

Keynote Speaker

Donald J. Kyle, Ph.D.

CEO at the National Center for Wellness and Recovery

Dr. Kyle received a BS degree in chemistry from Colorado State University (1982), then a Ph.D. in synthetic organic chemistry from Texas Tech University (1986). His industrial career spanned more than three decades and four pharmaceutical companies, during which time he made significant contributions to science and participated in the commercialization of drug-discovery technologies and various therapeutic agents. His final industrial role was at Purdue Pharma where he led all drug discovery programs and departments and held the title of Vice President, Discovery Research and Non-Clinical Development and Scientific Strategy. He was an early contributor to the development of high throughput screening (HTS) methodology in the 1980's, combining robotics and radioligand binding assays, and combinatorial chemistry methods, processes now widely practiced in most pharmaceutical research. Between 2005 and 2012 his team was focused on pain research and delivered 5 FDA-approved Investigational New Drug Applications aimed at non-opioid mechanisms for pain, several of which are still in human clinical trials. In 2017 he was invited by the Director of the NIH as a pain research expert to a series of NIH-led working groups aimed at science-led solutions to the opioid crisis. The output of these committees ultimately became known as the HEAL (Help End Addiction Long Term) initiative and currently funds nearly \$1B per year for important science. As a collaborator, Dr. Kyle has worked with industrial partners and academic researchers, serving as an adjunct professor at 6 different universities during his career where he participated on Ph.D. committees, supervised Ph.D. students, and hosted post-doctoral fellows and interns in his laboratory. In addition, Dr. Kyle is currently a reviewer and editorial advisory board member for several peer-reviewed journals. His scientific accomplishments are reflected in nearly 200 scientific publications, review papers, books and chapters, as well as 98 issued US patents representing a wide range of technologies, molecules, therapeutic uses, and commercial products. In 2022 he became the Chief Executive Officer at the National Center for Wellness and Recovery at Oklahoma State University, where he is currently building an advanced neuroscience and drug discovery core competency aimed at mechanistic studies and novel treatments for pain and addiction. To accelerate the research, he recently formed a strategic research alliance with the Center of Excellence in Addiction Sciences at the University of Arizona where new collaborative research is currently in progress.

HPV Vaccination Uptake Study in a Rural Oklahoma Family Medicine Clinic

Adrianna Elbon, BA, Tracy Freudenthaler, PhD, MPH, Krista Schumacher, PhD Adrianna Elbon, BA, Medical Student; adrianna.f.elbon@okstate.edu

Background: HPV is the most common STI in the U.S. and is linked to several cancers. Among females, the most prevalent HPV-associated cancer is cervical cancer, and among males, it is oropharyngeal cancer. Additionally, HPV is linked to about 90% of anal cancers, 70% of vaginal and vulvar cancer, and 60% of penile cancers. While HPV vaccination rates have been steadily increasing over the past few years, they are still lower than other childhood vaccines and remain below the Healthy People 2020 goal of 80%. Moreover, Oklahoma, which ranks near the top of all states for cervical cancer, has one of the lowest rates of HPV vaccination. The purpose of this study was to understand HPV knowledge and attitudes about the vaccine among patients at a rural Oklahoma clinic. Methods: We surveyed primary caregivers of children ages 9-17 and young adults ages 18-26 on HPV knowledge (5 T/F items scored and summed); health care provider vaccine recommendation; vaccination status (vaccinated, unvaccinated, unsure); reasons for vaccination decisions; and demographics. Data were analyzed using descriptive statistics. Survey items were a mix of multiple choice and open-ended questions, where patients/caregivers could express their concerns and opinions regarding the HPV vaccine. Results: The survey yielded 28 respondents, with 50% (n=14) parents/caregivers and 57% (n=15) YA. Mean knowledge score was 4.6. All respondents correctly answered the items "HPV can cause several types of cancer" and "HPV can cause cervical cancer." Four incorrectly answered "HPV is rare" and "Men cannot get HPV." Regarding vaccination status, 79% (n=11) of parents reported receiving a vaccine recommendation from a provider for their child; of these, 74% (n=8) vaccinated their children. Among YAs, 67% (n=10) received a provider recommendation; of these, 80% were vaccinated. Two YAs were vaccinated but did not receive a provider recommendation for a total of 10 vaccinated YAs. Regarding reasons for not getting the vaccine, 33% (n=6) of parents of unvaccinated children indicated they were afraid of side effects and 17% felt their child was not the right age. Among unvaccinated YAs (n=4), half were afraid of side effects and half felt they were not the right age. Of the 18 respondents who were themselves or had their children vaccinated, 50% indicated their health care provider was the reason for getting vaccinated, and 44% indicated a family or friend recommendation helped convince them. More YAs than parents relied on family or friend recommendations. Conclusion: This study aligns with literature pointing to the role of provider recommendation in vaccine uptake. It also opens a line of inquiry into the role of family and/or friends in promoting the vaccine. Of concern is the finding that some respondents did not understand vaccination age eligibility. This combined with concerns about side effects demonstrates the importance of education and messaging to increase HPV knowledge and vaccination.

Keywords: Human papillomavirus, HPV vaccine, provider recommendation, rural, cancer

3D histology of the growth, remodeling, and biomechanical locomotor loading in juvenile tyrannosaurs compared to modern ratites

Brenna Hart, MS, Eric Snively, PhD, Holly Woodward, PhD
Brenna Hart, MS, Graduate Student; hartbj@okstate.edu

Growth patterns and osteohistology of extant taxa are commonly compared to that of extinct vertebrates to interpret growth and ontogenetic maturation in extinct clades. This is traditionally done via ground thin sections, but recently microCT scans have been utilized as these newer processes are non-destructive. Synchrotron phase contrast microCT improves edge definition and resolution with larger samples. Although not as detailed at the tissue and cellular level, these 3D scans allow for better interpretation and modeling of complicated vasculature.

We applied synchrotron scanning at the Canadian Light Source BMIT beamline to metatarsals and femora of juvenile tyrannosaurids from sub-yearling to teenage stages, and hindlimb elements of ratites for extant grounding of interpretations.

The 3D imaging revealed abundant oblique canals, a vasculature type often mistakenly interpreted in 2D thin section histology and thus underrepresented. These canals can sometimes be indistinguishable from longitudinal canals in 2D but are readily apparent in 3D. They represent fast growth and or increased nutrient transport to tendon and ligament attachments. Because of their connective tissue relationships, they are frequently observed with Sharpey's fibers and thus have a biomechanical relationship. In the juvenile tyrannosaurids, oblique canals correspond with inferred direction of locomotor ligament tension. Cortical canal densities correlate inversely with maturity in both the ratites and tyrannosaurids.

3D vascular structure otherwise confirmed interpretations of predominant canal direction and remodeling zones identified from ground thin sections. Results demonstrate synergy between planar but higher-resolving 2D histology and extensive volumetric sampling possible with synchrotron microCT.

Keywords: Histology, Synchrotron, Theropods, Ratites

Disintegrin-like and Cys-rich domains mediate substrate-dependent regulation of ADAMTS13

Frida Miranda, BS, Anna Platt, BS, Kathryn Smith, BS, Joshua Muia, PhD
Frida Miranda, BS, Graduate Student; frida.miranda@okstate.edu

Background: The metalloprotease ADAMTS13 cleaves the highly hemostatic active von Willebrand factor (VWF) to prevent VWF-induced platelet aggregation. ADAMTS13 is a multidomain protein with metalloprotease (M), disintegrin-like (D), thrombospondin-1 (T), Cys-rich (C) and spacer (S) domains, followed by seven T domains and two CUB domains. VWF cleavage by ADAMTS13 is regulated by blood shear stress and substrate-induced ADAMTS13 activation. However, these regulatory mechanisms cannot account for variability in the cleavage of VWF by ADAMTS13 from diverse species. ADAMTS13 and VWF have not evolved to be optimal enzyme-substrate pairs; however, its allosteric regulation is evolutionarily conserved. We sought to characterize the substrate-dependent regulation of ADAMTS13.

Methods: Multiplex FRET ADAMTS13 assays were performed using 10 novel fluorogenic substrates. Substrates P3-P10 are chimeric substrates between C-71 and H-71; species-specific amino acid residues were swapped sequentially. Plasmas and recombinant proteins from various vertebrates have been characterized and reported before. Assays were performed as previously described and mean results are reported.

Results: The chimeric substrates (P3-P10) were designed to substitute wild-type, species-specific amino acid residues. Compared to C-71 (P2), only P3 and P6 exhibited reduced rates of cleavage by all vertebrate plasma containing ADAMTS13. The P3 substrate substituted the D binding residues from human VWF71 into C-71, whereas P6 substituted the C binding residues from human VWF71 into C-71. For P3, all ADAMTS13 assayed showed ~30-100% reduction in the rate of cleavage except for armadillo and dog plasma ADAMTS13. Likewise, P6 was cleaved ~0% to 60% slowly relative to P2 by all ADAMTS13. Substitutions occurring outside D and C binding sites had no effects, consistent with previous studies. Interestingly, there was no major change in cleavage rates when D- and C- VWF binding sites were of the same species, i.e., P9 ~ P1 and P10 ~ P2, irrespective of the peptide backbone.

Conclusions: We found allosteric regulation of ADAMTS13 had no effect on the cleavage of any of the substrates, implying substrate-dependent regulation is independent of the allosteric activation of ADAMTS13. Thus, coupling the disintegrin-like domain to the Cys-rich domain may prevent the activation of ADAMTS13 by off-target substrates. Genetic mutations of either domain may therefore contribute to an imbalance in the cleavage of VWF multimers in vivo.

Keywords: ADAMTS13, VWF, substrate-dependent regulation

Profiling ADAMTS13 Activity in Plasma from Patients Indicated of Thrombotic Disorders

*Khuong Nguyen, BS, Faiz Safdar, BS, Frida Miranda, BS, Gowthami Arepally, MD,
Joshua Muia, PhD Khuong Nguyen, BS, Medical Student; khuong.h.nguyen@okstate.edu*

Background: The metalloprotease ADAMTS13 regulates platelet adhesion by cleaving highly hemostatic active von Willebrand factor (vWF), a protein released after vascular damage. Autoimmune or genetic deficiency of ADAMTS13 activity causes a rare but fatal blood clotting disorder thrombotic thrombocytopenic purpura (TTP). Clinical symptoms of TTP include anemia, fever, thrombocytopenia, neurological abnormalities, and renal insufficiency. Many thrombotic disorders also can present with symptoms like TTP; therefore, an expedited TTP diagnosis can be challenging. However, severe ADAMTS13 activity <10% is confirmatory for TTP diagnosis. ADAMTS13 activity assays are not widespread, but the development of fluorescence resonance energy transfer (FRET) based assays makes it easier to perform the test due to shorter turnaround times and versatility.

Aim: Determine the clinical utility of our recently validated ADAMTS13 assay, Cattle-FRETS71, using plasma samples from a diverse patient population and healthy controls.

Method: We collaborated with investigators at Duke University to profile ADAMTS13 activity levels in biobanked plasma samples (n=73) of patients indicated for heparin-induced thrombocytopenia (HIT [nonheat inactivated, and heat inactivated]), platelet factor 4 (PF4) antibodies, thrombotic microangiopathy (TMA) syndromes including thrombotic thrombocytopenic purpura (TTP), immune thrombocytopenia (ITP), and healthy donor plasma samples. This was a blinded study. Plasma samples were recalcified with 6 mM CaCl₂ to neutralize the metal-chelating effects of citrate. Assays were performed at pH 7.4 in 50 mM HEPES, 150 mM NaCl, 10 mM CaCl₂, and 0.05% Tween-20 buffer with 2 μM Cattle-FRETS71 substrate. Data were analyzed with Prism (GraphPad).

Results: Comparing the mean activity in each group, ADAMTS13 activity was normal (>60%) in the PF4 and ITP groups with a mean of 69.4 + 22.7% (n=17) and 99.6 + 21.7% (n=10), respectively. The highest ADAMTS13 activity was in the ITP group, which mirrored the healthy donors with a mean of 89.7 + 26.3% (n=10). HIT (non-heat inactivated) and TMA samples had a mean of 56.1 + 54.9% (n=5) and 31.4 + 31.1 % (n=24), respectively. Excluding HIT (heat-inactivated, n=6) and healthy donor samples, all patient samples had a mean of 57.3 + 38.9 % ADAMTS13 activity (n=56).

We stratified ADAMTS13 activity in patients whose diagnosis was known with the TTP group having the lowest mean of 13.1 + 13.6% (n=15). Patients without TTP had a mean ADAMTS13% of 65.5 + 23.02% (n=5); samples of atypical hemolytic uremic syndrome (aHUS) patients (n=2) had a mean of 84.4 + 28.8%. One patient with malignant hypertension (HTN) and one unknown had ADAMTS13 activity levels of 42.8% and 18.7%, respectively.

Conclusion: Although all patients were suspected of TTP based on their clinical symptoms, only an ADAMTS13 activity test can reliably confirm who has TTP. Our preliminary results do support the use of ADAMTS13 assay to rule out other thrombotic disorders masquerading as TTP. We are yet to receive all pertinent information about the patient's samples to know at what stage of treatment samples were obtained. However, TTP samples had the lowest mean ADAMTS13 activity compared to HIT, PF4, ITP, and TMA, consistent with decreased levels of plasma ADAMTS13 activity in TTP patients.

Keywords: Hematology, ADAMTS13, plasma, thrombotic disorders, blood disorders

ADAMTS7 Substrate: A Great Mystery

Anna Platt, BS, Joshua Muia, PhD, Frida Z. Miranda, BS, Ayomide Ishola, BS, Songjukta Chakraborty, MS, Bhuvanesh Kumar Raju, MS, Thomas Momanyi, MS Anna Platt, BS, Graduate Student; anna.platt@okstate.edu

Background: ADAMTS7 is a metalloprotease which is involved in a variety of conditions from coronary artery disease (CAD) to fertility to arthritis and more. ADAMTS7 is involved in angiogenesis, potentially by breaking down the angiogenesis inhibitor Thrombospondin 1. The angiogenesis connection is important to understanding why ADAMTS7 may be involved in such a spectrum of diseases or disorders. Atherosclerosis leading to CAD is the best documented condition associated with ADAMTS7. Thirty-two percent of deaths worldwide are from cardiovascular diseases, and in the United States 7.2% of adults over 20 years of age have CAD. An inactivating SNP in the ADAMTS7 gene has been shown to mitigate atherosclerosis and coronary artery disease in animal and human studies. ADAMTS7 is an enzyme whose substrate has yet to be defined; finding the substrate for ADAMTS7 will provide more information on the purpose of ADAMTS7.

Methods: Our experiment looks at potential substrates through TurboID – a protein technology by which proteins in close proximity to ADAMTS7 will be biotinylated. A biotinylating protein is fused with the active domains of ADAMTS7 or a variation. The protein is then grown in cell culture and biotinylated proteins are purified using streptavidin agarose which binds biotin. Isolated proteins are then sent for identification via mass spectrometry.

Results: Data from the mass spectrometry experiment will be analyzed from which candidate substrates will be selected. From here, assays of candidate substrates will be performed by mixing them with ADAMTS7. These reactions will then be analyzed by SDS-PAGE and densitometry analysis looking for cleavage of the enzyme.

Conclusion: Once a suitable substrate has been identified, a FRET assay for ADAMTS7 activity can be developed and inhibitors searched for to help combat coronary artery disease and possibly other disorders.

Keywords: ADAMTS7, Coronary Artery Disease, Substrate

Three-dimensional Maxillary canal reconstruction of ancient mammal relative *Cotylorhynchus romeri* shows similarity to mammal sensory innervation

Lianna Marilao, BS, Daniel Barta, PhD

Lianna Marilao, BS, Graduate Student; lianna.marilao@okstate.edu

The trigeminal nerve is the fifth cranial nerve that provides both motor and sensory innervation to the face. There are three major branches of the trigeminal nerve: the ophthalmic, maxillary, and mandibular nerves. Here we focus on the evolution of the maxillary nerve (CN V2). In humans and mammals, the maxillary nerve transmits sensation from the maxilla, nasal cavity, sinuses, the palate, and the mid-face. CN V2 is a highly branched structure whose branches travel through the pterygopalatine fossa and the infraorbital canal before branching into terminal nerves within soft tissue.

In ancient mammal relatives, the non-mammalian synapsids, the maxillary nerve travels through the maxillary canal. The maxillary canal is a bony tube that runs through the maxilla and the premaxilla parallel to the tooth row. Synapsids are a group of amniotes that first appeared 320 million years ago and include mammals and their ancient fossil relatives. The maxillary canal has been used as a phylogenetic character to distinguish fossils at the amniote split as either synapsids or diapsids, the group that likely includes all extant reptiles. The synapsid condition has been found to be a highly branched structure while the diapsid condition has been found to be a long singular tubular structure. The maxillary canal has been reconstructed in only two other very early diverging synapsids. The morphology of the maxillary canal in Caseidae, a group phylogenetically closer to the divergence of synapsids from the amniote common ancestor is not well-understood. To test whether these early-diverging synapsids shared a similar branched morphology with their later-diverging members of their clade or had a more diapsid-like condition, we reconstructed the maxillary canal of *Cotylorhynchus romeri*, a caseid synapsid from the ~280-million-year-old Lower Hennessey Formation of Oklahoma that is well known for its disproportionately small head compared to its large body.

We obtained computed tomography (CT) scans of a complete adult skull (OMNH 4329) and a partial juvenile skull (OMNH 4188). CT scanning allows us to view the internal structures of fossils without having to use any destructive methods. Using the CT scans, we manually segmented and reconstructed the maxillary canals using Avizo 2020.1.

In both OMNH 4329 and OMNH 4188, the maxillary canal displays a long structure that is highly branched, ramifying in multiple directions. This is similar to what has been described in other early diverging synapsids and their later diverging relatives, therapsids. We did not find any major ontogenetic differences between the two specimens, which was what we expected for cranial nerves, which are patterned early in development.

This highly branched maxillary canal in *Cotylorhynchus romeri* shows that it likely had extensive sensory facial innervation comparable to the later diverging non-mammalian synapsid relatives and even modern mammals. Because we found this highly branched morphology very close to the amniote split, this adds more evidence that this structure can be used as a phylogenetic character to help distinguish fossils as synapsids or diapsids.

Keywords: trigeminal nerve, skull, synapsid, mammal

The Scholar 12 group-mentor model: building osteopathic scholarly culture in a multi-campus college of osteopathic medicine

Marija Rowane, DO Marija Rowane, DO, Resident; mrowane@okstate.edu

Background: The emergence of the coronavirus disease-2019 pandemic abruptly transformed medical education, necessitating a quick solution to accommodate remote learning needs. This compounded the perpetual osteopathic literature deficit and challenges meeting Commission on Osteopathic College Accreditation (COCA) and Accreditation Council for Graduate Medical Education (ACGME) scholarly activity criteria. Scholar 12 evolved the Scholar Series professional research development lectures and a Medical Education Masters thesis into a free, interactive virtual platform designed for the osteopathic medical community, accessible to all individuals and institutions. Scholar 12 provides an active, accessible training platform to not only build research skill competency, but to also create scholarly projects with an active research group. This model of Scholar 12 undergraduate medical education (UME) implementation at a multicampus college of osteopathic medicine (COM) demonstrates its application to all institutional learning needs.

Methods: A blinded multi-campus pre-survey was administered to third year osteopathic medical students at Lake Erie College of Medicine (LECOM), prior to starting Scholar 12 during Geriatrics/Osteopathic Principles and Practices Clerkships of 2020-21 and 2021-22. Students were assigned to groups with faculty mentors, including junior faculty from a fellowship program with Osteopathic Recognition. Student were surveyed on their research skill competency relevant to each Scholar 12 Unit on a 5-point Likert Scale, before and after completing their mandatory group project. The latest LECOM Research Day submissions were compared over a 5-year time span. The optional Scholar 12 site Student Feedback Form also rated the helpfulness of unit on a 4-point Likert scale.

Results: The weighted mean Likert Scale average from the pre- surveys in 2020-21 (n = 407, 71.9% response rate) and 2021-22 (n = 455, 82.73% response rate) to their respective post-surveys (n = 342, 60.46% response rate, 2020-21; n = 161, 36.34% response rate, 2021-22) significantly increased from 2.57 to 3.61 (p = 6.63x10e-8) and 2.76 to 3.71 (p = 6.36x10e-8), respectively. Both self-reported least research skill competency in grant development and most competency in poster development. The optional Scholar 12 site Student Feedback Form completed by 498 users total demonstrated a response rate ranging between 22.56- 62.93% between 2020-22 and average ratings (3.5) between "Above Average" and "Excellent" helpfulness across all units. Students completed over 90 posters for institutional research symposiums during the latest academic semester, with a 180-200% growth in abstract submissions at the Erie and Bradenton Campus Interprofessional Research Days over the past 5 academic years.

Conclusions: The successful and sustainable Scholar 12 curricular integration into the LECOM Geriatrics/OPP Clerkship provides a UME model with GME involvement as junior faculty mentors. This demonstrates the accessibility and application of Scholar 12 to ubiquitous institutional remote learning needs beyond the pandemic. The OSU-COM Research Strategic Plan, 2016-2026 describes goals of strengthening support systems by obtaining resources and training needed to execute research plans. Scholar 12 offers a free, accessible, and virtual learning platform with the training tools and interactive forum to achieve this goal in UME and GME at OSU-COM.

Keywords: scholarly activity, research development, virtual, app, mentors

Avapritinib for the Treatment of Indolent Systemic Mastocytosis

Samer Abdelkader, DO, Weyman Lam, MD Samer Abdelkader, DO, Resident; samer-abdelkader@ouhsc.edu

Background: Indolent systemic mastocytosis (ISM) is a disorder characterized by an accumulation of mast cells in subdermal tissue that leads to exaggerated immune response after release of mast cells mediators. Routinely administered treatments include H1 and H2 receptor antagonists, mast cell stabilizers, corticosteroids, and more recently anti-IgE antibody therapies. Our case presentation explores the treatment of indolent mastocytosis with avapritinib, an antineoplastic, after routine treatment options failed.

Case Presentation: A 64-year-old female with history of obesity presented to a community-based Allergy/Immunology clinic with chief complaints of recurrent throat tightness, fatigue, headaches, brain fog. She was found to have high tryptase levels which remained persistently elevated from 46 to 55 (include units) over 13-month span. Physical exam was grossly unremarkable.

