. There was a clear improvement in certain items involving diet and exercise. There was also a trend toward global stress reduction from pre to two months post intervention.