Bone marrow biopsy showed mast cell aggregates highly suspicious for ISM. PCR for KIT (D816V) mutation was positive. Initial treatment included fexofenadine 180mg and famotidine 20mg both twice daily. Overall, she had less frequent episode of throat tightness over 9 months, but itchiness, fatigue, brain fog persisted. Monthly omalizumab 300 mg was added on but was eventually discontinued to lack of benefit. She was referred to a tertiary center where avapritinib 25mg daily was started. Four months after initiation, occurrences of throat tightness, stomach cramps, and vomiting resolved, and came off all other therapies for mastocytosis. Eight months after avapritinib initiation tryptase had decreased to 19.

Discussion: Avapritinib is a selective kinase inhibitor used to avoid resistance in patients undergoing chemotherapy with indications in those with advanced systemic mastocytosis and neoplastic complications. The mechanism of action of avapritinib includes inhibition of KIT and PDGFRA mutations. Treatment in our patient resulted in the successful symptomatic treatment of indolent systemic mastocytosis targeting KIT (D816V). This case demonstrates a new treatment which may improve the quality of life of individuals with ISM.

Keywords: avapritinib; systemic mastocytosis; Indolent systemic mastocytosis

HPV and meningococcal vaccine uptake among teens: a cross-sectional examination from the National Immunization Survey - Teen 2020

*Caleb Alexander, MPH, Lydia Brock, BA, Benjamin Greiner, DO,
Micah Hartwell, PhD Caleb Alexander, MPH, Medical Student, caleb.s.alexander@okstate.edu*

Background: Vaccination against both Human papillomavirus (HPV) and meningococcal disease is recommended for all adolescents aged 11-12 years; however, many teens have not received these vaccinations.

Aim: This study aims to assess trends in dual vaccination against HPV and meningococcal disease among teens in the United States.

Methods: We analyzed data on 31,083 adolescents aged 13-17 years from the 2020 National Immunization Survey - Teen. Bivariate and multivariate logistic regression models were constructed to determine dual vaccination rates and associations between vaccination status and sociodemographic characteristics.

Results: Teens were 2.03 (95%CI: 1.98-2.09) times more likely to be vaccinated against meningococcal disease compared to HPV. Additionally, teens vaccinated against HPV were 1.21 (1.15-1.27) times more likely to be dually vaccinated than teens who were vaccinated against meningococcal disease. Among teens living in the South relative to the Northeast, the likelihood for being vaccinated against only HPV increased by a factor of 1.30 (1.07-1.58) and against only meningococcal disease increased by a factor of 1.17 (1.03-1.33). Relative to those living in the Northeast, the risk for being unvaccinated rather than dually vaccinated increased by a factor of 1.51 (1.25-1.83) for those living in the Midwest, 1.62 (1.30-2.03) for those living in the West, and 1.80 (1.50-2.15) for those living in the South. Although less significant, we also found association between sex, race/ethnicity and income-to-poverty ratio.

Conclusion: Dual vaccination against HPV and meningococcal disease among adolescents in the United States is associated with many factors including state legislation, physician recommendation, sex and census region. Although administration of both vaccines is recommended by the Advisory Committee on Immunization Practices (ACIP) to all adolescents aged 11-12 years, meningococcal vaccination is two times more likely than HPV vaccination. Given the trends in immunization and vaccine efficacy, we recommend that physicians advise patients in this age range to receive both vaccines during a single appointment. Increased vaccination at a societal level will increase protection against preventable diseases that cause significant burden to adolescents and young adults.

Keywords: Human papillomavirus, Meningococcal disease, Vaccination

Reporting of Harms in RCTs published in Urology Journals: An Updated Analysis

Reece Anderson, MPH, Andriana Peña, BS, Bradley S. Johnson, DO, Ross Nowlin, BS, Tillman Hudson, MD, Matt Vassar, PhD Reece Anderson, MPH, Medical Student; reece.anderson@okstate.edu

Introduction/Objectives: Randomized controlled trials (RCTs) underpin clinical practice guidelines (CPGs) utilized by physicians to direct management of care. Evidence shows that physicians often interpret significant p-values to be “real-world probability” which is not accurate, as p-values can be skewed by confounding variables such as sample size and loss to follow-up. Therefore, there is a need to assess the robustness of endpoints within RCTs that underpin CPGs, specifically for benign prostatic hyperplasia (BPH). This study uses the Fragility Index (FI) and Fragility Quotient (FQ) to assess the strength of statistically significant findings for RCTs cited in the American Urological Association (AUA) guidelines for benign prostatic hyperplasia.

Methods: Two investigators independently screened the AUA guidelines for management of BPH for RCTs cited as evidence for recommendations. In order to be included in this analysis, RCTs needed to 1) report a statistically significant ($p \leq 0.05$) dichotomous outcome as a primary or secondary endpoint, 2) have a parallel or two-by-two factorial design, 3) be randomized in approximately a 1:1 ratio, and 4) be available in English. Investigators extracted data related to event rate per group (e.g. incidence of acute urinary retention in each group) and loss to follow-up which was compared against the FI. Stata was used to calculate the FI and FQ which was then summarized and reported according to primary or secondary endpoints.

Results: Among the 373 citations in the AUA guidelines, twenty-four RCTs met inclusion criteria with 29 distinct outcomes analyzed. The median fragility index was 15 (IQR = 4 – 38), indicating that twelve alternative events to either study arm would nullify statistical significance. Six studies had a FI of ≤ 2 , indicating that only 1-2 outcomes would need to be changed in order to render non-significance of results. In 10/24 RCTs, the number of patients lost to follow-up was greater than the FI.

Conclusions: The AUA clinical practice guidelines for management of BPH cite RCTs with more robust findings when compared to previous studies assessing fragility in the field of urology. While several included studies had high fragility, the median FI in our analysis was approximately 4-5 times higher than comparable studies of urological RCTs. However, there are areas where improvement is necessary to support the highest quality of evidence-based medicine.

Keywords: Fragility Analysis; Fragility Index; Benign Prostatic Hyperplasia; Meta-epidemiology; Biostatistics; Randomized Controlled Trials

Reporting of Harms in RCTs published in Urology Journals: An Updated Analysis

Reece Anderson, MPH, Trevor McGee, BS, Andriana Peña, BS, Del Perkins, BA, Bradley S. Johnson, DO, Matt Vassar PhD
Reece Anderson, MPH, Medical Student;
reece.anderson@okstate.edu

Introduction/Objectives: In 2004, the Consolidated Standards for Reporting Clinical Trials (CONSORT) group published a Harms extension to their checklist to ensure RCTs properly report on adverse events within trials. In 2010, Breau et. al found sub-optimal reporting of harms within studies published in top urology journals in 1996 and 2004. Our objective was to determine whether their study influenced the completeness of harm reporting in subsequently published RCTs within the same journals.

Methods: PubMed was searched to identify all RCTs published within The Journal of Urology, Urology, European Urology, and BJU International from 2012 and 2020. These years were selected to provide eight-year intervals from the original publication. In a similar methodology to Breau et. al (2010), two authors independently evaluated each RCT meeting inclusion criteria according to the CONSORT-Harms checklist. Using Stata 17.0, we analyzed trends in reporting and factors associated with completeness of reporting.

Results: Overall, adherence to the CONSORT-Harms checklist improved since the original publication in The Journal of Urology. Overall reporting improved significantly from 2012 (59%) to 2020 (89%); further, checklist items #7, #8b, and #10c demonstrated statistically significant increases in reporting between 2012 and 2020. Completeness of reporting improved for each journal included in the study, although statistical significance could not be determined at the time of submission.

Conclusions: Completeness of Harms reporting is imperative for clinicians to make the most informed decisions for their patients well-being. Our analysis found significant improvements in the RCTs published by top Urology journals and we commend the authors and editors for their part in ensuring better reporting since the initial publication in 2010.

Keywords: Urology; CONSORT-Harms; Meta-epidemiology; Randomized Controlled Trials

Athletic Trainer Perceptions of Importance and Confidence in Emergency Skill Application

Jaclyn Arduini, MS, ATC, CAT(C), NREMT, Jennifer L Volberding, PhD, ATC, NREMT Jaclyn Arduini, MS, Graduate Student; jaclyn.arduini@okstate.edu

Background: Athletic trainers are required to be proficient in many skills upon certification, including Emergency Management (EM), yet they are rarely utilized in everyday sport. Thus, these EM skills are often not practiced and can be forgotten. In parallel, the guidelines for catastrophic injury and prehospital care are ever changing and athletic trainers not practicing and updating these skills can find themselves behind in their knowledge, therefore leading to a false sense of confidence. The purpose of this study is to determine how athletic trainers rate their confidence in various emergency management skills pre and post an emergency management workshop.

Methods: A convenience sample of certified athletic trainers and athletic training students (certified=33, students = 5, age 34.47 years \pm 10.62, male =20, female=18, years certified 9.98 \pm 10.9) attending EM workshop at a state meeting. Clinical setting varied (secondary=19, college =4, industrial =1, orthopedic clinic =5, academic =3 or other =6). Participants completed 21-questions pre and eight-questions post workshop online survey using Qualtrics. Questions included demographics and Likert-based confidence questions rated on a scale of 1 to 5 (from extremely unconfident to extremely confident). The surveys were found to be reliable (Pre Chronbach α =0.84 and Post Chronbach α =0.66). The workshop that included both didactic and hands-on skill EM skill demonstrations and practice. Overall means and standard deviations were calculated for all variables. One-way analyses of variance were completed for all twelve outcome measures of importance and confidence of various emergency skills. Three of the outcome variables, importance of refreshing EM skills, confidence in hemostatic agents and confidence in measuring a cervical collar, did not meet assumptions of homogeneity and therefore were analyzed with Welch's adjustment.

Results: Thirty-eight athletic trainers participated in the pre-workshop survey, answering some or all, of the questions while 38 athletic trainers participated in the post-workshop survey. Eight measures of confidence (rectal temperature, hemostatic agents, external hemostatic modalities, inline stabilization, measurement of a cervical collar, application of a cervical collar, football equipment removal and other equipment removal) were significant ($p < .05$) when comparing pre- to post-workshop, as was the importance of refreshing emergency skills ($p < .05$). Only three measures (confidence in cold immersion, tourniquet, and spine board use) were not significant in their confidence scores when measured before and after the workshop.

Conclusions: From the results of the study, we can determine that ATs may have an inflated confidence regarding EM skills. This is demonstrated by the decrease in confidence after proper instruction. As with any skill, ATs should aim to incorporate EM skills into their continuing education choices.

Keywords: emergency management, emergency skills, confidence, athletic training

Athletic Trainers' Abilities to Successfully Perform Emergency Management Simulation

Jaclyn Arduini, MS, ATC, CAT(C), NREMT, Jennifer L Volberding, PhD, ATC, NREMT Jaclyn Arduini, MS, Graduate Student; jaclyn.arduini@okstate.edu

Background: Athletic training accreditation requires educational programs to include emergency care skills within the curriculum. These skills must meet the minimum standards for an entry-level clinician as determined by the Board of Certification (BOC) and the role delineation study. The current Commission on Accreditation of Athletic Training Education (CAATE) Standards differ from the current BOC minimal Emergency Cardiac Care (ECC) requirements with regards to emergency care continuing education. The purpose of this study was to determine athletic trainers' (ATs) abilities to successfully complete graded emergency management (EM) simulations based upon the 2020 CAATE Standards.

Methods: A convenience sample (n=22, age 36.7±10.8 years; 13 males, 9 females, years of experience 13 + 11) of ATs attending a simulation based Continuing Education Unit (CEU) event. Participants took part in four simulations where they were assessed on their emergency skills, after reporting demographics. Simulations were completed individually or randomly paired, and participants were graded on a "yes" (completed) or "no" (not completed) scale by trained evaluators. The simulations were created based upon the authors' expertise, the CAATE, and the National Registry of Emergency Medical Technicians (NREMT) Emergency Medical Responder (EMR) standards. A benchmark of 80% was selected to determine successful completion of the simulation. Overall means and standard deviations were calculated for all Critical Action Checklists (CAC), SAMPLE medical histories, and overall scores. Each simulation was graded independently, so percent scores were calculated to be able to compare across simulations.

Results: The mean overall graded percentage for each simulation is as follows; elbow dislocation 65.0 ± 11.0, femur fracture 54.9 ±10.1, heatstroke 68.2 ±18.2 and external hemorrhage 64.0 ±13.0. In all, only eight participants achieved the 80% success rate (elbow=1, heat stroke=5 and external hemorrhage=1).

Conclusions: Based upon the results, there is a knowledge and ability gap between the 2020 CAATE Standards and the current EM abilities of practicing ATs. Ultimately, we do not know where this knowledge gap and associated skill decay occurs, however the findings of this study should encourage practicing ATs to include EM higher than the BOC minimum in their continuing education choices.

Keywords: emergency skills, SAMPLE, vitals, critical action checklist

Factors Influencing Athletic Trainer Confidence in Emergency Management Skills

Jaclyn Arduini, MS, ATC, CAT(C), NREMT, Jennifer L Volberding, PhD, ATC, NREMT
Jaclyn Arduini, MS, Graduate Student; jaclyn.arduini@okstate.edu

Background: Athletic Trainers (ATs) have a vast scope of practice that involves many skill sets, one of these skill sets is Emergency Management (EM). Like many health professions ATs do not use all their skills daily, this can lead to a decreased confidence and skill decay over time. The purpose of this study is to determine what impacted ATs' confidence in emergency skills.

Methods: A convenience sample of ATs (n=22) attending a simulation based Continuing Education Unit (CEU) event. Twenty-two ATs (age 36.7±10.8 years; 13 males, 9 females) completed a 22-question online survey prior to the CEU event. The survey was based upon the authors' content expertise, the Commission on Accreditation of Athletic Training Education (CAATE), and the National Registry of Emergency Medical Technicians (NREMT) Emergency Medical Responder (EMR) standards. Demographic information including route to certification, clinical setting and questions regarding EM continuing education as well as confidence questions about skills based upon a 5-point Likert scale (from extremely unconfident to extremely confident). Overall means and standard deviations were calculated for all demographic and confidence variables. As all variables violated assumptions of normality and homogeneity, Kruskal-Wallis tests were calculated against five factors (route of certification, graduation from an accredited program, clinical setting and elapsed time since practicing an EAP).

Results: Twenty-two ATs participated with years of clinical experience ranging from less than one to 36 (mean=13 ±11 years). Most of the AT's were in the secondary school setting (n= 13) while the others worked in the collegiate setting (n=5) or an orthopedic clinic (n=4). Route of certification was significant for confidence of using a spine board in a non-cervical situation, H=9.1 (p<0.05).

Conclusions: We find that many factors can impact the confidence of an ATs' EM skills, but not all impact confidence uniformly. Route of certification affected applying a spine board to a non-cervical patient. Clinical setting had the most impact on using both a rectal thermometer and joint reductions. Elapsed time since practicing an EAP most affected confidence for using cold immersion and hemostatic agents. Based on these limited findings, we can determine that there may be additional factors that may impact the results of confidence in emergency skills.

Keywords: emergency management, emergency skills, confidence, athletic training

Associations of Social Determinants of Health and Childhood Obesity

Kelsi Batioja, BS, Medical Student; kelsi.emmons@okstate.edu Kelsi Batioja, BS, Covenant Elenwo, MPH, Amy Hendrix-Dicken, MA, Lamaii Ali, MD, Marianna S. Wetherill, PhD, & Micah Hartwell, PhD

Background: Childhood obesity is a growing health problem in the United States, with those affected having an increased likelihood of developing chronic diseases at a younger age. Social determinants of health (SDOH) are known to influence overall health. Children with low socioeconomic status (SES) have been shown to be overweight and have poor health outcomes. Therefore, our primary objective was to use the National Survey of Children's Health (NSCH) 2021 data to determine current associations between childhood obesity and social determinants of health (SDOH).

Methods: We conducted a cross-sectional analysis of 2021 NSCH to extract data from questions related to the SDOH domains. We extracted sociodemographic variables to use as controls and constructed bivariate and multivariable logistic regression models to determine associations, via odds ratios, between SDOH and child obesity.

Results: Within the binary regression models, we found that children identified as having obesity were more likely than non-obese children to experience SDOH in all domains. After controlling for race/ethnicity, household income (%FPL), parental education, and child sex, children identified as having obesity were significantly more likely to experience food insecurity when compared to non-obese children (AOR = 1.39; 95% CI: 1.13-1.17).

Conclusion: Our study found that the food insecurity domain of SDOH was significantly associated with childhood obesity. Improving policies for programs such as SNAP as well as addressing lack of access to nutritious foods, especially within food deserts, may help alleviate some food insecurity. Improving access to adequate amounts of nutritious foods is critical in addressing childhood obesity and thus, decreasing risk of chronic disease and poor long-term health outcomes.

Keywords: social determinants of health, childhood obesity, food insecurity, chronic disease, national survey of children's health

The Effect of Hip Range of Motion on Upper Extremity Pitching Kinematics

Brionna Belcher, BS, Matthew O'Brien, PhD, Kira Wicker, BS
Brionna Belcher, BS, Graduate Student;
brionna.belcher@okstate.edu

Clinical Scenario: Baseball pitchers suffer from a variety of upper extremity injuries. It is hypothesized that deficits in hip range of motion can lead to compensations in the upper extremity, increasing injury risk.

Focused Clinical Question: Do deficits in hip range of motion lead to increased injury risk in the upper extremity in baseball pitchers due to changes in pitching kinematics?

Key Findings: A search was conducted of the literature that studied the relationship between hip range of motion and upper extremity pitching kinematics. A total of 6 studies met the inclusion and exclusion criteria, however only 3 were included in the final analysis due to limitations of the other studies. All studies found a significant relationship between hip range of motion and upper extremity pitching kinematics.

Clinical Bottom Line: While all studies found a significant relationship, two of the three studies supported the clinical question. Based on this evidence, hip range of motion has a significant effect on upper extremity kinematics during the pitching motion.

Future Research: Future research needs to be conducted to determine if there is a true relationship between hip range of motion and upper extremity pathology in baseball pitchers.

Strength of Recommendation: Based on the Center of Evidence-Based Medicine, evidence from three level III cross-sectional studies indicates a Grade B level evidence that supports hip range of motion influences upper extremity kinematics.

Keywords: hip range of motion, pitching kinematics, upper extremity

Purple Urine Bag Syndrome

*Jessica Blalock, BS, Michael Blose, DO, Taylor Blose, DO, Daelor Osen, DO,
Jennifer Briggs, DO, Anna Fisher, DO Jessica Blalock, BS,
Medical Student; jessica.blalock@okstate.edu*

Background: Purple urine bag syndrome (PUBS) is a rare complication of urinary tract infection in the setting of indwelling catheters, leading to purple discoloration of urine and tubing. Reported prevalence varies in the literature with poorly described incidence and management recommendations. It is noted to be associated with bedbound, constipated patients and history of end stage renal disease. We present a classic case of this unusual, but distinct finding.

Case Presentation: 74 year old female with past medical history of type 2 diabetes mellitus, hypothyroidism, chronic anemia, essential hypertension, and end stage renal failure on hemodialysis presents from dialysis by nephrologist request for evaluation due to purple urine discoloration. Her urinary catheter was exchanged, and preliminary urine culture demonstrated Enterococcus infection. Final sensitivities revealed vancomycin resistant enterococcus. Her antimicrobial regimen was empirically started as cefepime and advanced to vancomycin upon preliminary results. Infectious disease was consulted upon final sensitivity result with recommendation to discontinue antibiotics, presuming colonization rather than acute infection. She was placed on a bowel regimen and did have restoration of normal yellow urine prior to discharge. The remainder of her hospital course was uneventful and she was discharged back to the nursing home.

Discussion: In patients with indwelling foley and chronic urinary tract infection, PUBS may arise. This is thought to be due to gastrointestinal metabolism of tryptophan by gut bacteria. Tryptophan conjugates undergo oxidation within the urine, leading to indigo and indirubin pigmentation. This produces the consequential and notable urinary discoloration. Constipation allows for bacterial overgrowth, and renal failure decreases clearance of these metabolites Together this leads to predisposition to purple urine. In summary, despite the striking appearance PUBS is a relatively benign condition with the limitation of no well-established treatment guidelines. Most sources recommend multimodal treatment with addressing the predisposing factors such as treating constipation in addition to changing of foley bag materials regularly.

Keywords: catheter, constipation, UTI

Association and Disparities of Food Insecurity and Child Abuse: Analysis of the National Survey of Children's Health

Molly Bloom, BS, Cassie McCoy, BS, Michael A. Baxter, DO, Sara Coffey, DO, Amy D. Hendrix-Dicken, MA, Micah Hartwell, PhD Molly Bloom, BS, Medical Student; molly.bloom@okstate.edu

Background: Child abuse is a major public health issue and is a significant risk factor for compromised development, health morbidities, and the development of mental and behavioral disorders in children. Many factors contribute to child abuse, especially family stressors. Food insecurity, a significant family stressor, likely increases the rate of child abuse while also contributing directly and indirectly to the consequences on child development and lifespan. Given the adverse effects of child abuse and food insecurity, investigating their relationship is crucial to developing mitigation strategies.

Purpose: Our primary objective was to assess the relationship between child abuse and food insecurity using data from the National Survey of Children's Health (NSCH). Given that these disproportionately affect children of different demographic groups, our study aims to identify associations amongst varying demographic factors.

Methods: We conducted an observational study assessing the National Survey of Children's Health (2016-2021) to investigate the relationship between food security and child abuse. Using survey weights provided by the NSCH, we determined population estimates and rates of children experiencing food insecurity and child abuse. We then constructed logistic regression models to assess associations, via odds ratio, between food security groups and whether the child experienced child abuse. Finally, we constructed logistic regression models, via odds ratios, to assess food security and child abuse by demographic factors.

Results: While rates of food security were similar across age groups, households with lower income had higher rates of marginal or low food security, as well as homes with Black, Indigenous, multi-racial, and Hispanic children. Compared to those with high food security, the odds of children with marginal or low food security were significantly more likely to experience child abuse (AORs: 2.36, 95% CI: 2.17-2.57 and 5.24, 95% CI: 4.59-6.00, respectively). Compared to White children with high food security, Indigenous, Black, and White children were significantly more likely to experience child abuse as household food security decreased.

Conclusion: Child abuse and food insecurity have a significant association, including overlapping contributory factors and disparities. Efforts to improve food insecurity through policy, community food banks, and school-based programs may secondarily reduce child abuse. To address racial/ethnic disparities, the expansion of culturally-competent, evidence-based programs to reduce food insecurity should be established, which may also reduce risk factors for child abuse.

Keywords: Food Insecurity, Child Abuse, Disparities

Trends and Disparities in Unmet Childhood Mental Health Care Needs: Analysis of National Survey of Children's Health 2016-2020

*Pedro Braga, BS, Cassie McCoy, BS, Covenant Elenwo, MPH,
Michael Baxter, MD, Tessa Chesher, DO, Micah Hartwell, PhD
Pedro Braga, BS, Medical Student; pbraga@okstate.edu*

Background: With 20% of children experiencing mental health disorders, it is critical to ensure mental health care (MHC) is accessible to all children. The COVID-19 pandemic created unique challenges in MHC delivery and accessibility. Therefore, assessing trends in children's unmet MHC needs from 2016–2020 may aid in developing strategies to overcome barriers to MHC.

Objective: Our primary objective is to analyze the trends in unmet needs among the pediatric population from 2016-2020. Our secondary objectives are to identify 1) the disparities among age groups, race/ethnicity, insurance coverage, or urbanicity that exist within the time frame, 2) the changes among each state over this time period, and 3) the potential effects of the COVID-19 pandemic.

Design & Methods: We conducted an observational study of the National Survey of Children's Health to estimate five-year trends of unmet MHC needs. To identify state-level trends, we calculated each state's percent change between 2016-2019 and 2019-2020 to determine the impact of COVID-19. Lastly, we measured associations, via logistic regression, between children's unmet MHC needs and demographic factors to assess disparities.

Results: Between 2016 and 2019, the percentage of children with unmet MHC needs ranged from 17.28% to 22.22%. Nevada had the highest rates of unmet MHC needs at 28.72%, while Montana had the lowest rates of unmet MHC needs at 10.92%. Children between the ages of 3-5 were significantly more likely (AOR: 1.62; CI 1.13-2.33) to have unmet MHC needs than ages 6-10, while adolescents 15-17 were much less likely (AOR: 0.84 95%CI: 0.65-1.08). Compared to White children, Black children were significantly more likely to have unmet MHC (AOR:1.91; CI:1.46-2.50). Unmet MHC was also significantly associated with household income but not urbanicity.

Conclusions: From 2016-2020, there were no significant improvements in unmet MHC needs among children; however, disparities in receiving MHC exist, primarily among Black children and those between the ages of 3-5. Efforts to improve the accessibility of MHC through advocacy, optimized payment options, and expansion of evidence-based programs targeting groups most likely to have unmet MHC needs may improve children's mental health outcomes.

Keywords: Unmet Mental Health Care; Pediatrics; Disparities

Women in Orthopaedic Surgery: How Medical Schools and Residencies Can Improve Gender Imbalance

Laura Brown, BS Laura Brown, BS, Graduate Student; laura.r.brown@okstate.edu

Background: Studies about women in orthopaedics was once a rarely researched topic, though it has seen an increase in interest in the last five to 10 years; a trend that parallels with the changes in our culture as a country that is pivoting towards equality and the importance of diversity and inclusion in the workplace. Recent studies focused on the medical school experience and how early exposure to orthopaedic surgery through clinical rotations and outreach programs, as well as having access to a role model or mentor, could be the most critical reason women choose orthopaedics. In addition to early exposure, other studies found gender bias, work/life balance, workplace culture, and perceptions on physical strength as explanations for this same phenomenon. These studies spotlight the many factors that play into female students' decisions. However, there is a gap in research on how medical schools, specifically those with osteopathic-based education, sway a students' decision on residencies.

Objective: This study looks at why female medical students do not choose orthopaedics and specifically how osteopathic medical schools further impact their decision. The aim is to highlight the perceptions among female medical students of what makes a good orthopaedic surgeon and the demands of the residency, and if osteopathic medical schools are inadvertently encouraging women to go into traditionally female-heavy residencies by not providing adequate exposure and mentorship in orthopaedics. With this knowledge, the hope is that medical schools, in conjunction with residency programs, can improve the rate of females into orthopaedic surgery residencies.

Methods: Qualitative research was conducted using transformative worldview methodology. 16 articles were collected and reviewed from PubMed, and the mission statements from 15 Osteopathic medical schools were analyzed using word count in Microsoft Word, as well as an online word cloud generator for word frequency. Data was requested from the Oklahoma State University College of Osteopathic Medicine on the number of female students who matched into primary care residencies compared to those that matched into surgical residencies.

Results: Increasing the number of females in orthopedic surgery residencies will require efforts across all levels. All research analyzed points to the importance of early exposure by way of musculoskeletal curriculum, clinical rotations, and mentorship prior to a student's third year of medical school. In addition, efforts must be made by residencies and graduate medical education departments to foster and promote female surgeons into positions of leadership. For residencies to see diversity in their programs, it requires initiative from leadership, faculty, and coordinators to promote its attainability. A concerted effort must be made to modernize what an orthopaedic surgeon looks like— for the health of the program and the health of its community. Regarding osteopathic medical schools, research shows that the mission of osteopathic medical education emphasizes primary care practice and, therefore, could dissuade a female student from choosing orthopaedic surgery, thus continuing to contribute to the shortage.

Keywords: Orthopaedic Surgery, Graduate Medical Education, Gender Disparities, Diversity, Osteopathic Education

Determination of Presence of ADAMTS7 in Several Human Cell Lines

Songjukta Chakraborty, MS, Joshua Muia, PhD

Songjukta Chakraborty, MS, Graduate Student; songjukta.chakraborty@okstate.edu

Background: According to studies, ADAMTS7 is associated with coronary atherosclerotic diseases. To understand the regulation of ADAMTS7, we have cultured the following laboratory available human cell lines to 3 or 4 passages: HeLa, Human gingival fibroblast (HGF-1), Liver hepatocellular carcinoma (HepG2), and Human umbilical vein endothelial cells (HUVEC). These passage numbers are important because genetic and phenotypic changes will be less during early passages. After having 70 to 80% confluency, media was changed to Freestyle media and harvested after 48 hours of conditioning to do Western blotting. During the Western blot technique, primary antibody will bind with ADAMTS7 if this enzyme is present in the specific cell culture media. This process will help to understand the cell type and the amount of ADAMTS7 present in the cells.

Method: We took the cell lines such as HeLa, Human gingival fibroblast (HGF-1), Liver hepatocellular carcinoma (HepG2), Human umbilical vein endothelial cells (HUVEC) from cryogenic liquid and grew into T-25 flasks in DMEM or F-12K media with additives respectively. After subculturing 3 to 4 passages into the T-150 flask, we replaced the media with Freestyle media when the cells are 70 to 80% confluent. We harvested the media, added biotin to 10ml, and took samples of the biotinylated and non-biotinylated media for Western blotting. Then 25 ml conditioned media was concentrated by using viva spin columns and a sample of the concentrated media was taken for Western blotting.

Result& Conclusion: Western blotting with the concentrated, unconcentrated and biotinylated media to determine the expression of ADAMTS7 in specific human cell lines. Additionally, we will study that which cell lines are appropriate for ADAMTS7. We will further study the localization of ADAMTS7 by using imaging and microscopy.

Keywords: Atherosclerosis, Western Blotting, Biotin, Human Cell Culture

Health Inequalities in Mammography: A Scoping Review

Matthew Chancellor, BS Jay Modi, BS, Rohaan Muhammad BS, Kelsi Batioja BS, Elizabeth Garrett BA, Philo Waters BS, Matt Vassar PhD Matthew Chancellor, BS, Medical Student;
matt.chancellor@okstate.edu

Objective: The objective of this scoping review is to chart the existing evidence on health inequities related to mammography and identify existing knowledge gaps to guide future research.

Methods: This scoping review followed guidelines from the Joanna Briggs Institute and the PRISMA extension for scoping reviews. In July 2022, we searched PubMed and Ovid Embase for published articles on mammography screening, published between 2011-2021, written in English, and examining at least one health inequity as defined by the NIH. Screening and charting were both performed in a masked, duplicate manner. Frequencies of each health inequity examined were analyzed and main findings from each included study were summarized.

Results: Following screening, our sample consisted of 128 studies. Our findings indicate that mammography screening was less likely in historically marginalized groups, patients who live in rural areas, and in women with low-income status and education level. Significant research gaps were observed regarding the LGBTQ+ community and sex and gender. No trends between inequities investigated over time were identified.

Discussion: This scoping review highlights the gaps in inequities research regarding mammography, as well as the limited consensus across findings. To bridge existing research gaps, we recommend research into the following: 1) assessments of physician knowledge on the LGBTQ+ community guidelines, 2) tools for health literacy, and 3) culturally competent screening models.

Keywords: mammography, reporting gap, screening, health inequity, scoping review

Reporting of harms in systematic reviews focused on reverse shoulder arthroplasty: a cross-sectional study

*Assad Chaudhry, BS, Skylarr Beerman, MS, Holly Flores, BA,
Morgan Garrett, BS, Brayden Rucker, BS, J. Michael Anderson, DO, Matt Vassar, PhD Assad Chaudhry, BS,
Medical Student; assad.chaudhry@okstate.edu*

Background: Reverse shoulder arthroplasty (RSA) is projected to increase in frequency by over 300% in the next decade due to the recent expansion of indications for this procedure. Therefore, a more thorough understanding of efficacy and harms is relevant for clinicians and patients to make unbiased evaluations of the intervention. Systematic reviews (SRs) are commonly used to guide clinical decisionmaking in orthopaedics, but they are known to weigh efficacy more heavily than harms in their reporting. Therefore, the objective of this cross-sectional analysis was to investigate the completeness of harms reporting in SRs relating to reverse shoulder arthroplasty (RSA).

Methods: We performed a comprehensive search using EMBASE, MEDLINE (PubMed and Ovid), Epistemonikos, and the Cochrane database for Systematic Reviews for relevant literature. Search returns were screened for inclusion and extracted data using a masked, duplicate method. General study characteristics, harms items, and overall methodological quality for each SR were extracted. Corrected covered area (CCA) was quantified for SR pairs. Regarding data analysis, Stata 16.1 was used to conduct a bivariate analysis between variables.

Results: After screening and full-text review, our sample consisted of 89 SRs. Of the included SRs, 26 (26/89, 29.2%) reported $\leq 50\%$ of harms items. Fifteen included a pre-specified protocol that addressed harms (15/89, 16.9%), specific harms or harms language were included in the search strategy of 13 included SRs (13/89, 14.6%), and harms were listed and separately defined in the methods section of only 38 included SRs (38/89, 42.7%). Seventy-four SRs assessed harms in a quantitative manner only (74/89, 83.2%), 5 assessed harms both qualitatively and quantitatively (5/89, 5.66%), 1 assessed harms in a qualitative manner only (1/89, 1.1%) and the remaining 9 did not perform a harms assessment (9/89, 10.1%). Eighty-four SRs were graded as 'critically low' quality and 5 SRs were graded as 'low' quality by AMSTAR-2. Six SR dyads had CCAs greater than 50% overlap and were compared for shared harms.

Conclusion: Our findings suggest inadequate harms reporting pertaining to RSA in SRs. To illustrate this, nearly 30% of SRs related to RSA in our sample failed to report at least 50% of harms items. We recommend improvement to reporting guidelines regarding harms reporting and that these improved guidelines be used by future studies. Complete harms reporting may facilitate better patient outcomes and allow for more thorough risk-benefit assessments.

Keywords: RSA, harmsreporting, systematic reviews

Adherence of Surgical Transplantation Journals to Reporting Guidelines: A Systematic Review

*Mahad Chaudhry, BS, Matthew Rashid, BS, Kyle Fitzgerald, BS,
Caleb A. Smith, BS, Danya Nees, BS, Matt Vassar, PhD Mahad Chaudhry, BS, Medical Student;
mahad.chaudhry@okstate.edu*

Background: Biomedical research significantly affects patient outcomes and changes clinical care. Further, this research has the requirement of being the utmost quality for medical professionals in their practice. Reporting guidelines for all various study designs and the official registration of clinical trials both help reduce bias and promote transparency within methodologies. To date, no study has assessed surgical transplantation journals for their promotion or omission of reporting guidelines and clinical trial registration. Therefore, the purpose of this study was to investigate these journals and categorize the instructions for authors surrounding the mention, recommendation, or requirement of reporting guidelines and trial registration.

Methods: A total of 47 peer-reviewed transplantation clinical journals were eligible for analysis according to the Scopus CiteScore tool. Two investigators extracted the journal's title, five-year impact factor, and 18 reporting guidelines in a masked, duplicate manner from each journal's "Instructions for Authors" section. We also extracted data on whether journals required clinical trial registration. Finally, we emailed journals once every three weeks in order to allow journal editors the opportunity to clarify the publication types they accept. Journals that did not accept certain study designs we omitted from analysis with respect to that study design's reporting guideline.

Results: A total of 13 (13 of 47; 28%) transplantation journals mentioned the EQUATOR Network: an online resource of validated and developing reporting guidelines. Of the 47 journals examined, CONSORT was the most commonly mentioned guideline with 11 (11 of 47; 23%) journals requiring it and 19 (19 of 47; 40%) journals recommending it. The QUOROM guideline was never mentioned by any journal. Finally, 24 (24/47; 51%) required and 9 (9/47; 19%) recommended the clinical trial registration, totaling 33 (33/47; 70%) mentioning clinical trial registration.

Keywords: Transplantation, Reporting Guidelines, EQUATOR

Effects of Gender and Age on the Progress of Depression and Anxiety Measures across treatment sessions

Emilie Cleveland, BS, Jason Beaman, MD,

Luke Lawson, PhD Emilie Cleveland, BS, Research Assistant; emilie.cleveland@okstate.edu

Background: Depression and anxiety are among the most common disorders affecting the U.S. population. They can severely impact an individual's daily life, which causes them to seek treatment. Treatment centers will use surveys to quantify the severity of the symptoms and monitor it across appointments to track progress. The standardized tools to measure anxiety and depression are the General Anxiety Disorder 7 (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9), respectively. Depression and anxiety have broad symptoms and effects depending on the patient's demographics, such as gender and age. This study will analyze the relationship between these groups and the change in survey responses between treatment sessions.

Aim: This study is focused on determining the effects of age and gender on the change in depression and anxiety measurements between treatment sessions.

Methods: A secondary analysis will be conducted on a dataset of 81 newly admitted patients to the OSU Behavioral Medicine Clinic: 41 completed the PHQ-9, and 40 completed the GAD-7 at their initial visit and follow-up appointment, approximately a month later. The GAD-7 and PHQ-9 produce a quantitative representation of the severity of symptoms based on self-rated questions for each disorder. A two-way mixed factorial ANOVA with factors of gender (male, female) and age (35 and below, 36 and above).

Results and Conclusion: Results will be reported after the completion of data analysis. Conclusions are also pending analyses. Understanding the differences between these demographic groups in the changes in symptoms between sessions is essential due to the widespread effects of these disorders and how the disorders vary based on experiences, which means treatment will also be. This study will assist in better understanding these disorders and insight into how age and gender can affect anxiety and depression symptoms.

Keywords: Depression, Anxiety, Demographic Factors

Family Medicine Journals' Adherence to Reporting Guidelines: A Systematic Review

Wyatt Compton, MBA, MS, Brody Dennis, BS,

Payton Clark, BA, BS, Caleb A. Smith, BS, Danya Nees, BS,

Matt Vassar, PhD Wyatt Compton, MBA, MS, Medical Student; wyatt.compton@okstate.edu

Reporting guidelines have been developed as a method of mitigating inadequate reporting quality. Reporting guidelines such as the Consolidated Standards of Reporting Trials (CONSORT) for randomized control trials have shown to improve the completeness of reporting in CONSORT-endorsing journals. Additionally, requiring the registration of clinical trials and systematic reviews have similarly demonstrated a reduced risk of overall bias in comparison to trials and reviews that were not registered. To our knowledge, the rate of endorsement and requirement of the two aforementioned tools in family medicine journals has not been ascertained. Thus, our objective was to determine the frequencies of recommendation or requirement of reporting guidelines for common study types within Family Medicine journals. In addition, we also sought to assess the rate of recommendation or requirement to register clinical trials and systematic reviews. We conducted a systematic review of family medicine journals' policies and guidelines for authors in order to examine guideline use and adherence. Using the 2021 Scopus CiteScore tool, we identified 44 active, peer-reviewed journals in the "Family Practice" subcategory as of December 2022. Prior to data collection, email correspondence to the Editors-in-Chief was sent once a week for three weeks, to determine if the journal had any unaccepted article types. In a masked, duplicate fashion, statements regarding the requirement/recommendation of reporting guidelines for popular study designs were extracted from each journal's "instructions to authors" webpage. Statements regarding clinical trial registration were obtained in a similar manner. Our search identified 44 journals that were included for data collection. The most commonly recommended guidelines were CONSORT (29/44, 65%), PRISMA (26/44, 59%), and STROBE (26/44, 59%). The most commonly required guidelines were PRISMA (7/44, 16%) and CONSORT (6/44, 14%). The least required guidelines were SPIRIT (1/44, 2.4%), SRQR (1/44, 2.5%), ARRIVE (1/44, 2.5%), and CHEERS (1/44, 2.7%). PRISMA and STROBE guidelines were more likely to be recommended or required in journals that mentioned the EQUATOR network ($p < 0.001$). With respect to study registration, twenty-nine out of the forty-four (66%) journals either recommended (4/44, 9%) or required (25/44, 57%) clinical trial registration. Although CONSORT, PRISMA, and STROBE guidelines were recommended or required by more than half of our included journals, a majority of the journals did not mention many of the other reporting guidelines. Explicit endorsement or requirement of study registration, as well as appropriate reporting guidelines, is necessary to improve the quality of research published in family medicine journals. Therefore, we recommend journal editors make an effort to impose tighter instructions to prospective authors by recommending/requiring these tools.

Keywords: Family Medicine, General Practice, Reporting Guidelines, Systematic Review

Evaluation of Adherence to Reporting Guidelines Among Geriatric Journals: A Meta-Epidemiological Study

Logan Corwin, BS, Jacob Duncan, BS, Shaelyn Ward, BS, Caleb Smith, BS, Danya Brewer, BS, Matt Vassar, PhD Logan Corwin, BS, Graduate Student; corwin.research@gmail.com

Objective: The adoption of reporting guidelines and clinical trial registration reduces bias and improves transparency in science. It is unknown whether geriatric and gerontology journals mention, recommend, or require their use for the studies they may potentially publish. The purpose of this study is to assess the submission guidelines of the top geriatric and gerontology journals for their editorial recommendation or requirement of predetermined reporting guidelines and clinical trial registration.

Methods: We identified the top 100 journals in the “Geriatrics and Gerontology” subcategory using the 2021 Scopus CiteScore tool. We probed each journal's “Instructions to Authors” for statements regarding reporting guidelines for popular study designs and extracted them as “Not Mentioned”, “Recommended”, “Does Not Require”, or “Required”. Further, we classified each journal’s reference to clinical trial registration in a similar manner.

Results: The QUOROM statement was not mentioned by any journals, whereas the CONSORT statement (44/100, 44%) and ICMJE (66/100, 66%) was mentioned and recommended/required the most often. Of the 100 examined journals included in our analysis, forty-five journals (45/100,45%) did not mention study registration.

Discussion: The recommendation or requirement of reporting guidelines and clinical trial registration in the top 100 geriatric and gerontology journals is inconsistent. Journal editors should strongly recommend that author’s follow validated reported guidelines to reduce potential bias and improve transparency in the articles they publish.

Keywords: Submission guidelines, Geriatrics, Clinical trial registration, Instructions to authors

Murine ethanol ingestion promotes hepatic platelet accumulation mimicking acute CCl₄ exposure

*Katherine Cox, BS, Matthew Chancellor, BS, R Chen, PhD,
M McMullen, PhD, LE Nagy, PhD, TM McIntyre, PhD Katherine Cox, BS, Medical Student;
katherine.cox@okstate.edu*

Background: Dysregulated coagulation contributes to inflammation and fibrosis from chemical injury. Platelets are key contributors to inflammation and are primary sources of TGF- β , PDGF, and EGF that promote fibrosis, and so may contribute to hepatic fibrosis. We questioned whether platelets accumulate during chronic ethanol- or chemical-induced hepatic injury, whether platelet accumulation would occur prior to induction of hepatic fibrotic responses, and whether platelet accumulation reflects deposition of intravascular microthrombi or individual platelets intercalated into liver parenchyma.

Methods: We modeled acute hepatic injury with a single injection of CCl₄, a chronic model of moderate ethanol ingestion, or a combination of the two insults. C57Bl6 mice ingested a control liquid diet or provided free access to 1% ethanol (2d), then 2% ethanol (2d, 11% calories). At day 4, mice received, or not, a single i.p. injection of CCl₄ (1 μ l/g, 1:3 in olive oil), with sacrifice 72h later. Formalin-fixed livers were transversely sectioned, paraffin-embedded prior to immunohistochemistry with anti platelet integrin α IIb (CD41), endothelial CD31, or α -smooth muscle actin (aSMA) antibodies with DAPI nuclear staining. Adherent platelets spread to micron thickness, so detection was by serial tyramide amplification (Biotium). This catalyzed reporter deposition system uses a single tyramide dye activated by HRP-derived H₂O₂ to a reactive specie that multiply ligates adjacent molecules before the antibody complex is thermally stripped prior to a subsequent tyramide labeling.

Results: Our preliminary data show basal parenchymal platelet deposition with inflammation 24h after CCl₄ injection massively increasing platelet accumulation, with enhanced expression of aSMA, just below the outer Glisson's sheath encasement, correlating to the area of highest arterial flow (DOI 10.1139/y93-018). Platelet accumulation, but not aSMA, within liver parenchyma was modestly increased at this time. 72h after CCl₄ injection, subsurface platelet accumulation in association with endothelial cell PECAM1 remained apparent, with aSMA now extended in disordered filaments surrounding portal tracts. Ethanol ingestion alone, similar to CCl₄ exposure, revealed massive platelet accumulation just below the Glisson's sheath liver encasement in association with endothelial cell PECAM11 without aSMA deposition. The combination of ethanol and CCl₄ presented similarly.

Conclusions: We conclude ethanol ingestion promotes hepatic platelet accumulation, providing a non-transcriptional source of fibrotic growth factors, that parallels hepatic injury invoked by CCl₄ exposure.

Keywords: Ethanol, Hepatic, Fibrosis

Assessing the Reporting of Harms in Systematic Reviews Focused on the Therapeutic and Cosmetic Uses of Botulinum Toxin

*Katherine Cox, BS, Merhawit Ghebrehiwet BS, Micah Kee, BS,
Brayden Rucker, BS, Holly Flores, BA, Ryan Ottwell, DO,
Matt Vassar, PhD Katherine Cox, BS, Medical Student; katherine.cox@okstate.edu*

Background and Objective: The expanding use of botulinum toxin (BoNT) in medical practice demonstrates the need to highlight whether there is adequate information regarding its safety profile. The aim of our study was to identify completeness of harms reporting for BoNT treatment within systematic reviews (SRs), assess quality of SRs using the AMSTAR-2 tool, and determine the degree of overlap among primary studies within each SR.

Methods: On May 31, 2022, we searched Embase, Epistemonikos, MEDLINE, and the Cochrane Database of Systematic Reviews for SRs on BoNT therapy. Screening and data extraction was performed in a masked, duplicate fashion. AMSTAR-2 was used to evaluate the methodological quality of included SRs. Corrected covered area (CCA) was calculated for SR dyads.

Results: Of the 90 included SRs, we found that 70 completed less than 50% of harms items. The most reported items were BoNT as a favorable intervention (73/90, 81.1%) and harms as a primary outcome (72/90, 80.0%). The least reported items were grades and severity scales used to classify harms (8/90, 8.9%) and number of treatment discontinuations in each arm (10/90, 11.1%). Eighty-three SRs were rated “critically low” (83/90, 92.2%), while 5 SRs were rated “high” (5/90, 5.6%) via AMSTAR-2 tool. Significant associations were found between completion of harms reporting and: (1) a “critically low” appraisal on AMSTAR-2 tool ($P = 0.0060$) and (2) whether harms was reported as a primary outcome ($P = 0.0001$). The total CCA overlap was determined to be 0.8%.

Conclusion: Our results demonstrate that harms are underreported within BoNT SRs. Owing that healthcare professionals often refer to SRs to guide clinical decision making, it is important to continue to explore shortcomings among BoNT literature in future studies.

Keywords: Botulinum, Harms, Reporting

Reporting Guideline and Clinical Trial Registration Adherence in Nephrology Journals: Results of a Preliminary Systematic Review

Patrick Crotty, BS, Carson Wright, Haley Howard, BS, Caleb Smith, BS, Danya Nees, BS, Griffin Hughes, BA, BS, Matt Vassar, PhD Patrick Crotty, BS, Medical Student; patrick.crottyosu@gmail.com

Background: Clinicians rely on relevant, high-quality research to inform their decisions regarding patient care. This research is held to a higher standard when journals implement reporting guidelines and clinical trial registration into article submission requirements. Due to the small number of nephrology journals — and the growing yet still limited research in the field — it is of the utmost importance for these journals to apply stringent guidelines to ensure the publication of limited bias and high quality research. However, the extent of reporting guideline adoption and clinical trial registration policies among nephrology journals is unknown. Therefore, the purpose of this study is to examine the recommendation or requirement of reporting guidelines and clinical trial registration in nephrology journals.

Methods: The 2021 Scopus CiteScore Tool was used to identify 62 journals in the “Nephrology” subcategory. In a masked, duplicate fashion, we examined the “Instructions for Authors” webpage of each included journal to determine whether the following reporting guidelines — outlined by the Enhancing the Quality and Transparency of health Research (EQUATOR) Network — were recommended or required: PRISMA, CONSORT, PRISMA-P, STARD, TRIPOD, MOOSE, ARRIVE, CHEERS, QUOROM, STROBE, CARE, SRQR, SPIRIT, and COREQ. Clinical trial registration statements were investigated in a similar fashion. Journal statements were documented as “Not mentioned”, “Recommended”, “Required”, or “Does Not Require”. Stata 17.0 was used to analyze the data. To minimize bias, all journals were contacted to confirm their accepted article types.

Results: The most frequently mentioned guidelines were CONSORT, STROBE, and PRISMA. Of the 62 nephrology journals investigated, CONSORT was required by 11 (18%) and recommended by 34 (55%) journals. Furthermore, STROBE was required by 7 (11%) and recommended by 27 (44%) journals, and PRISMA was required by 8 (13%) and recommended by 18 (29%) journals. The least frequently mentioned guidelines were QUOROM (0/62, 0%), PRISMA-P (24/60, 40%), and MOOSE (26/62, 42%). Finally, 32 (52%) of journals required and 19 (31%) of journals recommended clinical trial registration.

Discussion: These findings illuminate the variable adoption of reporting guidelines and inconsistent clinical trial registration policies across nephrology journals. We recommend that journal editors in this field require more author adherence to guidelines to improve the quality of research submitted to and published by their journals.

Keywords: Nephrology, Guideline Adherence, Clinical Trial Registration, EQUATOR, PRISMA

A New Full-Body Model of *Tyrannosaurus rex* Skeletal Musculature for Biomechanical Calculations and Education

Andy Danison, BA, Oliver Demuth, BA, Heinrich Mallison, PhD, Eric Snively, PhD Andy Danison, BA, Graduate Student; andy.danison@okstate.edu

Background: *Tyrannosaurus rex* is a popularly studied non-avian dinosaur with hundreds of papers investigating different aspects of its biology. The biomechanics of *T. rex* is of particular interest, with many analyses examining its locomotion and feeding. However, biomechanical models often focus on only one region of the body rather than incorporating multiple and some muscle groups have never been previously reconstructed in this taxon. Here we present (1) a new full-body model of *Tyrannosaurus* musculature, and (2) muscle force estimates for forelimb protractors and retractors, which have never yet been biomechanically analyzed.

Methods: We created this model by generating a 3D render of a *Tyrannosaurus rex*'s skeleton with photogrammetry and sculpting the musculature onto the skeleton. The lengths and volumes of these scaled muscle models were then measured to calculate their physiological cross-sectional areas and ultimately estimate the maximum contractile force of each muscle for three possible fiber lengths.

Results: The largest of the humeral protractors, the *m. pectoralis*, was estimated to have a maximum contractile force of 3,860 N – 11,000 N, while the largest humeral retractor, the *m. latissimus dorsi*, was estimated to have a maximum contractile force of 3,770 N – 10,800 N.

Discussion: These forces will inform future calculations to explore how *T. rex* could use different muscle groups in its movements in addition to developing a better understanding of its forelimb biomechanics, which are largely undescribed. Furthermore, these muscle models will be presented as a digital atlas of *T. rex*'s skeletal muscle morphology.

Keywords: Dinosaur, Musculature, Biomechanics

Sex-based differences in 17 β -HSD13 during Hepatitis C Virus-induced Pathogenesis

Carldon Deniega, Sachi Pathak, BS, Logan Swope, MS, Dorsa Hajimirsadeghi, BS, Christy Eslinger, BS, Radhika Pande, BS, Anna Platt, BS, Subhas Das, PhD, Anil Kaul, MD, DDS, MPH, Daniel Zhao, PhD, Rashmi Kaul, PhD Carldon Deniega, Undergraduate Student; carldon.deniega@okstate.edu

Background: Sex-based differences are observed in chronic hepatitis C virus (HCV) infections leading to cirrhosis and hepatocellular carcinoma (HCC). We previously showed that liver estrogen receptor (ER)-mediated sex-based differences exist in cirrhosis and HCC. Liver ER-binding may lead to protective effects in pre-menopausal women. This study aimed to determine sex-based differential role of 17 β HSD13 in development of cirrhosis and HCC. We hypothesized that chronic HCV infection leads to dysregulated 17 β -HSD13 in male cirrhosis and progression to HCC.

Methods: 65 (normal, cirrhosis, HCC) liver tissues were obtained from NIH Liver Tissue Bank. DIA proteomics mapped 4445 proteins, including 17 β -HSD13. Clinical correlation with bilirubin, AST, ALP, and creatinine was determined (Spearman's). Immunohistochemistry validated 17 β -HSD13 protein expression in tissues.

Results: 17 β -HSD13 had significantly lower expression in male cirrhosis group than females ($P < 0.05$). In HCC group, the expression in males was down-regulated compared to HCC females ($P < 0.05$). Bilirubin values showed negative correlation with 17 β -HSD13 expression ($P < 0.05$) between cirrhosis and HCC (males alone and combined sex data).

Conclusions: Low 17 β -HSD13 levels may predict worse disease in males with cirrhosis or HCC serving as disease biomarker. This novel report shows sex-based differences in 17 β -HSD13 during HCV-induced cirrhosis development.

Keywords: 17 β -HSD13, Hepatitis C Virus, Liver Cirrhosis

Adherence to reporting guidelines across obstetrics and gynecology journals: a preliminary study

*Vanessa Donaldson, BS, Joanna George, BS, Kimberly Magana, MEd,
Caleb A. Smith, BS, Danya Nees, BS, Griffin Hughes, BA, BS,
Matt Vassar, PhD Vanessa Donaldson, B.S, Medical Student; vanesra@okstate.edu*

Background: Research published in academic journals is often used to drive clinical practice. It is imperative that findings are reported uniformly with an emphasis on transparency and reproducibility. Academic journals may improve reporting clinical research findings by requiring or recommending the use of reporting guidelines. Guidelines act as a checklist for authors to follow when reporting clinical findings. Use of guidelines such as the Consolidated Standards of Reporting Trials (CONSORT) for randomized control trials (RCTs) and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) for systematic reviews have been shown to enhance data reporting quality and reproducibility. 1–4 Another way of improving research reporting is through requiring registration to public registries for clinical trials and systematic reviews. The registration of studies prior to their commencement has been shown to prevent selective reporting bias and improve transparency of results. 5–7 The extent of which journals enforce reporting guideline adherence and study registration is unknown in many fields of medicine including obstetrics and gynecology.

Objective: The primary objective of this study was to assess obstetrics and gynecology journals to determine the rate of recommendation or enforcement of reporting guidelines for common study designs used in medical literature. Additionally, we assessed the recommendation or enforcement of the registration of clinical trials and systematic reviews.

Methods: Our systematic review assessed the top 100 peer-reviewed clinical journals for obstetrics and gynecology according to the Scopus CiteScore tool. Prior to data extraction, the editorial staff of each journal was emailed once a week for three consecutive weeks to identify any research article types not accepted by the journal. We used a pilot-tested Google form to extract general characteristics and requirement of adherence to common reporting guidelines from identified journals in a masked, duplicate fashion.

Results: The most commonly required guidelines were CONSORT and PRISMA. Of the 98 OB/GYN journals evaluated in our analysis, 29/98 (30%) required adherence to CONSORT, 39/98 (40%) recommended adherence to CONSORT, and 30/98 (31%) did not mention CONSORT guidelines in the instructions to authors. There is a statistically significant relationship ($p < 0.001$) between journals mentioning the EQUATOR Network and CONSORT guideline. Regarding PRISMA, 18/98 (19%) required adherence, 47/98 (48%) recommended adherence, and 32/98 (33%) required adherence. Clinical trial registration was required by 54/98 (55%) of journals and recommended by 16/98 (16%) of journals.

Conclusion: Although CONSORT was the most commonly required guideline, nearly one-third of the included journals did not mention CONSORT on the instructions to authors. These findings are similar for PRISMA guidelines. Increased guideline adherence from these top journals may help to limit bias in medical research. Additionally, clear recommendations for reporting guidelines may provide authors a checklist to follow in reporting and allow for more uniform reporting. This may make findings for evidence based medicine more clear allowing physicians to make more informed medical decisions with regard to patient care.

Keywords: Reporting Guidelines, Equator Network, Reproducibility, Transparency

Teeth, and Hair, and Sebum, Oh My! A Case of Bilateral Large Ovarian Teratomas

Alexander Eddy, MS, Shelby Brown, DO Alexander Eddy, MS, Medical Student;
alexander.eddy@okstate.edu

Background: An ovarian teratoma can be classified as either mature (benign) or immature (malignant). Mature teratomas contain hair follicles, adipose tissue, glial tissue, and perinervous tissue. They can reach massive sizes. Immature teratomas are fortunately rarer and generally don't contain mature tissue. Abdominal pain is the most common presentation of teratomas in general. Approximately 10- 15% of ovarian teratomas present bilaterally.

Case Presentation: A 45-year-old nulligravida woman presented to the clinic with a chief complaint of abdominal pain and pressure as well as dyspareunia. She also noted a 4-month history of abnormal, heavier periods. Past medical history was unremarkable. Social history was significant for a 30-pack-year smoking history, binge drinking, and methamphetamine use. Family history was notable for ovarian cancer in her mother. Ultrasound showed an enlarged uterus (13.2x7.9x8.6 cm) with a thickened endometrium (2.66 cm). The left ovary was enlarged (9.7x9.4x6.5 cm), and the right ovary was even larger than the left (11.5x7.8x11.3 cm). Tumor markers were within normal range. The patient underwent a total laparoscopic hysterectomy with bilateral salpingo-oophorectomy. The uterus, right ovary, and left ovary were too large to be evacuated through the vagina, as is standard protocol, so they were cut in pieces. Fragmentation of each ovary yielded un-pigmented hair, over one dozen teeth, and large amounts of sebaceous fluid. The patient had an uneventful post-op recovery, and she admitted to resolution of her previous pain at two-week follow-up.

Discussion: The patient's mother had died of ovarian cancer at the age of 71. The type of ovarian cancer was unknown to the patient. The patient's teratomas were found to be benign. Approximately 1% of mature teratomas do undergo malignant transformation. This could possibly have happened if the patient had delayed surgery. However, whether this is what happened to her mother is unlikely, as the prevalence of familial ovarian teratomas is thought to be extremely rare. Finally, it is unknown whether the patient's social history could have increased the chances of her teratoma undergoing malignant transformation. Some suggest that exposure to a carcinogenic environment could cause such a transformation.

Keywords: ovarian teratoma, gynecologic tumor, gynecologic surgery, women's health

The Impacts of Physiological and Socioeconomic Parameters on the Likelihood of Heart Disease Using a Statistical Model

Alexander Eddy, MS, Micah Hartwell, PhD Alexander Eddy, MS, Medical Student;
alexander.eddy@okstate.edu

Background: Heart disease has many predisposing factors. Genetics, lifestyle, socio-economic status have all been shown to play a role. The National Health and Nutrition Examination Survey (NHANES) combines data from interviews and physical examinations from approximately 5000 people each year in the United States. It is an excellent source for acquiring nationally representative data on known cardiovascular risk factors. By its nature, survey data, such as from NHANES, frequently has missing entries. Multiple imputation provides a statistically robust way to handle missingness. Rather than discarding partially complete entries in a listwise manner, multiple imputation uses a Bayesian model to produce multiple datasets that include uncertainty on the missing data. The datasets are then recombined to provide a complete dataset with more accurate standard errors than would be obtained by other imputation methods.

Methods: We used the R statistical programming language to download and process anonymized NHANES data from the 2017-2018 data acquisition cycle. Several parameters known to have a bearing on cardiac health were analyzed. Multiple imputation was used to handle missingness in the data. Survey weighting was also used to account for under/over-represented demographic groups in the data. Logistic regression was carried out the parameters using the presence of heart disease as the dependent variable.

Results: Preliminary results in this study show that the strongest predictors for heart disease were having a first-degree relative suffering from a myocardial infarction before the age of 50, followed by higher Hgb A1c values. The greatest “protectors” against heart disease were having a greater number of family members in the house, followed by more weekend nightly sleep hours.

Conclusion: It is no surprise that family history of early myocardial infarction and high A1c values are strong risk factors to acquiring heart disease. However, it may be less obvious that sleep acquired during the weekend and household family size would have much of a bearing. It could be the case that weekend sleep compensates for any sleep deficit acquired during the workweek and thereby reduces physiologic stress from sleep deprivation. Regarding household family size, perhaps having a greater number of dependents fosters more responsible lifestyle behaviors.

Keywords: heart disease, multiple imputation, logistic regression, NHANES, R programming language

Trends of Public Interest of Chronic Traumatic Encephalopathy (CTE) from 2004 – 2022

*Blakelee Eggleston, BPH, Caitlin Ball, BS, Carly Sweat, BS,
Micah Hartwell, PhD, Douglas Nolan, DO
Blakelee Eggleston, BPH, Medical Student; blakelee.eggeston@okstate.edu*

Background: In the 2021 football season alone, 187 National Football League players were reported having a concussion. Multiple sports concussions can often result in chronic traumatic encephalopathy (CTE), a brain condition resulting from repetitive forceful blows to the head, such as repetitive concussions. Over the past two decades there has been an increase in public interest in CTE as several former National Football League (NFL) players have been diagnosed with this degenerative brain condition post mortem.

Aim: In this study, we are investigating the effects media (eg. movies and news publications) and player incidents had on public interest in CTE. **Methods:** To assess trends in public interest, we extracted monthly relative search interest (RSI) in CTE from Google Trends between 01/2002 through 11/2022. To assess the increase in RSI following a major event (Table 1), we first constructed an autoregressive integrated moving average to predict RSI from 03/2012—as if the events had not occurred—through the end of the period and calculated the differences between actual and forecasted values.

Results: We found that the RSI increased over time—specifically following the release of the movie ‘Concussion.’ The peak in RSI (100) over this timespan was following the release of Aaron Hernandez’s autopsy results in 2017, which was 87.81 (95%CI: 8.72-15.66) higher than forecasted, showing a 720.26% increase in RSI. Other significant peaks occurred after the release of ‘The Killer Inside: The Mind of Aaron Hernandez’ in 2020, with a RSI of 92, compared to the forecasted value of 13.35 and the death of Demaryius Thomas due to seizure complications, with a RSI of 68 and forecasted value of 14.34. **Conclusion:** The increasing trend in public interest in CTE is likely due to the increased media exposure following traumatic NFL injuries and highlighted by the movie ‘Concussion’ and the release of Aaron Hernandez’s autopsy. Increased public interest in CTE from this media coverage likely spurred more research and clinical interest in traumatic brain injuries, as well as funding for these types of studies. We recommend healthcare professionals stay up to date with ongoing research related to TBI and CTE as more research becomes available—especially among younger athletes who are likely not provided the same level of professional equipment for combative sports.

Keywords: Chronic Traumatic Encephalopathy, Concussions, National Football League

Doxycycline vs. Penicillin G Benzathine for the Treatment of Syphilis in Patients with HIV

Cole Eichelberger, PharmD, Isaac Nichols, PharmD, Bryan Bozell, PharmD Cole Eichelberger, PharmD, Resident; aceichelberger@osumc.net

Background: Syphilis is a highly prevalent sexually transmitted infection which can lead to serious health complications if not treated effectively. Historically, penicillin G benzathine has been the primary agent used to treat syphilis infections, with doxycycline being an alternative agent for patients who cannot tolerate penicillin antibiotics. The efficacy of doxycycline in treating syphilis in patients with HIV, however, has not been well documented despite its use as an alternative treatment. The objective of this study is to compare the ability of these two agents to treat syphilis, specifically in patients infected with human immunodeficiency virus (HIV).

Methods: This study has been approved by the facility's Institutional Review Board. It examined a cohort of patients retrospectively to analyze the comparative effectiveness of resolution of syphilis infection in patients treated with penicillin G benzathine vs. doxycycline utilizing diagnosis codes for specific types of syphilis (primary, secondary, tertiary, early latent, late latent). An information technology specialist working with the institution was instructed to run a report of patients from the electronic medical record who received a prescription for doxycycline or were administered an intramuscular injection of penicillin G benzathine with a diagnosis for syphilis and HIV. The population of patients was collected from October 2020 to present. An informational technology specialist developed the report and pulled any identifiable patient information prior to forwarding it to the primary research team. Clinical pharmacy residents reviewed all patients included in the report for involvement in the study based on set inclusion and exclusion criteria. The primary endpoint assessed was resolution of syphilis infection, with secondary endpoints looking at reported adverse reactions to treatment, reinfection with syphilis, and incomplete initial treatment. All members of the research team were kept up to date on the happenings of the trial, as is relevant for their level of involvement.

Results: Data analysis for this trial is still ongoing. The total number of patients included in the study was 134, with 21 patients having received doxycycline and 113 having been administered penicillin G benzathine. The primary outcome occurred in 18/21 (85.71%) of patients in the doxycycline arm, while 103/113 (91.15%) of patients in the penicillin group saw resolution of syphilis. Adverse effects were widely unreported, with gastrointestinal symptoms being the only type of reaction reported. One patient reported diarrhea after taking doxycycline, and another patient reported nausea after receiving an injection of penicillin G benzathine.

Conclusion: Doxycycline had a lower resolution of infection. This could be due to the uneven distribution of patients between the two arms of the study. Given that the place in therapy of doxycycline is primarily patients with severe penicillin allergy, it is not surprising that far more patients were treated with penicillin G benzathine than with doxycycline. The lack of reported adverse effects is encouraging, as it is likely they would have been stated if reactions had occurred. Other endpoints will be analyzed in the future. Further, larger scale, studies are needed to determine if doxycycline is truly inferior to penicillin in treating syphilis infection.

Keywords: syphilis, HIV, doxycycline, penicillin

Associations between Social Determinants of Health and Frequency of Poor Mental Health Days

*Covenant Elenwo, MPH, Kelsi Batioja, BS, Natasha Bray, DO,
Micah Hartwell, PhD Covenant Elenwo, MPH, Medical Student; elenwo@okstate.edu*

Introduction: In 2020, over 50 million adults in the US had a diagnosed mental illness. While the overall burden of illness among mental health disorders is great, studies continue to show increased mental health needs among US adults. Frequency of poor mental health days (FPMHD) has shown to be related to individual factors such as SES, race, and rural versus urban environments. Additionally, social determinants of health (SDOH) have been found to directly influence factors related to premature death. Assessing the disparities in mental health outcomes regionally and among sociodemographic variables may highlight predictors of mental health outcomes. Therefore, our objective was to examine the relationship between frequent (14+) poor mental health days and SDOH, and which states had the highest rates of FPMHD.

Methods: We conducted a cross-sectional analysis of the 2017 Behavioral Risk Factor Surveillance System (BRFSS) to extract data regarding poor mental health days and the SDOH module. We extracted sociodemographic variables to use as controls and constructed bivariate and multivariable logistic regression models to determine associations, via odds ratios, between SDOH and FPMHD. We visualized overall state-levels of FPMHD via a heatmap.

Results: We found statistically significant associations between all SDOH variables in both the binary and multivariable regression models. The average number of poor mental health days per month was the highest in West Virginia (14.11 days), Oklahoma (12.94 days), and Mississippi (12.87 days). However, individuals in states that reported experiencing zero poor mental health days were the lowest in Oregon (58.7%), Utah (59.65%), and Arkansas (59.84%).

Conclusion: Our study found that frequency of poor mental health days was significantly associated with all domains of SDOH. Providing expanded mental health care resources through the use of evidence-based programs could improve average numbers of poor mental health days among US adults. Additionally, further investigation to identify the specific variables of each SDOH domain and their association with FPMHD is warranted to improve the efficacy and reach of available mental health resources.

Keywords: mental health, social determinants of health, frequency of poor mental health days, BRFSS

Factors associated with health inequities in access to kidney transplantation in the USA: A Scoping Review

Zachary Ernst, BS, Andrew Wilson, BS, Andriana Peña, BS, Mitchell Love, BS, Ty Moore, MS, Matt Vassar, PhD Zachary Ernst, BS, Medical Student; zernst@okstate.edu

Background: The kidney is the most needed organ for transplantation in the United States. However, demand and scarcity of this organ has caused significant inequities for historically marginalized groups. In this review, we report on the frequency of inequities in all steps of kidney transplantation from 2016-2022. Search criteria was based on the National Institute of Health's (NIH) 2022 list of health inequity populations, which includes: race and ethnicity; sex or gender; Lesbian, Gay, Bisexual, Transgender, Queer + (LGBTQ+); underserved rural communities; education level; income; and occupation status. We outline steps for future research aimed at assessing interventions and programs to improve health outcomes.

Methods: This scoping review was developed following guidelines from the Joanna Briggs Institute and PRISMA extension for scoping reviews. In July 2022, we searched Medline (via PubMed) and Ovid Embase databases to identify articles addressing inequities in access to kidney transplantation in the United States. Articles had to address at least one of the NIH's 2022 health inequity groups.

Results: Our sample of 42 studies indicate that Black race, female sex or gender, and low socioeconomic status are negatively associated with referral, evaluation, and waitlisting for kidney transplantation. Furthermore, only two studies from our sample investigated LGBTQ+ identity since the NIH's addition of SGM in 2016 regarding access to transplantation. Lastly, we found no detectable trend in studies for race/ethnicity or sex or gender inequities between 2016-2022.

Conclusion: Investigations in inequities for access to kidney transplantation for the two most studied groups, race/ethnicity and sex or gender, have shown no change in frequencies. Regarding race and ethnicity, continued interventions focused on educating Black patients and staff of dialysis facilities may increase transplant rates. Studies aimed at assessing effectiveness of the Kidney Paired Donation program are highly warranted due to incompatibility problems in female patients. The sparse representation for the LGBTQ+ population may be due to a lack of standardized data collection for sexual orientation. We recommend this community be engaged via surveys and further investigations.

Keywords: kidney transplantation, inequities, race, ethnicity

Assessing Requirement Rates of Reporting Guidelines and Study Registration in Pediatric Medical Journals

*Todd Fernandez, BS, Taylor Gardner, BS, Katherine Cox, BS,
Caleb Smith, BS, Danya Nees, BS, Griffin Hughes, BA, BS,
Matt Vassar, PhD Taylor Gardner, BS, Medical Student; taylor.j.gardner@okstate.edu*

Background: Adherence to reporting guidelines and clinical trial registration are two methods of improving the quality of clinical research by mitigating biases and improving the transparency of research practices. To our knowledge, there is inadequate coverage on the requirements of reporting guideline adherence and clinical trial registration in pediatric medical journals. For this reason, we aim to investigate the adoption of these requirements in the journals' instructions for authors in this medical specialty.

Methods: Our systematic review assessed the top 100 peer-reviewed clinical pediatric journals that were identified using the 2021 Scopus CiteSource tool. In a masked duplicate fashion, two investigators extracted data from each journal's "instructions for authors" webpage concerning statements regarding the Enhancing the QUALity and Transparency Of health Research (EQUATOR) Network and/or ICMJE, selected reporting guidelines as outlined by the EQUATOR Network, and clinical trial registration requirements. To eliminate bias, each journal's editorial board was contacted to confirm which article types are accepted.

Results: Of the 100 journals analyzed, 61 did not mention the EQUATOR Network (61/100). The most frequent guidelines reported were CONSORT and PRISMA. Thirty-one journals recommended the use of CONSORT guidelines (31/100), while 22 journals required its use (22/100). Twenty-nine journals recommended the use of PRISMA guidelines (29/100), while 12 journals required it (12/100). The least mentioned guidelines were QUOROM and MOOSE. We found that 91 journals did not mention (91/100) the use of QUOROM, and 93 journals did not mention the use of MOOSE (93/100). Clinical trial registration was recommended in 9 journals (9/100) and required in 49 journals (49/100). Overall, we found that none of the investigated reporting guidelines were reported in more than 50% of our journal sample.

Conclusions: The majority of the pediatric journals analyzed scarcely required or recommended reporting guidelines. However, the journals that had a higher frequency of guideline reporting recommendations and requirements had higher rates of mentioning the EQUATOR Network. We recommend that pediatric journals consider enforcing the use of reporting guidelines as this is likely to cause a subsequent improvement in the quality of published results, as well as decrease the incidence of biases.

Keywords: Pediatric, Guidelines, Registration, Requirements

Effects of Statin Therapies on Individuals Taking Antipsychotics: A Systematic Review

Matthew C. Ferrell, BS, Zachary Ernst, BS, Sydney C. Ferrell BS, Dev D. Jaiswal DO, Matt Vassar, PhD Zachary Ernst, BS, Medical Student; zernst@okstate.edu

Introduction: Patients with a severe mental illness (SMI) taking antipsychotics may develop side effects such as dyslipidemia. Our objective is to provide an update to a previous systematic review showing statin therapy lowering lipid levels in individuals taking antipsychotics while further identifying changes, if present, in body mass index (BMI), blood pressure or any safety concerns.

Methods: In August 2022, we searched MEDLINE, Embase, PsycINFO, PubMed and Cochrane Central Register of Controlled Trials for studies pertaining to the effects of statins on lipid profile measures for those taking first or second-generation antipsychotic medications, with a diagnosis related to SMI. Data extraction was performed in a masked duplicate fashion. Based on article type, each study's risk of bias was assessed using ROBINS-I or RoB-2. The GRADE criteria were used for certainty assessment.

Results: Our initial search returned 396 articles, of which six were included. Five (of 6, 83.3%) articles identified significant change between baseline and post-treatment lipids. Of the articles recording blood pressure, BMI or weight and significant safety concerns, no significant changes were found. The certainty assessment for this systematic review is rated moderate. A meta-analysis was not performed.

Discussion: Studies continue to demonstrate statin therapy's utilization in prevention and treatment for dyslipidemia and its related cardiovascular risk through significant reduction in LDL-C. Patients at risk of developing dyslipidemias secondarily to antipsychotic treatment for a SMI should be considered for lipid lowering therapy with a statin. The limited number of studies included and their heterogeneity demonstrates areas for improvement for future research.

Keywords: severe mental illness, dyslipidemia, cardiovascular prevention, statins

The Perceptions and Experiences among Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and Agender (LGBTQIA+) Patients of Quality of Care with Healthcare Services

Lauren Ford, BS, Connor Lewis, BS, Jennifer L.

Volberding, PhD, LAT, ATC Lauren Ford, BS, Graduate Student; lauren.ford@okstate.edu

Clinical Scenario: The LGBTQIA+ community has a unique set of healthcare needs and experience barriers to services. Many providers assume these needs are similar to heterosexual counterparts. Investigating experiences and perceptions with healthcare and recommendations on how to improve care can provide insight for professionals.

Clinical Question: What are the perceptions of quality of healthcare and experiences among the LGBTQIA+ patients?

Summary of Key Findings: A search was performed for articles exploring perceptions and experiences of LGBTQIA+ patients with healthcare. Four articles were included. All were Level VI qualitative studies. All demonstrated a lack of cultural competency leading to poor experiences with providers. Common themes included: misgendering, stigmatization, and negative provider attitude leading to poor experiences. Experiences improved if providers used inclusive language, created welcoming environments, and had knowledge/experience about needs of LGBTQIA+ patients. Clinical Bottom Line: LGBTQIA+ patients felt providers lacked adequate knowledge to understand and care for their needs. Future research should include facts contributing to accessing healthcare services, solutions to these barriers, and increasing geographic areas.

Strength of Recommendation: According to the SORT scale, there is Level A evidence that LGBTQIA+ patients experience providers who are not adequately prepared to properly care for their unique needs.

Keywords: LGBTQIA+, perceptions, experiences, healthcare, discrimination

Association of COVID-19 Diagnosis and Depression in Healthcare Workers

Holton Fox, BS, Drew Williams, BS, Micah Hartwell, PhD Holton Fox, BS, Medical Student;
drew.williams22@okstate.edu

Purpose: Depression has been on the rise in the United States prior to and throughout the COVID-19 pandemic; the amount of U.S. adults with depression increased from 8.7% in 2017-2018 to 14.4% in April of 2020. Amidst the COVID-19 pandemic, healthcare providers faced increased risk of infection and increased occupational stressors. With the growing rates of depression in the U.S. and occupational risk of contracting COVID-19, determining an association between a COVID-19 diagnosis and increased risk for depression in healthcare providers may bring awareness to potential improvement strategies for the mental health of providers, with potential to improve patient outcomes in the future. Thus, our objective was to identify disparities in depression diagnoses among healthcare workers, frequency of symptoms, and whether they had sought mental health therapy.

Methods: We performed a cross sectional analysis of the 2021 National Health Interview Survey produced by the Center for Disease Control and Prevention to determine the relationship between a diagnosis of COVID-19 and depression severity among healthcare providers. We extracted data related to COVID-19, a diagnosis of depression, frequency of depressive thoughts, and whether or not those individuals sought out mental health therapy in the last 12 months.

Results: Among 2,293 medical workers who responded to the NHIS, 28.6% were males and 71.4% were females, with a mean age of 42.6 years old. Among all participants, 19.83% had a diagnosis of depression. However, 25.52% of those reporting COVID-19 infection reported a depression diagnosis compared to 18.33% of those who had not acquired COVID-19 ($\chi^2 = 9.74$, $P = .002$). No significant difference was found between frequency of feeling depressed, nor in engaging in mental health therapy by COVID-19 diagnosis, although rates of mental health therapy were low—14.21% overall. Lastly, among medical workers who reported COVID 19 infection, we found that compared to those with mild or no symptoms, the odds were 2.15 (95%CI: 1.21-3.82) times more likely that individuals with moderate to severe symptoms reported having a depression diagnosis after adjusting for comorbidities of diabetes, coronary heart disease and sex.

Conclusions: Our study found that rates of depression diagnoses were higher among individuals who had COVID-19—as well as among those having more severe COVID-19 symptoms. Given the low rates of mental health therapy, screening for and providing treatment for depressive disorders among healthcare professionals—especially among those who have experienced COVID-19 infection— could mediate the prevalence of depressive symptoms and as a byproduct, improve patient care.

Keywords: COVID-19, Depression, Healthcare Workers

Arthritis Robustus: Still Alive and going Strong!

*Landon Frank, DO, Jonas Weygandt, BS, Matthew Gibson, BS,
Prashant Kaushik, MD Landon Frank, DO, Medical Student; jonas.weygandt@okstate.edu*

Background: There is little current literature on arthritis robustus, first described by Haas, et al. in 1973 as “Rheumatoid arthritis, typus robustus,” is an atypical presentation of rheumatoid arthritis (RA) wherein the patient can work and complete activities of daily living despite possessing severe disease.

Case Presentation: This article expands the current literature on arthritis robustus as an atypical presentation of rheumatoid arthritis using a case-revelation from a rural rheumatology clinic in the United States. Despite being treated with effective DMARD therapy in the form of Hydroxychloroquine and Methotrexate augmented by the use of a steroid bridge. This patient elected, of his own accord, to discontinue treatment and self-taper his steroids despite diagnosis with severe rheumatic disease affecting multiple joints.

Discussion: Late onset RA (LORA) has been associated with worse outcomes including increased joint erosions, disease activity, all associated with poor outcomes. Earlier detection of the rather rare arthritis robustus variant of PMR-like onset of LORA and subsequent mindful therapeutic intervention, respecting patient-autonomy as a shared informed decision, may improve outcomes.

Keywords: Arthritis Robustus; Rheumatoid Arthritis; Polymyalgia Rheumatica

A case of ST segment elevation myocardial infarction in the presence of pneumoperitoneum

Jonathan Gaikwad, DO, Dev Jaiswal DO Jonathan Gaikwad, DO, Resident;
jonathan.gaikwad@okstate.edu

Myocardial infarctions are a very common occurrence that have a wide range of potential causes. In the inpatient setting, more specifically in the intubated and sedated patients, myocardial infarctions can often go missed if a high level of suspicion is not present to obtain serial troponins and EKG's.

This patient is a 83 year old female who initially presented due to increasing abdominal pain in association with nausea, vomiting, and diarrhea. Patient has a past medical history significant for hypertension, diabetes mellitus type 2, and ESRD. Patient was discharged two days prior to her most recent admission due to diverticulitis. She re-presented due to worsening symptoms. A clinical diagnosis of sepsis secondary to diverticulitis was established. Patient was started on empiric antibiotic treatment. Initial CT did not show any evidence of free fluid or abscess. As patient's clinical course progressed her symptoms did not subside, and her WBC count continued to increase while on empiric antibiotic therapy. Infectious disease was consulted who broadened patient's antibiotics to ertapenem and recommended repeat CT abdomen/pelvis due to patient's continued symptoms in the setting of a persistently increasing WBC count. Repeat imaging showed evidence of moderate pneumoperitoneum and free fluid in the right lower quadrant due to sigmoid colon perforation. General surgery subsequently performed an ExLap with sigmoid colectomy. Patient was also noted to incidentally have an elevated troponin at this time of 0.06. Patient post-operative EKG showed right bundle branch block with inferior ST segment elevations consistent with acute coronary syndrome. Once patient had undergone surgery, she was taken for emergent PCI in the setting of an inferolateral STEMI. Due to patient being intubated, it is unknown if patient was experiencing concomitant anginal symptoms. Patient was found to have a 99% occlusion of the left circumflex, significant ulcerated plaque with associated thrombus was noted. She underwent successful IVUS guided PCI with mechanical thrombectomy and DES x2 placement to the LCx. Patient's post-op echocardiogram did show evidence of mild septal and inferior hypokinesis with a new reduced EF of 44%. Post PCI patient was started on rectal aspirin and IV cangrelor due to inability to use the upper GI tract post-op. Though patient could be on clopidogrel, ticagrelor was chosen as it is an easier transition from IV cangrelor. Patient was also started on a high intensity statin as this time as is indicated by guidelines. Due to patient's complex clinical course and multiple comorbidities, goals of care discussions led to patient's family electing for CMO.

This case illustrates the importance of having a high level of suspicion for myocardial ischemia in patients with multiple risk factors who are unable to complain about chest pain. Physiologic stress in the setting of pneumoperitoneum with feculent peritonitis was likely the culprit of this patient's myocardial infarction. It is not indicated to obtain daily troponins on patients who have not complained of chest pain, but checking troponin and EKGs in severely ill patients with multiple cardiac risk factors, especially in those who cannot verbalize anginal symptoms could potentially save patients from prolonged cardiac ischemia.

Keywords: Infarction, pneumoperitoneum, troponin

Inequalities in Epilepsy: A Scoping Review

Background: Epilepsy is a neurological disorder with a strong presentation worldwide. It is imperative that the health inequities tied to epilepsy are assessed and accounted for. Further, it is vital that healthcare providers are familiar with such inequities to supplement appropriate care for patients. We intend to complete a scoping review of current literature surrounding health inequities in epilepsy while providing recommendations for future research.

Methods: During July of 2022, we searched MEDLINE and Ovid Embase to find published articles pertaining to epilepsy and health inequities. Authors received training then screened and data extracted in a masked, duplicate manner. Studies published within the timeframe of 2011-2021 in all countries were deemed appropriate. We screened 5,325 studies for titles and abstracts, then 56 studies for full text. We evaluated the inequities of race/ethnicity, sex or gender, income, occupation status, education level, under-resourced/rural, and LGBTQ+. To summarize the data and descriptive statistics of our study, we used Stata 17.0 (StataCorp, LLC, College Station, TX).

Results: We obtained a sample size of 45 studies for study inclusion. The most reported health inequities were income (18/45, 40.0%), under-resourced/rural (15/45, 33.3%), race/ethnicity (15/45, 33.3%). The least reported health inequity was LGBTQ+ (0/45, 0.0%).

Conclusion: The findings of our study suggest that gaps exist in literature concerning epilepsy and inequities. The inequities of income status, under-resourced/rural, and race/ethnicity were examined the most while LGBTQ+, occupation status, and sex or gender were examined the least. With the ultimate goal of more equitable and patient-centered care in mind, it is vital that future studies endeavor to fill in these determined gaps.

Keywords: Epilepsy, inequities, sex, gender, race/ethnicity

Adherence to reporting guidelines across urology journals: preliminary results of a cross-sectional survey

*Alex Hagood, RN, BSN, Joseph Case BS, Trevor Magee, BS,
Caleb A. Smith, BS, Danya Nees, BS, Griffin Hughes, BS, Matt Vassar, PhD*

Background: The quality of clinical research may be improved by the adoption of validated reporting guidelines and clinical trial registration policies. It is unknown how well journals in the field of urology mandate the use of these tools by prospective authors. Therefore, the aim of our study was to assess the instructions to authors of urology journals to determine the requirement of reporting guideline adherence for commonly used study designs and the requirement of clinical trial registration.

Methods: Using the 2021 Scopus CiteScore tool, we identified 94 urology journals. For each journal, we analyzed the "instructions to authors" webpage and identified statements regarding reporting guidelines for popular study designs as proposed by the Enhancing the Quality and Transparency of health Research (EQUATOR) Network and clinical trial registration requirements in a masked, duplicate fashion. Each journal was contacted to confirm article types that are accepted. Descriptive statistics were calculated using Stata 17.0 (StataCorp, LLC, College Station, TX) to summarize data.

Results: Of the 94 Urology journals examined, less than a third (27/94) mentioned the EQUATOR network in their "instructions to authors." CONSORT was the most adhered to guideline with 52.7% (48/91) of the journals either recommending or requiring it for publication. The least adhered guideline was QUOROM with 7.6% (7/92) of journals recommending or requiring adherence. All other investigated guidelines fell below 50% adherence. Clinical trial registration was not required by 4 (4.3%) journals, not mentioned by 36 (38%), recommended by 18 (19%), and required by 36 journals (38%).

Conclusion: We found that urology journals do not properly adhere to reporting guidelines and inconsistently require clinical trial registration. Journal adoption of validated guidelines is important to enhance the quality of research reporting, promote transparency, and prevent reporting bias. Therefore, we suggest that urology journals consider adopting stricter reporting guideline policies and improve the rate at which clinical trial registration is required.

Keywords: Urology, Adherence, Guidelines

A Rare Case Report of An Adult with Rapidly Progressive Glomerulonephritis secondary to Severe IgA Vasculitis

*Taryn Haney, DO, Kelley Harris, DO, Reagan Livingston, DO,
Suma Nadimpalli, DO Taryn Haney, DO, Resident Physician; taryn.haney@okstate.edu*

Background: IgA nephropathy is a common form of glomerulonephritis (GN) with an estimated incidence of two per 100,000 adults. A small portion of these cases will advance to rapidly progressive glomerulonephritis (RPGN). Risk factors include older age, purpura, elevated antistreptolysin O titer, and low complement C3 levels.

A common clinical sign is gross hematuria. Significant proteinuria is also noted prompting a GN evaluation. Another common manifestation is palpable purpura. Although, this classic rash is not present in approximately 25% of cases at time of diagnosis.

Diagnosis is heavily based on clinical presentation thus underscoring the need for clinical suspicion. Lab tests support diagnosis, however, the definitive method is via biopsy. Pathology will reveal leukocytoclastic vasculitis with IgA deposition. Mainstay of therapy focuses on limiting progression by reducing proteinuria to a goal of less than one gram per day. Renin-angiotensinogen-aldosterone inhibitors are initially utilized followed by the addition of glucocorticoids if excessive proteinuria persists. If RPGN develops the degree of immunosuppression is advanced.

This report explores a case of IgA vasculitis in an older adult brought on by a streptococcal infection with manifestations of RPGN and palpable purpura.

Case Presentation: A 72-year-old male presented reporting generalized weakness and fatigue that worsened over a few months. Labs revealed an elevated creatinine of 12.02 and significant proteinuria. Further workup included low complement levels, equivocal PR3 ANCA level, and negative glomerular basement membrane antibody, ANA, and cryoproteins. Four of four blood cultures did return positive for Streptococcus. Antistreptolysin O and DNase-B antibodies were later found to be negative. However, given this presentation there was a high suspicion for post-streptococcal GN.

Due to significant thrombocytopenia, a renal biopsy was postponed, and antibiotics continued for the bacteremia which were completed during hospitalization.

The patient returned to the emergency department the day following discharge reporting a painful rash to his legs consistent with palpable purpura. ESR >140 and CRP 67.86. Biopsy revealed leukocytoclastic vasculitis. High-dose steroids were started, and arrangements were made for renal biopsy showing pauci-immune GN (ANCA vasculitis) with crescentic cells and 20% fibrosis.

High-dose steroids were continued, and initiation of a more aggressive immunosuppressant was postponed until hematology/oncology evaluation.

Discussion: This case presents a unique example of IgA vasculitis with progression to RPGN following a streptococcal infection and the use of high-dose steroids in an effort to prevent the progression to end stage renal disease (ESRD). Unfortunately, this patient did become hemodialysis dependent.

Though, rare in adults, clinical trials have shown worse outcomes with the use of glucocorticoids including progression to ESRD and long-term gastrointestinal side effects. This probes the necessity for re-evaluation of high-dose steroids use in moderate-to-severe episodes of IgA vasculitis versus the use of other treatments such as rituximab, cyclophosphamide, and mycophenolate mofetil.

Keywords: vasculitis, IgA nephropathy, rapidly progressive glomerulonephritis

A Case of Bilateral Coronary-cameral Fistulae Incidentally Identified on Left Heart Catheterization

*Taryn Haney, DO, Dev Jaiswal, DO, Gershon Koshy, DO,
Cristina Valladares, DO Taryn Haney, DO, Resident Physician; taryn.haney@okstate.edu*

Background: Coronary-cameral fistula are a rare phenomenon. Fistula have an incidence of 0.08-0.3%. Of those, approximately 5% possess multiple concurrently.

Most early cases are asymptomatic. However, anginal symptoms may occur secondary to a steal phenomenon inducing ischemia. When a fistula from coronary artery to a venous or right-sided cardiac structure blood flow will redirect toward lower resistance in the fistula.

Larger and/or multiple fistulae have higher rates of anginal symptoms. Blood is drawn away from the typical flow pathway and stays within the fistula risking development of myocardial infarction, heart failure, arrhythmias, aneurysm, and endocarditis.

Diagnosis may prove difficult. A screening electrocardiogram (EKG) may only reveal T wave inversions. Early in the presentation, an echocardiogram may not show any irregularities and further imaging, such as cardiac CT, may be foregone. Left heart catheterization (LHC) is the current the gold standard in diagnosis.

Management is case-by-case as features of the vessel, symptomatology, and patient characteristics are factored into treatment. The American College of Cardiology and the American Heart Association recommend surgical or transcatheter closure in those with large fistula. Further recommendations include closure for symptomatic cases including unexplained systolic or diastolic dysfunction. Many post-closure cases have shown improved cardiac function including EF.

Case Presentation: A 32-year-old female with past medical history of methamphetamine use initially presented to the outlying facility with gradually worsening shortness of breath and associated generalized weakness. Vital signs revealed hypoxia on room air necessitating two liters via nasal cannula to maintain appropriate saturations as well as tachycardia. Labs remarkable for elevated brain natriuretic peptide (BNP) of 407. Troponin and thyroid stimulating hormone were within normal limits. Chest X-ray was suggestive of interstitial and pulmonary edema with cardiac silhouette appearing appropriately sized.

Echocardiogram revealed EF of 20% and grade 1 diastolic dysfunction confirming suspicions of new onset heart failure. LHC was performed and cardiomyopathy was deemed nonischemic in nature—likely with large contribution from drug use. Incidentally, during the catheterization, the patient was found to possess bilateral coronary-cameral fistulae. Further characterization with cardiac CT revealed one fistula extending from the left anterior descending artery (LAD) to the main pulmonary artery (mPA) and another extending from the right coronary artery (RCA) to the left main coronary artery (LM).

The patient was started on guideline-directed medical therapy (GDMT) with plans for up-titration as tolerated and repeat echocardiogram in three months.

Unfortunately, the patient has yet to have clinical follow up and repeat echocardiogram to evaluate for functional improvement following initiation of therapy.

Discussion: With characterization, it was deemed that the patient's cardiomyopathy was likely not due to the fistulae but rather related to her history of methamphetamine use. As such, this patient was initiated on medical therapy with recommendations for close follow up outpatient with repeat echocardiogram in place of closure.

Though uncommon, cameral coronary fistulae do possess symptomatic consequences deserving clinical awareness and suspicion. Additionally, with advancing cardiac imaging finding its place in screenings and diagnostics more cases may be identified necessitating knowledge of presence and treatment indications.

Keywords: cardiology, coronary cameral fistula, heart failure

Calcium imaging and deep behavior analysis in fentanyl vapor self-administration and relapse

Mason J. Hochstetler, BA, Jake D. Layne, BS, Brandon M. Curry, BS,
Craig T. Werner, PhD Mason J. Hochstetler, BA, Graduate Student; mason.hochstetler@okstate.edu

The prevalence of opioid use disorder (OUD) and overdose deaths have reached epidemic proportions and constitute a global crisis. In 2019 synthetic opioids, including fentanyl, were being used by 1.2% of the worldwide population and contributed to more than 70% of the record-breaking number of overdose deaths. Fentanyl, which is often used clinically for anesthesia and analgesia, is commonly administered intravenously or by inhalation (smoking/vaping), which results in rapid drug bioavailability in the brain. Technical challenges have contributed greatly to our lack of understanding of the neurobiology of OUD, including limitations of behavioral models, difficulty tracking individual neurons longitudinally in freely behaving animals, and inadequate behavioral analysis tools. Intravenous drug self-administration is considered the “gold standard” model to investigate the neurobiology of OUD preclinically, but it remains difficult to perform in vivo electrophysiology or calcium imaging during drug self-administration due to the tangling of drug catheter and recording cable. This technical challenge was overcome with the development of a noninvasive mouse model of opioid self-administration using vaporized fentanyl that recapitulates key features of OUD. Imaging freely behaving animals is difficult, and conventional single-unit recordings can neither distinguish neuron subtypes nor track individual neurons longitudinally. In contrast, in vivo imaging using miniaturized fluorescence microscope (miniscope) systems allows for examining spatially and temporally coordinated activity in hundreds of individual neurons longitudinally in freely behaving animals. Complex behavioral analysis is infrequently incorporated in preclinical models, which likely contributes to limited translational impact. Recent computational advances in convolutional neural networks, pose estimation, and machine learning analysis has overcome these challenges to provide tools for computational neuroethology. We are leveraging these cutting-edge imaging technologies and behavioral analysis tools to gain a deeper insight into the neuronal ensembles that encode opioid-related behaviors during fentanyl self-administration and relapse.

Keywords: Opioid use disorder, self-administration, relapse, fentanyl, imaging

Effects of Aerobic Exercise for Improving Concussion Symptoms Compared to Traditional Rest or Placebo-Like Stretching in Adolescents: A Critically Appraised Topic

Rylee Holman, BS, Cayla Lee, MAT-II, Aric Warren, PhD, LAT, ATC, CSCS, CES, TSAC-F Rylee Holman, BS, Graduate Student; rylee.holman@okstate.edu

Clinical Scenario: Children under the age of 18 are still developing physically, cognitively, neurologically, and emotionally. When adolescents obtain a concussion, it can hinder their developmental skills and put them at high risk for future concussions and/or second impact syndrome, meaning sustaining another concussion before full recovery which can exacerbate symptoms to become even more severe. Recent studies have suggested that early activity within the first week of injury had decreases in rate of delayed recovery and reduction in concussive symptoms.

Clinical Question: Is sub-symptom aerobic exercise more effective at improving concussion symptoms in adolescents compared to traditional rest or placebo-like stretching? Summary of Key Findings: Three articles were included to investigate the effectiveness of sub-symptom threshold aerobic exercise in adolescents with concussion. Two articles demonstrated level 2 evidence while one article demonstrated level 3. All articles concluded suggested that early sub-symptom aerobic exercise was the most effective treatment intervention compared to placebo-like stretching and traditional rest.

Clinical Bottom Line: Sufficient evidence has demonstrated that sub-symptom threshold aerobic exercise is more effective in self-reported symptom reduction than placebo-like stretching and traditional rest in adolescents with sport-related concussion.

Strength of Recommendation: According to the SORT scale, Level A evidence demonstrates that sub-symptoms threshold aerobic exercise decreases symptoms in adolescents with concussion more effectively than other interventions.

Keywords: concussion, aerobic exercise, placebo-like stretching, adolescents

Inequities in Medically Assisted Reproduction: A Scoping Review

*Abbi Huddleston, BA, Kaylin Ray, BS, Rigel Bacani, BA, BS,
Jordan Staggs, BS, Reece M. Anderson, MPH,
Matt Vassar, PhD Abbi Huddleston, BA, Medical Student; abbi.huddleston@okstate.edu*

Introduction: Infertility affects one in five women in the United States and may do so regardless of race/ethnicity, socioeconomic status, geographic location, income, or educational status. These factors, however, may play a large role in access to infertility treatments, or medically assisted reproduction (MAR). This scoping review aimed to identify gaps in research pertaining to inequities in MAR, and propose suggestions for future research directions.

Methods: This review was conducted following the guidance of the Joanna Briggs Institute methodology for scoping reviews. Searches were performed in July 2022 using MEDLINE (via PubMed) and Ovid Embase, identifying articles for screening. Articles that reported on MAR inequities, published between 2016–2021 in the United States, and written in English were included. Each article's inequity findings were analyzed, extracted, and reported. The frequencies of the inequities investigated were recorded.

Results: Ninety-six articles underwent full-text screening and 66 were included in our sample. Race/ethnicity was the most commonly reported inequity. The majority of the studies focused on MAR outcomes by race/ethnicity, and many found that historically marginalized populations had worse outcomes. Since the NIH's classification of Sexual and Gender Minorities as a health disparity population in 2016, 15 articles within our sample investigated LGBTQ+ inequities in MAR. Historically marginalized populations were less likely to use MAR or seek infertility care and findings were similar among LGBTQ+ populations. The majority of studies found positive correlations with MAR use with income and education. The least commonly studied inequities in our sample were sex or gender and rural/under-resourced populations; findings showed that men and people from rural/under-resourced populations were less likely to access MAR. Studies that examined occupational status had varying findings.

Conclusion: Our study identified research gaps regarding MAR within each of the inequities examined, though some gaps were more prominent than others. We suggest that future research be targeted toward: (1) standardizing and diversifying race/ethnicity reporting regarding MAR, (2) increasing access to infertility care for LGBTQ+ populations by providing more inclusive care, (3) increasing access to infertility care for men, and (4) increasing access to MAR for rural/under-represented populations by identifying logistic challenges.

Keywords: medically assisted reproduction, scoping review, infertility

Protein Size Differentiation in ADAMTS7 TurboID Experiment

Ayomide Ishola, BS, Joshua Muia, PhD

Ayomide Ishola, BS, Graduate student; ayomide.ishola@okstate.edu

Background: In research for ADAMTS7's substrate, a question arose about the size of Turbo ID constructs. Turbo ID is an enzyme that can catalyze the biotinylation of endogenous protein, which fuses to the protein of interest to cause an interaction with the proteins or a protein complex. Biotinylation is the process of attaching biotin to protein. This technique involves enzyme catalyzed Proximity Labeling (PL). PL assay is performed by labeling the protein of interest with an enzyme which biotinylates biomolecules in a proximity dependent manner. TurboID's technology serves as a convenient protein - protein interaction detection method. Differences in sizes of the protein should be observed based on variations of ADAMTS7 being added to the biotinylation protein.

Method: After confirming the plasmid sequences were correct by DNA sequencing, the plasmids Del Pigeon, E151, E151Q, E389 and E389Q were transfected into HEK 293 cells. The transfected cells were placed in Freestyle media for 48 hours for expression. The conditioned media was then harvested and purified using Q-Sepharose. The conditioned, purified media was run on a Western blot and imaged for ADAMTS7 protein bands.

Result: Del pigeon, E151, E151Q, E389Q and E389 has 256kDa, 290kDa, 290kDa, 307kDa and 307kDa respectively. The ones with higher kilo-Dalton has a bigger size compared to the one with the lesser kiloDalton. **Conclusion:** We anticipate the Del pigeon with 256kDa will migrate faster towards the anode while E151, E151Q, E389Q and E389 will migrate more slowly because of their bigger sizes.

Keywords: ADAMST7, Size Differentiation, Substrate.

Public interest in cardiac arrest, cardiopulmonary resuscitation, and commotio cordis in the United States associated with Damar Hamlin: An infodemiology study of Google Trends

*Hayden Jacobs, MPH, Macy Haight, BS, Amy Nguyen, BS,
Micah Hartwell, PhD Hayden Jacobs, MPH, Medical Student; hayden.jacobs@okstate.edu*

Objectives: During a National Football League (NFL) game on Monday, January 2, 2023, a 24-year old athlete, Damar Hamlin, experienced cardiac arrest after a tackle on the field. Experts are suggesting this event was caused by commotio cordis, a condition where blunt force trauma disrupts the electrical activity of the heart. Due to rapid response by team medical staff, including cardiopulmonary resuscitation and the use of an external defibrillator, Hamlin survived this episode and has had positive clinical outcomes. Thus, our primary objective was to quantify the degree of which this episode triggered public interest in cardiac arrest, commotio cordis, and cardiopulmonary resuscitation.

Study Design: We performed a temporal analysis of search query volume of the Google search engine via Google Trends (trends.google.com).

Methods: Google Trends was used to extract daily search interest related to topics of “cardiac arrest,” and “cardiopulmonary resuscitation” and injury of “commotio cordis” within the United States for a 90-day time frame from October 12, 2022 through January 8, 2023. Search interest from Google Trends is reported as relative search interest (RSI) on a scale from 0-100—where 100 is the peak interest within the searched timeframe. Dates that resulted in RSI < 1 were imputed as 0.5. We constructed an autoregressive integrated moving algorithm (ARIMA) to project search interest for each of these topics if the injury to Damar Hamlin had not occurred. From this model, we compare the forecasted values to the actual values to determine the increase in RSI immediately following the injury.

Results: RSI for ‘cardiac arrest’, ‘cardiopulmonary resuscitation’, and ‘commotio cordis’ each peaked (RSI=100) on January 4, 2023—the day following the injury to Damar Hamlin (the game was scheduled Monday night). The forecasted RSI for ‘cardiac arrest’ on this day was 0.99 (0.04-1.94)—a difference in RSI of 99.01, which was 10,023.46% increase above the expected value. The forecasted value for ‘cardiopulmonary resuscitation’ on this day was 3.99 (2.03-5.95)—an increase for the actual value of 2,407.65%. The term ‘commotio cordis’ had relatively little prior RSI to this specific injury resulting in a forecasted value for January 4, 2023, of 0.11 (-0.30-0.53). The peak of 100 for the RSI of ‘commotio cordis’ was an 87,268.42% increase.

Conclusion: Through Damar Hamlin’s unfortunate cardiac arrest, which occurred during a televised NFL game, followed by immediate mass media attention, public interest in cardiac arrest, commotio cordis, and cardiopulmonary resuscitation increased as evidenced by our results. Increased interest in these topics could advance interest in cardiac arrest prevention and increase effectiveness of bystander interventions, such as cardiopulmonary resuscitation.

Keywords: Damar Hamlin, cardiac arrest, commotio cordis, cardiopulmonary resuscitation, public interest

Are Electrocardiograms accurate in detecting cardiac pathologies in athletes ages 13-25: A Critically Appraised Topic

Jessica Jacobs, BES, Brionna Belcher, BS, Matthew S. O'Brien, PhD, LAT, ATC, PES, CES Jessica Jacobs, BES, Graduate Student; jessica.l.jacobs@okstate.edu

Clinical Scenario: Electrocardiograms (ECGs) have become increasingly utilized in pre-participation exams for athletes in settings ranging from secondary schools to professional sport. Historically, this diagnostic modality has been effective when used properly and interpreted accurately in other healthcare settings. ECGs have the potential to accurately detect athletes who possibly have underlying cardiac pathologies. The aim of this review is to identify if ECGs can accurately detect cardiac pathologies in those athletes who are between the ages of 13-25. Challenges and positive outcomes are interpreted and highlighted throughout the review.

Clinical Question: Are ECGs accurate in detecting cardiac pathologies in athletes ages 13-25?

Summary of Key Findings: ECGs proved accurate in detecting cardiac pathologies. In the studies surveyed comparing ECGs with other diagnostic criteria, the ECG performed better and assisted physicians in diagnosing cardiac pathologies. However, more research is needed to conclude if ECGs can be used to diagnose cardiac pathologies without the use of other modalities or examinations.

Strength of Recommendation: Based on the evidence presented the strength of recommendation is a grade B, or moderate quality of information. Collectively, these studies possessed moderate limitations but were able to support the inclusion of ECGs in cardiac of health of athletes ranging in ages 12-25.

Keywords: Athlete, ECGs, Cardiac Pathologies

Adherence to reporting guidelines across rheumatology medical journals: a series of systematic reviews

Background: As physicians rely on research to guide clinical decision-making, it is essential for journals to adopt guidelines to ensure high-quality reporting and standardization. It is not highly known to what extent rheumatology journals are encouraging the use of standardizing tools such as reporting guidelines and clinical trial registration. Therefore, the purpose of this study was to investigate the author instructions of rheumatology journals concerning reporting guidelines and clinical trial registration to determine the proportion to which the policies are stated.

Methods: Fifty-nine rheumatology journals were selected by a research librarian and an investigator through the 2021 Scopus CiteScore tool. The 'instructions for authors' subsection of each journal was assessed to determine the adherence to reporting guidelines noted, as well as clinical trial registration. The data contained information on the journal's requirements, recommendations, or if it made no mention of reporting guidelines and clinical trial registration. To mitigate unfair evaluation, the investigators emailed the editors of the journals to obtain the types of articles accepted. Descriptive statistics were obtained through the Stata 17.0 program to interpret the data.

Results: Of the 58 journals analyzed, 33 (57%) had mention of the EQUATOR Network. Of these 33 journals, 32 (97%) adhered to ICMJE guideline recommendations. The most commonly required study guidelines were CONSORT and PRISMA, with 10 journals (10/57, 18%) requiring adherence to CONSORT and 7 journals (7/57, 12%) requiring adherence to PRISMA. The guidelines with no mention in journals were most prevalent for QUORUM and SRQR, as 55 journals (55/57, 96%) had no mention of QUORUM guidelines, and 52 (52/56, 93%) had no mention of SRQR guidelines. Clinical trial registration was required by 37 journals (37/57, 65%) and recommended by 8 journals (8/57, 14%).

Conclusion: Our study found that less than 60% of the included rheumatology journals mentioned EQUATOR Network. Additionally, less than one-fifth of journals required adherence to CONSORT and PRISMA, despite it being the most commonly required guidelines found. Adherence to EQUATOR and reporting guidelines have shown to not only mitigate bias, but also to implement research in a robust, methodological manner. Therefore, we recommend rheumatology journals strongly encourage the requirement of reporting guidelines and clinical trial registration for authors to follow.

Keywords: Rheumatology, Trial Registration, EQUATOR, Reporting Guidelines

Trends in Public Concern Surrounding 2022 Infant Formula Shortage

Kimberly Kaase, BS, Elissa Ray, BS, Alexis Jones, PhD

Kimberly Kasse, BS, Medical Student; kimberly.kaase@okstate.edu

Background: The beginning of 2022 was marked by Food and Drug Administration's investigation of Abbott Nutrition, a producer of approximately one-third of the United States' baby formula (Cunningham, n.d.). After report of a third and fourth Cronobacter case of death potentially associated with their products, the FDA recommended that Abbott Nutrition voluntarily recall their product, leading to a voluntary cease in production. Russia invasion of Ukraine additionally contributed to supply chain uncertainty as Ukraine served as a major exporter of infant formula ingredients including sunflower oil (Timeline of Infant Formula Related Activities, n.d.). In order to better understand public concern, we examined Google Trends data surrounding the 2022 United States infant formula shortage. The results of this study have important indications concerning infant health and existing disparities for low-income families.

Methods: Our team began by researching the dates, news articles, and AAP/FDA recommendations and findings surrounding the infant formula shortage. Using Google Trends to collect data, we entered various key words found from our research that included "baby formula near me", "baby formula shortage", "homemade formula", and "baby formula recipe" into Google Trends. The parameters we set were to show searches done in the United States and occurring over the previous 12 months from January 2022 to January 2023. After each trend was found, we compiled key word searches onto one line graph to compare the timelines of the trend data. We then determined the times of peak interest and compared them to the AAP/FDA recommendations and findings.

Results: According to the Google Trends data, all searches showed a peak interest from May 8th to May 21st. "Baby formula shortage" had the highest search interest. "Homemade formula", "baby formula recipe", and "baby formula near me" at their peak interest had 12%, 11%, and 7% of the searches that "baby formula shortage" had, respectively. For all four searches, the interest dropped drastically from May 21st to June 4th. "Baby formula shortage" searches decreased to 12% of its peak interest going into June and was at 4% of its peak interest going into July. **Conclusions:** Our results suggest that the highest search volumes corresponded to the dates when the infant formula supply shortage was at its lowest, spiking to over 74% nationwide at the end of May 2022 (Laura Stilwell & Lisa A. Gennetian, 2022).

Keywords: Baby formula shortage

Adherence to Reporting Guidelines and Clinical Trial Registration in Psychiatry and Mental Health Journals': Preliminary Results of a Cross-Sectional Analysis

*Karim Kari, BS, Varun Jhanji, BS, Jazmine Rodriguez, BS,
Caleb A. Smith, BS, Danya Nees, BS, Griffin Hughes, BA, BS,
Matt Vassar, PhD Karim Kari, BS, Medical Student; karim.c.kari@okstate.edu*

Background: To reduce bias and advance research methods, reporting guidelines and trial registration regulations have been adopted by various journal submission instructions. For example, it has been demonstrated that the quality and reproducibility of data reporting in randomized control trials (RCTs) are improved when journals abide by guidelines such as the Consolidated Standards of Reporting Trials (CONSORT). Therefore, it is imperative for journals to specify reporting guidelines that authors should follow in order to publish their study. It is unclear how well reporting guidelines and clinical trial registration policies are adhered to by psychiatry and mental health journals.

Therefore, the purpose of this systematic review was to investigate psychiatry and mental health journals' practices regarding reporting guideline adoption and trial registration. **Methods:** We conducted a systematic review to evaluate the top 100 psychiatry medical journals according to the 2021 Scopus CiteScore tool. In a masked, duplicate fashion, the "instructions to authors" webpage of each journal was assessed to identify whether journals required, recommended, or mentioned reporting guidelines outlined by the EQUATOR network. We also extracted data on whether journals recommended or required systematic review or clinical trial registration. To reduce the risk of bias, the article types accepted by each journal were confirmed via contacting the editorial team.

Results: Only 37 out of the 100 journals mentioned the EQUATOR Network (37/100, 37%). The most referenced guidelines were CONSORT at 56% (53/95), followed by PRISMA at 48% (48/99). There is statistical significance between journals that mention both EQUATOR and CONSORT ($p < .001$), as well as between journals that mention both EQUATOR and PRISMA ($p < .001$). The MOOSE and QUOROM guidelines were the least mentioned as both were recommended/required in less than 10% of the psychiatry journals. Regarding study registration, 62 of the 100 journals (62%) either recommend or require clinical trial registration.

Conclusions: Our results indicate the majority of psychiatry journals do not mention reporting guidelines or the EQUATOR network. CONSORT was the only guideline that was mentioned in over half of the evaluated journals. We recommend that the editors of psychiatry and mental health journals better adhere to the recommendation of reporting guidelines and clinical trial registration by prospective authors. **Keywords:** Reporting guidelines, Psychiatry, EQUATOR

Response of *Serratia marcescens* when exposed to the biocide triclosan

*Sue Katz Amburn, PhD, Halla Hamdan, BS, Elizabeth Pascual, MS,
Jennifer Gaonya Yang, MS, Senait Assefa, PhD,
Gerwald Köhler, PhD, Franklin R. Champlin, PhD
Sue Katz Amburn, PhD, Adjunct Faculty; sue.d.katzamburn@okstate.edu*

Background: While the biocide triclosan traverses the outer membrane of most bacteria, our previous work demonstrated *Pseudomonas aeruginosa* to be intrinsically resistant, with triclosan only entering through a permeabilized outer membrane. For *P. aeruginosa*, eventual recovery requires multidrug efflux pump activity. Our research has also demonstrated intrinsic triclosan resistance by *Serratia marcescens*, with a shorter recovery time after permeabilization. The mechanisms used by *S. marcescens* to recover are not yet understood.

Aim: The objectives are to obtain better understandings of *S. marcescens* responses to extracellular triclosan and to membrane damage from outer membrane permeabilizer compound 48/80, as well as the mechanisms by which the bacteria reinitiate growth after a synergistic dual exposure.

Method: RNAseq was performed on total RNA (minus rRNA) from logarithmic growth- phase control cells, cells exposed only to either triclosan or compound 48/80, and cells exposed to both biocide and outer membrane permeabilizer. Analysis of the RNAseq data was performed with CLC Genomics Workbench and by Bacterial and Viral Bioinformatics Resource Center (BV-BRC) programs. For analysis using quantitative reverse transcription real time PCR (qRT-PCR), total RNA was obtained through repeated experiments from cells harvested at seven time points (0, 15, 30, 60, 90, 120 and 150 minutes). Isolated RNA was examined electrophoretically to ensure intactness before DNase treatment and reverse transcription. Primers were designed using Integrated DNA Technologies (IDT) PrimerQuest Tool, and checked using BLAST before synthesis by Eurofins Genomics.

Results: RNAseq data analysis detected a large number of unique up- and down-regulated genes in the dual treated cells. The number of genes with $> \log_2$ fold increase for 30 and 150 minute exposure were 12/7 for triclosan, 134/49 for compound 48/80 and 456/243 for dual treatment, respectively. Many cellular stress active genes were up-regulated by the synergistic dual treatment, including chaperone proteins, acid and alkaline stress proteins, and a ribosome inhibitor protein. For simplicity, in-progress and planned experiments focus solely on the up-regulated genes. Housekeeping gene candidates were selected through selecting those with the lowest coefficient of variation in fragments per kilobase per million reads (FPMK).

Conclusion: Initial qRT-PCR experiments confirmed the stable expression of rho as a housekeeping gene for triclosan exposure, and we have several candidates to test for housekeeping genes for the compound 48/80 and dual treatments. These experiments will allow us to observe the time course of expression changes for specific genes and determine whether any are involved in a specific response to damage from either triclosan or compound 48/80 or the synergistic effects of both.

Future Work: The time course of expression of several genes likely to be involved in generating protective responses, including the components of the constitutive efflux pump sdeXY and regulatory genes, will also be determined.

Keywords: triclosan RNAseq qPCR *Serratia* outer membrane

Evaluation of Adherence to Reporting Guidelines Among Immunology Journals: A Meta-Epidemiological Study

*Adam Khan, BA, Tim Smith, BA, Asaad Chaudhry, BS,
Matt Vassar, PhD Adam Khan, BA, Medical Student; adman.Khan@okstate.edu*

Background: Reporting guidelines and trial registration policies have been used to reduce bias and improve the quality of published research. It is unclear how well immunology and allergy journals adhere to the use of these reporting tools. Therefore, the objective of this study was to examine the policies of immunology and allergy journals regarding reporting guideline appropriation and clinical trial registration.

Methods: A web-engine search was performed to identify the top 100 immunology and allergy journals to be included in the study per the 2021 Scopus CiteScore tool. Search returns were screened for inclusion criteria and data was extracted in a masked, duplicate manner. Statements regarding clinical trial registration and the use of reporting guidelines outlined by the Enhancing the Quality and Transparency of Health Research (EQUATOR) were extracted from each journal's "Instructions for Authors" section on their respective websites. Statements were recorded as "Not Mentioned", "Recommended", "Does Not Require", or "Required." Each journal was contacted by email to confirm what article types are accepted.

Results: Of the 100 journals analyzed, 54 followed recommendations by the EQUATOR Network. Ninety-five journals failed to mention QUOROM. Conversely, CONSORT was recommended by 58 journals and required by 11. PRISMA was only required by six journals and recommended by 32. Only 41 journals specifically required clinical trial registration and 24 failed to mention registration at all.

Conclusion: Our results indicated there to be inconsistencies in the adoption of reporting guidelines and clinical trial registration policies. Nearly half of the top 100 immunology and allergy journals did not mention an EQUATOR statement and less than half required clinical trial registration. We recommend that the editors of immunology and allergy journals encourage the use of reporting guidelines and clinical trial registration policies to improve transparency and mitigate the potential for biases.

Keywords: reporting guidelines, clinical trial registration, immunology

Endocrinology, Diabetes and Metabolism Journals Adherence to Reporting Guidelines: A Systematic Review

*Hassan Khan, BS, Diana King, BS, Rohaan Muhammad, BS, Christian Hemmerich, BS, Caleb Smith, BS, Danya Nees, BS, Griffin Hughes, BA, BS, Matt Vassar, PhD
Hassan Khan, BS, Medical Student; hassan.khan@okstate.edu*

Background: Clinicians rely on evidence-based research for clinical practice to ensure safe, efficacious patient care. Reporting guidelines and clinical trial registration improve the quality of this research by increasing transparency and reducing the risk of biases. The extent of which endocrinology journals adopt the use of these tools is unclear. Therefore, the purpose of this study is to assess the recommendation/requirement of reporting guidelines and clinical trial registration in the top endocrinology journals.

Methods: The top 100 journals in the “Endocrinology, Obesity, and Metabolism” subcategory were identified using the 2021 Scopus CiteScore tool. The “Instructions for Authors” of each journal was analyzed for statements regarding select reporting guidelines outlined by the Enhancing the Quality and Transparency of health Research (EQUATOR) Network as well as clinical trial registration. Statements were recorded as “Not Mentioned”, “Recommended”, “Does Not Require”, or “Required.” To prevent unfair assessment, each journal was contacted to confirm the article types that are accepted.

Results: Of 100 journals examined, ARRIVE was the most commonly mentioned guideline with 51 journals recommending adherence and 21 journals requiring adherence. QUOROM was the least frequently mentioned guideline with only three journals recommending its use and two requiring it. CONSORT was recommended by 40 journals and required by 36 journals. Finally, 77 journals required clinical trial registration.

Conclusion: There are inconsistencies in the adoption of reporting guidelines in the top endocrinology journals. We recommend that journal editors in this field should more strongly enforce adherence to validated reporting tools to improve the quality of research that is published.

Keywords: Reporting Guidelines, Endocrinology, EQUATOR

Coronaridine congeners attenuate fentanyl seeking during prolonged abstinence

Jacob D. Layne, BS, Mason J. Hochstetler, BS, Brandon M. Curry, BS, Benjamin M. Williams, BS, Christina A. Small, BS, Scott C. Steffensen, PhD, Hugo Arias, PhD, Craig T. Werner, PhD Jacob D. Layne, BS, Graduate Student; jacob.layne@okstate.edu

Background: The prevalence of opioid use disorder (OUD) has reached epidemic proportions with a record-breaking number of overdose deaths. Over 70% of the record-breaking number of overdose deaths are caused by synthetic opioids, including fentanyl. Fentanyl is commonly administered intravenously or by inhalation (smoking/vaping), which results in rapid drug bioavailability in the brain. There is a current need to identify a novel pharmacologic therapy to treat OUD, and there is increasing evidence to support the use of novel compounds referred to as coronaridine congeners to treat OUD and other psychiatric illnesses. In preclinical models, coronaridine congeners have been shown to decrease self-administration of drugs of abuse and induce antidepressant and anxiolytic effects. Here we used a preclinical fentanyl vapor self-administration model and fast-scan cyclic voltammetry (FSCV) to study the anti-addictive effects of two coronaridine congeners, 18-methoxycoronaridine (18-MC) and catharanthine (Cath).

Methods: C57BL/6J mice were trained to self-administer vaporized fentanyl (5 mg/mL) or vehicle in airtight operant chambers. Mice self-administered vapor for 1 hour per day for 10 days (sessions were conducted for 5 consecutive days, followed by 2 days off). Chambers were equipped with two nose-pokes, one active and one inactive. A successful response in the active nose-poke resulted in a vapor delivery that coincided with the presentation of a cue light, followed by a 1-minute timeout period. Mice learned to self-administer vapor with 3-second vapor deliveries for the first 3 days of training, which was then reduced to 1.5-second vapor deliveries the remaining 7 days. After training, mice were returned to their home cages for a forced abstinence period. Cue-induced drug seeking tests were conducted on abstinence days (AD) 20 and 25. During cue-induced seeking tests, successful responses in the active nose-poke resulted in presentation of the drug-associated cue, but no vapor was delivered (i.e. extinction conditions). Cue-induced drug seeking tests were conducted using a crossover design where half of subjects received coronaridine treatment (18-MC or Cath), while the other half received vehicle (ddH₂O), on AD20. On AD25, subjects received the opposite treatment compared to AD20. Mice were injected (i.p.) with either vehicle or coronaridine treatment 1 hour before seeking tests. To examine the molecular mechanism of coronaridine congeners, FSCV was conducted on dopaminergic pre-synaptic terminals in the nucleus accumbens (NAc) neurons to measure dopamine (DA) release in the presence of 18-MC and Cath with or without nicotinic acetylcholine receptor antagonists.

Results: We found that both 18-MC and Cath significantly reduced fentanyl seeking during prolonged abstinence with no effect on mice that had previously self-administered vehicle. Furthermore, FSCV revealed that 18-MC and Cath significantly reduced DA release onto NAc neurons.

Conclusion: In this study, we report that both 18-MC and Cath decrease fentanyl seeking during prolonged abstinence. DA release is important for opioid-related behaviors, and we found that 18-MC and Cath reduce DA release in the NAc, a mechanism that may underlie the effect of coronaridine congeners on fentanyl seeking. Together, these results provide evidence that coronaridine congeners may be promising novel compounds for the pharmacotherapeutic treatment of OUD.

Keywords: Opioid use disorder, fentanyl, self-administration, relapse, coronaridine congeners

The Relationship Between Isometric Hip Strength and Incidence of Noncontact ACL Injuries in Female Athletes: A Critically Appraised Topic

Cayla A. Lee, BS, Jessica L. Jacobs, BS, Jennifer L. Volberding, PhD, LAT, ATC Cayla A. Lee, BS, Graduate Student; cayllee@okstat.edu

Clinical Scenario: Noncontact ACL injuries are prevalent among athletes in multi-planar sports, but especially among female athletes. Hip strength may be a factor that contributes to the incidence of noncontact ACL injuries because of the dynamic movement patterns it creates at the knee.

Clinical Question: Does hip strength impact the incidence of noncontact ACL injuries in female athletes?

Summary of Key Findings: A search of the literature was conducted for the relationship between hip strength and noncontact ACL incidence. Three prospective cohort studies that measured isometric hip strength and then recorded the number of noncontact ACL injuries that occurred within a set time period were included in this critically appraised topic. One study found that a lower isometric hip adductor to abductor ratio was associated with noncontact ACL injuries. Two studies found that subjects who sustained noncontact ACL injuries had greater isometric hip strength measures.

Clinical Bottom Line: The evidence suggests that greater isometric hip strength and poor isometric hip adductor to abductor strength ratio may be a risk factor that is associated with noncontact ACL injuries in female athletes. Future research should continue to study the impact that hip strength has on the incidence of noncontact ACL injuries, across all genders, and why.

Strength of Recommendation: Based on the Center of Evidence Based Medicine, these studies provide Level 3 evidence that hip strength is a positive factor associated with the risk of noncontact ACL injuries in female athletes.

Keywords: noncontact ACL injuries; isometric hip strength; intrinsic forces; biomechanics

The Effectiveness of Vitamin D Supplementation on Serum 25(OH)D and its Association with Stress Fractures in High-Risk, Physically Active Adults: A Critically Appraised Topic

Connor Lewis, BHS, Martha Yost, BS, Aric Warren, PhD Connor Lewis, BHS, Graduate Student;
connor.lewis@okstate.edu

Clinical Scenario: In collegiate athletic and military populations alike, the repetitive and intense training increase the risk of experiencing a stress fracture. Stress fractures are an overuse injury resulting from repeated trauma and the body's inability to remodel the bone efficiently enough to adapt to the stresses placed upon it. This chronic injury represents a significant time loss and financial cost to the individual and organization. Research on these high-risk populations suggests the use of supplemental vitamin D to prevent the occurrence of stress fractures in high-risk adults.

Clinical Question: In high risk, physically active adults, does the effect of vitamin D supplementation on serum 25-hydroxyvitamin D [25(OH)D] concentration effect the occurrence of stress fractures?

Summary of Key Findings: A search for articles investigating the use of supplemental vitamin D to reduce the occurrence of stress fractures was completed resulting in two studies that met all inclusion criteria and level of evidence requirements. Only one study found a significant correlation between vitamin D supplementation and the reduction of stress fractures. The other study could not find a significant association with the reduction of stress fractures but did find a significant difference in stress fracture rate that was higher in those who did not improve their serum vitamin D levels with supplementation compared to those who did.

Clinical Bottom Line: The findings suggest that clinicians should consider the use of supplemental vitamin D as a protective measure against the occurrence of stress fractures. Future research on the relationship between vitamin D supplementation and the occurrence of stress fractures in athletic and military populations and the effect of diet modifications versus supplementation on the occurrence of stress fractures is warranted.

Strength of Recommendation: Based on the consistent findings across both level 2 articles according to OCEBM Levels of Evidence, a strength of recommendation of B can be suggested in support of vitamin D supplementation for the prevention of stress fractures.

Keywords: Stress Fractures, Vitamin D, Supplementation, 25 Hydroxyvitamin D, Diet

Identification of Critical Virulence Factors of *Fusobacterium nucleatum* in Promoting Colorectal Carcinoma

Serene Lim MS, Wan-Hsin Hsueh, MS, Molly Bloom, BS,
Kaylee Mach, BS, Claire Hodges, BS, I-Hsiu Huang, PhD Serene Lim, MS, Graduate Student;
serene.lim@okstate.edu

Background: The presence of an oral commensal, *Fusobacterium nucleatum*, in colorectal cancer (CRC) has been identified as an indicator of poor prognosis and has also been shown to increase gradually from stage I to IV. Several adhesion molecules in *F. nucleatum*, including RadD, FadA and Fap2, have been identified as virulence factors in CRC. However, given that *F. nucleatum* contains over 2,000 genes, it is possible that additional undiscovered pathogenic factors are contributing to *F. nucleatum*-induced CRC stimulation.

Aims: (1) Identification of potential pathogenic genes involved in CRC progression; (2) Evaluation of biofilm properties of clinical *F. nucleatum* isolates and their carcinogenicity in CRC cell line.

Methods: (1) A *F. nucleatum* transposon library was created through EZ-Tn5 transposon mutagenesis. The catP transposon DNA fragment contains a chloramphenicol/thiamphenicol resistant cassette that can be used as a selection marker for the insertion. *F. nucleatum* mutant colonies were inoculated into 96-well plates and stored at -80°C in 100% glycerol.

(2) Clinical *F. nucleatum* isolates were successfully identified from saliva samples of 101 oral squamous cell carcinoma (OSCC) patients and 158 non-OSCC patients at a positive rate of 10%. The overnight bacterial culture was adjusted to OD 0.1 and anaerobically incubated at 37°C in 24-well plates for 96 hours. Bacterial biofilm stability was determined by comparing the density of attached biomass before and after washing with 500µl of 1X PBS twice.

1x10⁶ of HCT116, a CRC cell line, were seeded in 6-well plates for 24 hours and a "+" mark was scratched with 200µl pipette tips. Overnight bacterial culture was resuspended in McCoy's 5a medium (no supplements or antibiotics). HCT116 cells were then infected with MOI 10 of various clinical *F. nucleatum* isolates. Cell migration rates were calculated based on the distance traveled in 24 and 48 hours.

Results and conclusions: A transposon mutant library of 9,600 mutant colonies of *F. nucleatum* was established, with a minimum genome coverage of 99% achieved. This robust genetic tool will be used to identify novel virulence genes. Clinical isolates from both OSCC and non-OSCC patients demonstrated varying levels of biofilm stability and CRC cell migration. Further experiments, such as bacterial cell adhesion and invasion, as well as RNA sequencing, will be performed to expand the knowledge towards the development of novel OSCC prevention and treatment strategies.

Keywords: *Fusobacterium nucleatum*, Colorectal Carcinoma, Transposon library, Biofilm

Unusual Presentation of a Recurrent Asthmatic with Bronchiectasis on Multiple Computed Topographies

Reagan Livingston, DO, Nadim Daher, MD Reagan Livingston, DO, Resident; relivin@okstate.edu

Recurrent treatment resistant asthma in high-risk patient populations may be the inciting factor that leads to further evaluation of other contributing etiologies of a patient's symptoms. Allergic bronchopulmonary Aspergillus (ABPA) is primarily an immunologic response that is most commonly seen in asthmatics and cystic fibrosis patients. Common presentation will include symptoms of hemoptysis, fever, weight-loss, malaise as well as transient and fleeting pulmonary opacities and bronchiectasis on imaging. ABPA is classified as an allergic respiratory mycosis against *Aspergillus fumigatus*, and has a higher incidence seen in asthmatic specialty clinics as well as those in the intensive care unit.

The pathogenesis of ABPA is not fully understood, but is thought to be due to difficulty with clearance of the airways in genetically predisposed patients as well as T-helper 2 cell immune response. In these genetically predisposed patients, they are unable to clear the *Aspergillus fumigatus* conidia from their airways which subsequently germinates into hyphae leading to an activation of the adaptive immune response and release of both chemokines and cytokines. This ultimately leads to development of a large inflammatory response with mast cell degranulation, recruitment of eosinophils and neutrophils, and the development of the characteristic immunologic response seen in ABPA as well as progression to bronchiectasis and pulmonary fibrosis.

Keywords: Allergic, bronchopulmonary, aspergillosis, asthmatic, bronchiectasis

Breast Cancer Chemoprevention: Are we saving lives?

Reagan Livingston, DO, Jonathan Storey, MD

Reagan Livingston, DO, Resident; relivin@okstate.edu

Breast cancer is diagnosed in approximately one in eight women during their lifetimes. Following a new diagnosis of early-stage breast cancer, treatment usually consists of disfiguring surgery and often includes adjuvant radiation and/or chemotherapy. Mammography has been successful in diagnosing women with cancer at earlier stages, but unfortunately is associated with overdiagnosis and the resultant risk from overtreatment. There has been great interest in medications for primary prevention which offer the promise of reducing breast cancer diagnoses and cancer deaths while also limiting the number of woman exposed to potentially toxic treatments. We present a review of the breast cancer chemoprevention literature with a focus on exploring the clinically meaningful endpoints that we believe should inform clinical practice.

Keywords: Breast cancer, SERM, aromatase inhibitor

Social determinants of health and family planning: Impact of food and financial insecurity on contraception use and pregnancy intention

Jordan Lowrimore, BS, Covenant Elenwo, MPH, Brenna Sharp, BS Jordan Lowrimore, BS, Medical Student;
jordan.lowrimore@okstate.edu

Purpose: Social Determinants of Health (SDOH) play a crucial role in determining an individual's access to reproductive healthcare. Given that nearly 1 million unplanned pregnancies in the U.S. result from oral contraception misuse or discontinuation annually, those experiencing negative impacts from SDOH may experience greater barriers to family planning (FP). Our primary objective is to assess the relationships between SDOH, contraceptive utilization and pregnancy intention among individuals using the Behavior Risk Factor Surveillance System (BRFSS).

Methods: We conducted a cross-sectional analysis of 2017 BRFSS, our main focus was to use the SDOH module to assess differences in the utilization of FP. While sociodemographic variables related to SDOH were extracted to use as controls. We then constructed bivariate and multivariable logistic regression models to determine the associations, via odds ratios, between SDOHs, contraceptive use and FP.

Results: Compared to women not experiencing SDOH, we found that individuals were less likely to have used contraceptive methods who reported running out of food (AOR: 0.65; CI:0.50-0.86), not being able to afford balanced meals (AOR: 0.64; CI:0.49-0.84) or ran out of money by the end of the month (AOR: 0.45; CI:0.32-0.64). Among women not using contraceptive methods, women who were not intending to become pregnant were more likely to report suffering from financial instability including having difficulty affording balanced meals as opposed to those women who intended on becoming pregnant.

Conclusions: Our study found that the food insecurity and monthly financial instability domains of SDOH were significantly associated with women who did not use any contraceptive measures but had no intention of pregnancy. With changing policies around women's reproductive healthcare, addressing barriers to FP and contraceptive access is increasingly critical. Expanded funding for public health programs may provide a solution for women seeking contraceptive and FP counseling.

Keywords: Contraceptive use, SDOH, Family Planning, Food Insecurity

Development of an orally administered nanoparticle vaccine to combat *Clostridioides difficile* infections

Joseph McCreary, MS, Yi-Wen Liu, MS, Yu-Shan Lin, MS, I-Hsiu Huang, PhD Joseph McCreary, MS. Graduate Student; joseph.mccreary@okstate.edu

Clostridioides difficile is a gram +, spore forming, toxin producing anaerobe that is found throughout the environment. *C. difficile* is the leading agent of hospital acquired infections. Symptoms of *C. difficile* infection can range from diarrhea to pseudomembranous colitis and if left untreated can lead to death. *C. difficile* is currently only treated with 3 antibiotics Metronidazole, Vancomycin, and Fidaxomicin. All these antibiotics are non-specific to *C. difficile* and have the side effect of killing the normal microbiome of the gut. This microbiome helps to keep the body resistant to *C. difficile* infections, and its destruction can lead to relapses of disease. Ongoing work in our lab is looking at preventing *C. difficile* infections using a nanoparticle based oral vaccine. In a mouse model of *C. difficile* infections, we previously demonstrated that intraperitoneal injection of a vaccine composed of the receptor-binding domain of *C. difficile* toxin B (TcdB) with chitosan and poly-g-glutamic acid were effective in inducing antigen-specific IgA and IgG antibodies. Continuing this research, we later demonstrated that rTcdB encapsulated in a polypeptide-based polymer and delivered orally produces a long lasting and robust antibody response. These robust antibody responses to the *C. difficile* toxin were enough to prevent disease within a mouse model, however, it was not able to reduce bacteria burden leaving the potential for asymptomatic spread and relapses of disease. In my project, I wish to continue this research in two ways. First, by continuing the optimization of the nanoparticle delivery system. To do this we propose using a nanoparticle polymer that specifically targets M-cells lining the intestine and be pH activated. We hypothesize that this will improve antigen immunogenicity and provide better protection against *C. difficile* infections. Second, evaluate several *C. difficile* surface proteins immunogenicity in a mouse model. We hypothesize that a two-target approach may decrease the bacterial load and lead to complete protection against *C. difficile* infections.

Keywords: *Clostridioides difficile*, Vaccine, Prevention, Nanoparticle

Mental and Physical Health Perspectives of Medical Students: A Cross-Sectional Study

Ryan McIntire, BS, Conner Howard, BS, Jennifer L. Volberding, PhD, ATC Ryan McIntire, BS, Medical Student; ryan.mcintire@okstate.edu

Background: Medical students maintain a rigorous schedule over years of didactic and clinical training to become physicians. The strenuous nature of this training may lead to sleep deprivation, chronic stress, and mental health disorders. Published literature demonstrates the prevalence of such issues, yet few studies provide insight from medical students subjectively with validated tools. Given the lengthy path of becoming a physician and the importance of well-being and interpersonal reliability within the profession, identifying issues among medical students early in their training may help prevent dysfunctions. The aim of this study was to evaluate mental and physical health perspectives of medical students in their pre-residency years to better understand their well-being.

Methods: This cross-sectional study used surveys to collect data. Thirty-two students participated from each of the four years of an osteopathic medical school and was approved by an Institutional Review Board. Participants completed the Simple Lifestyle Indicator Questionnaire (SLIQ), RAND-36 Measure of Health-Related Quality of Life (SF-36), Pittsburgh Sleep Quality Index (PSQI), and Profile of Mood States Short Form (POMS-SF). The surveys were evaluated based on the respective questionnaire's scoring via means and standard deviations.

Results: The mean Total Category Score for the SLIQ was 6.42 ± 1.26 (possible 10, higher score indicates healthier lifestyle). The PSQI subscores of Sleep Efficiency Score, Sleep Latency Score, Medications to Sleep Score, and PSQI Total Score each indicated better quality sleep in parallel to the progression from first to fourth year students. The SF-36 subscores for Physical Functioning and Limitations- Physical Health demonstrated decreasing means from MS-I to MS-IV classes. The highest total mean subscore across the MS classes was for Physical Functioning at 94.80 ± 12.09 (possible 100, higher score indicates better health status), and the lowest total mean subscore was pain at 46.37 ± 12.89 (possible 100). The highest total mean across MS classes was the POMS-SF Vigor Score at 7.06 ± 4.77 (possible 32, higher score indicates more vigorous). The lowest total mean was for the Depression Score at 1.84 ± 3.30 (possible 90, higher score indicates more depression).

Conclusion: Across the surveys and medical school classes, poor scores in terms of well-being were related to stress, diet, sleep, and pain. Better sleep efficiency scores, sleep latency scores, PSQI Total Scores, and worse physical health in terms of physical functioning and limitations were reported on average in parallel with the progression through the four years of medical training. These findings demonstrate many aspects of sleep quality are worse in the earlier years of medical school, and the physical well-being of medical students in later years of medical school is worse. The findings warrant further investigation into whether poorer sleep quality is a consistent finding among medical students at the beginning of their training and whether it relates to the reported status of physical functioning in medical students later in their training. Future studies could assess this via longitudinal cohort studies or by annual repetition of the current study design to evaluate changes observed among differing medical school classes.

Keywords: Medical students, Health Surveys, Sleep Quality

Osteopathic Manipulative Treatment for Chemotherapy-Induced Abdominal Pain and Anorexia in Glioblastoma Multiforme

Ryan McIntire, BS, Rachel Terry, BS, Garren Gebhardt, DO Ryan McIntire, BS, Medical Student;
ryan.mcintire@okstate.edu

Background: Glioblastoma Multiforme (GBM) is a rapidly growing tumor of astrocyte cells in the Central Nervous System (CNS) with a five-year median survival rate of 5.6% in adults (ages 40+). On average, 12,000 glioblastoma cases are diagnosed each year in the United States.

Case Presentation: We present the case of a 53-year-old male who was diagnosed with the malignant brain tumor glioblastoma multiforme. The patient initially presented to the emergency department (ED) with a concern for seizure or stroke on 08/21/21. Magnetic resonance imaging of the patient's head performed 8/28/21 revealed the presence of a ring-enhancing lesion in the left frontoparietal region extending to the dura, which helped support a diagnosis of glioblastoma multiforme, a highly malignant primary brain tumor. Targeted chemoradiation treatment supplemented with Temozolomide chemotherapy was implemented 10/06/21 - 11/24/21, followed by adjuvant treatment using Temozolomide from 12/15/21 - 04/19/22. The patient lost appetite for food during this treatment, and reduced eating led to a decrease in weight by 54 pounds, from 210 pounds on initial ED presentation on 08/21/21 to 156 pounds at his initial encounter following referral for osteopathic manipulative treatment (OMT) on 04/19/22. Despite appropriate therapy, there was evidence of continued tumor growth via MRI on 4/11/22. Given the disease progression along with significant side effects of treatment, the patient elected to discontinue radiation and pharmaceutical therapies. Therefore, the patient's only intervention in terms of treatment of his symptoms from 4/19/22 to the time of this case report was OMT. Appointment weights were 152 pounds, 147 pounds, 154 pounds, and 166 pounds at respective, chronological one-month follow-ups. This weight re-gain demonstrates the effect of OMT in promoting appetite and feelings of wellness. The patient endorses increased appetite, alleviation of stomach cramping, and weight gain following OMT sessions consisting of visceral manipulation, myofascial release, soft tissue, and lymphatic techniques directed to the celiac, superior mesenteric, and inferior mesenteric ganglia.

Discussion: The case supports the use of these OMT techniques to promote appetite and improve patient-reported wellness in a patient with glioblastoma multiforme.

Keywords: Osteopathic Manipulative Medicine, Glioblastoma Multiforme, Chemotherapy-induced anorexia

Depression Screening Scores in Osteopathic Medical Students

Haddon McIntosh BS, Luke Weaver BS, Jennifer L. Volberding PhD, LAT, ATC Haddon McIntosh, BS, Medical Student; haddon.mcintosh@okstate.edu

Purpose: As burnout of health-care workers continues to rise, checking the mental health of future health care providers may provide insight into the future of burnout trends. Our study seeks to determine the relationship between demographic variables and depressive symptoms experienced while in medical school.

Methods: Scores for Patient Health Questionnaire 9 (PHQ-9) and interference of daily activities were collected by Qualtrics during the first semester of the 22-23 academic school year for first through fourth year medical school students. Additionally, the survey included demographic information including: age, relationship status, presence of dependents at home, race/ethnicity, Native American and/or tribal affiliation, relationship status, presence of dependents at home, residency status, cohort year, pell grant eligibility, cohort year, sexual orientation, gender identity, sex assigned at birth, sexual orientation, transgender identification, history of depression diagnosis, treatment history for depression. Data was entered into SPSS for analysis. PHQ-9 scores were distinguished by total score with categories of minimal depression, mild depression, moderate depression, moderately severe depression, and severe depression. Statistical analysis included standard deviations, means, and frequencies. A Kruskal-Wallis analysis was conducted for total score by demographic variables. A one-way ANOVA was conducted for total score by year.

Results: One hundred and fifty-three medical students' (MS-1=36, MS-2=44, MS-3=36, MS-4=37) with a mean age of 26.02 (SD=3.77) participated with 26.1% reporting previous history of a depressive disorder diagnosis. Of the participants, 57 were assigned male at birth, and 96 were assigned female at birth. 58 had a gender identity of male, 94 female, and 1 third gender/non-binary. 50.7% of participants PHQ-9 survey results indicated mild, moderately, or severely depressed. Statistical significance ($p < 0.05$) in total PHQ-9 score was found for sex assigned at birth, gender identity, and experiencing difficulties with activities of daily living. PHQ-9 scores were increased in respondents assigned female at birth, female gender identity, and those experiencing difficulties with activities of daily living.

Conclusion: Approximately fifty percent of medical students displayed mild to moderately severe depression symptoms. The prevalence of depression in medical students points to potential problems in the future physician workforce. Since the Covid-19 pandemic the healthcare provider shortage has only widened. Further support of mental health and seeking changes to curriculum could decrease the depressive symptoms in osteopathic medical students and provide strategies for long term mental wellbeing to keep physicians in the workforce longer.

Keywords: Depression, Students, PHQ-9

Correlations in caregiver distress: analysis of the rates of depression and frequent poor mental health days among varying subsets of caregivers

*Zach Monahan, BS, Dyani Shores, BS, Alyson Mack, MA,
Natasha Bray, DO, Micah Hartwell, PhD Zach Monahan, BS, Medical Student;
zach.monahan@okstate.edu*

Background: Caregiver distress is the strain experienced by individuals providing care for people with chronic physical or mental health conditions which limit their self-sufficiency for tasks of daily living. More than 1 in 5 Americans are caretakers of a family member or friend with a long-term disability—a number expected to increase with an aging population. Methods: We performed a cross-sectional analysis using the 2021 Behavioral Risk Factor Surveillance System (BRFSS) conducted by the Centers for Disease Control and Prevention (CDC) to determine rates of depressive disorders among caregivers and associations between demographic and relational aspects of the care recipient. Results: The included sample size for analysis was 32,676, representing 17,274,935 caregivers in the US. Our analysis found caregivers who responded female (6008, 29.71%), earning less than \$15,000 a year (837, 41.47%), did not complete high school (555, 31.56%) or had some college with no degree (2904, 29.45%), and American Indians (216, 35.18%) had the highest rates of a depression diagnosis within these categories. Furthermore, the odds for having a diagnosis of a depressive disorder is higher among caregivers if the care recipient has a mental disorder, substance use disorder, asthma, or a chronic respiratory condition compared to caregivers of individuals with infirmity or frailty due to old age. Lastly, we found that compared to individuals providing care for their mother, individuals providing care to their mother-in-law or spouse were less likely to have a diagnosis of depression and those caring for their live-in partner were more likely to have a diagnosis. Conclusion: Our findings add to previous research showing specific groups of caregivers are at higher risk for caregiver stress which may lead to depression. More specifically, we found that depression is more likely to occur among individuals caring for live-in partners and among care recipients who have mental health or substance use disorders or chronic respiratory conditions such as COPD. This may be due to the need for more closely supervised care, as well as the risk for hostility or impulsivity of the care recipients. In addition to these prevalences and associations, qualitative research may elucidate underlying trauma among caregivers. Analysis into the demographic risk factors for the development of depression amongst caregivers is vital in providing effective therapeutic options for the care recipient and educational opportunities for the caregiver, both at the individual and community level. Keywords: caregiver distress; depression; disability; demographic factors

Protective effects of β -Funaltrexamine against LPS-induced CCL2 expression and behavioral deficits

Stephanie Myers, BS, Daniel J. Buck, BS, Kelly McCracken, MS, J. Thomas Curtis, PhD, Randall L. Davis, PhD Stephanie Myers, BS, Graduate Student;stephanie.myers10@okstate.edu

Background: Inflammation is present in both neurological and peripheral disorders. Specifically, inflammation is one of the common factors in diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), mood disorders which include anxiety and depression, and even inflammatory bowel disease (IBD). Thus, exploring potential treatments geared toward the assessment of inflammation is crucial to the continuation of treatment development. One pharmacological agent researched for its anti-inflammatory effects is β -funaltrexamine (β -FNA), a selective mu-opioid receptor antagonist. Preclinical studies using in vitro human astroglial cells showed that β -FNA inhibited inflammatory signaling, NF- κ B signaling, and chemokine expression in a mechanism unrelated to MOR. Also, β -funaltrexamines neuroprotective effects were discovered in a preclinical model of lipopolysaccharide (LPS)-induced neuroinflammation and sickness-like behavior when administered before LPS.

Methods: This study determines the effects of β -FNA (50 mg/kg, i.p.) on LPS-induced (0.83 mg/kg, i.p.) sickness-like behavior using a 10 min open field test, and anxiety-like behavior, using a 5 min elevated plus maze in male and female C57BL/6J. It also assesses the effects on LPS-induced neuro and peripheral inflammation when β -FNA is administered immediately or 10 h post-LPS. Tissue collected included whole brain, hippocampus, prefrontal cortex, cerebellum/brain stem, spleen, liver, small intestine, large intestine, and plasma.

Results and Conclusions: Levels of inflammatory chemokine Monocyte Chemoattractant Protein-1 (MCP1, also known as CCL2) was measured using an enzyme-linked immunosorbent assay (ELISA). Two-way analysis of variance revealed that at 24 hours, LPS increased chemokines, and β -FNA treatment was protective depending on the dosing schedule and had region-specific effects. Also, to our knowledge, this is the first time β -FNAs effect on female mice has been assessed. Differential effects of β -FNA were found between the whole brain vs. brain regions, central vs. peripheral, and sexes. This study provides insight into the inflammatory protection offered by β -FNA in both the central and peripheral systems and further knowledge of the potential therapeutic options for inflammatory disorders.

Keywords: neuroinflammation, chemokine, inflammation, opioid, anti-inflammatory

Feasibility of Using Biomarkers to Examine Associations between Commercial Cigarette Smoking and Glycemic Levels during a Smoking Cessation Attempt

*Kayli Nail, BS, Sydney Martinez, PhD, Rachel Terry, BS,
Stephanie Ice, RN, Samantha Keener, LPN, Tara Ritter, RN,
Doug Nolan, DO Rachel Terry, BS, Medical Student; rachel.terry10@okstate.edu*

Introduction: American Indians have a higher prevalence of type 2 diabetes mellitus (T2DM) and commercial cigarette smoking compared to other racial groups. The complex relationship between smoking, cessation, and glycemic control is not well understood. We examined the feasibility of using continuous glucose monitoring (CGM) and mobile health (mHealth) to understand the acute effects of smoking and cessation on glycemic levels.

Methods: We recruited T2DM current smokers aged 21 to 75 in the Cherokee Nation Health System willing to make a cessation attempt. Patients wore 14-day FreeStyle Libre Professional CGM sensors to examine glycemic levels two weeks pre-quit and two weeks post-quit. Participants completed daily smartphone assessments using mHealth to report cigarettes, meals, exercise, tobacco, and nicotine replacement therapy. Remote carbon monoxide (CO) sensors were used to biochemically verify abstinence. Participants completed a semistructured interview at the exit to describe their experiences using the technology.

Results: We enrolled 13 participants and 10 made a smoking cessation attempt defined as at least a 10% reduction in cigarette consumption. Most participants who reduced cigarette consumption experienced a decrease in mean glucose. Many experienced episodes of hypoglycemia post-quit. Participants on average experienced a 13% absolute change in desired time in range in the two weeks post-quit but the direction varied by baseline HbA1c. For those who normally experienced high glucose levels, their glucose levels also decreased and for some led to an increase in time in range. Glycemic variability increased in most patients, and most recorded weight loss. Participants reported satisfaction with the technology.

Conclusion: A decrease in cigarettes per day resulted in a decrease in glucose levels initially, which suggests an acute change in glucose metabolism. A more granular view of acute glycemic changes using CGM during smoking cessation could inform tailored interventions for smokers with T2DM.

Keywords: CGM, Smoking Cessation, Type 2 Diabetes Mellitus

Impact of BioFire FilmArray Blood Culture Identification Panel 2 and Antimicrobial Stewardship Interventions on Time to Optimal Antimicrobial Therapy in Patients with Positive Blood Cultures

Issac Nichols, PharmD, Anjly Kunapuli, PharmD Issac Nichols, PharmD; Resident;
inichols@okstate.edu

Background: Delayed treatment of bloodstream infections (BSI) is associated with increased morbidity and mortality. Conventional methods for organism identification and susceptibility data from blood cultures can take on average 2-5 days, with pathogen identification taking longer. Technological advancements in gene-based polymerase chain reaction (PCR) tests amplify DNA targets from positive blood cultures which can shorten the identification time of certain organisms and resistance genes, aiding in optimization of antimicrobial therapy. Our goal is to evaluate the impact of the Biofire FilmArray Blood Culture Identification Panel 2 (BCID2) combined with real-time ASP intervention on time to optimal antimicrobial therapy and clinical outcomes.

Methods: This study has a letter of determination from the Oklahoma State University (OSU) Center for Health Sciences IRB as a multidisciplinary quality improvement initiative. This pre/post quasi-experimental study conducted at OSU Medical Center in Tulsa, Oklahoma, will include adult inpatients with at least 1 positive blood cultures from a 6-month period prior to implementation of the BCID2 panel and for 6 months post-implementation. Patients less than 18 years of age, those with identical positive blood cultures within previous 7 days, positive blood cultures at an outlying facility, transitioned to CMO or died within 24 hours of positive blood cultures and patients with BSI with an organism not included on the BCID2 panel were excluded.

Demographic information will be collected including comorbid health conditions, risk factors for BSI, infection source, and clinical status. The primary endpoints include time to effective therapy and time to optimal therapy. Secondary outcomes include: 30-day all-cause mortality, hospital length of stay, and microbiologic clearance and 30-day readmission with bacteremia.

Results: The pre-intervention group has a final included patient population of 125 for demographic, primary, and secondary endpoints, while the post-intervention group has 89 included for demographic and primary endpoints and 62 included in secondary outcomes with final number pending. Primary endpoint data between the two groups shows a 22-hour difference in average time to pathogen ID (51 hours (pre) vs. 29 hours (post)), a 1.6-hour difference in average time to effective therapy (17.4 hours (pre) vs. 15.8 hours (post)), and a 15.1-hour difference in average time to optimal therapy (61.4 hours (pre) vs. 45.3 hours (post)). Secondary endpoint data has shown decreased time to microbiologic cure (55.6 hours (pre) vs. 49.1 hours (post)) and decreased length of stay in the intensive care unit (ICU) (3.9 days (pre) vs. 2.4 days (post)) and in the hospital total (10.8 days (pre) vs. 9 (post)). Adverse event data has shown similar rates of 30-day mortality (11.2% (pre) vs. 12.9% (post)), but a possible increase in 30-day readmission with bacteremia (0.8% (pre) vs. 6.5% (post)).

Conclusions: Based on preliminary data the implementation of the BCID2 panel has decreased time to pathogen identification and optimal therapy, but has similar time to effective therapy. Data also shows a 6.5-hour difference in microbiologic clearance time with over 1.5 and 1.8-day

difference in ICU and total length of stay. Further investigation into the statistical significance of final data set needs to be completed.

Keywords: Blood Culture Identification Antimicrobial Stewardship

Parameterized analyses of subject-specific femoral stresses in female treadmill runners

Danielle O'Connor, BS, Kalin Ray, BS, Eric Snively, PhD Danielle O'Connor, BS, Medical Student;
danielle.s.oconnor@okstate.edu

Background: Biomechanics play an important role in running, especially regarding prevention of injury. For example, female runners or runners with increased Q angles (between the quadriceps and patellar tendon) are often more prone to knee injury. The purpose of this analysis is to identify areas of stress on the femur in two runners. Determining which areas undergo the highest stress can be used to modify running form and optimize training and recovery.

Methods: This analysis used individualized finite element (FE) stress-strain models based on self-measured palpable dimensions for one leg, angles, body weight, and stride on two different subjects. Measurement for individual model scaling included width across the femoral condyles, anteroposterior dimensions of each condyle, and length video-measured varus (inclination) angle from the greater trochanter to the knee joint. Varus angle and Q angle are positively correlated.

A finite element model was created for each subject based on the material properties of human femoral compact bone, with a medullary cavity but no cancellous bone. Finite element analyses were performed using linear static assumptions in COMSOL Multiphysics. Mid-stance knee-joint reaction forces were derived from multiples of body weight experienced during treadmill running. Quasi-static, instantaneous constraints were applied proximally at the hip to prevent rigid body motion and enable loads to propagate through each femur. We compared effects of constraints at the femoral head alone and at stabilizing muscle attachments.

Results: Proportions: Both subjects had similar measurements, with relatively small differences. One subject had a shorter femur that was more robust, with larger anterior/posterior and transverse measurements. The subject with the more gracile femur had a higher body weight and slightly smaller Q angle, by about 2 degrees.

Stresses: Models for both subjects showed the highest amount of stress on the upper 1/3 of the femur shaft. However, the more gracile femur had higher stress on the medial and lateral sides of the shaft, while the more robust femur had higher strain on the anterior and posterior aspects. The more slender femur also showed higher stress in general.

Interpretations and Conclusion: The greater overall stress in the more slender femur was expected, especially with subject's higher mass and ground forces. However, the more robust femur's relatively lower stress medially and laterally was unexpected given the greater angle of inclination and Q angle. These results could all be related to flexibility, muscle strength, and running form. The subjects also have different running forms and exercise routines. We conclude that soft tissue factors may have a greater effect on optimized running form than femoral stresses. This analysis can be expanded upon and refined by including more subjects, different running speeds, and MRI scans of subjects' legs for more accurate measurements. Incorporating cancellous bone properties will yield better results proximally and distally.

Keywords: biomechanics, orthopedics, female runners, femur

Use of behavioural change taxonomies in systematic reviews and meta-analyses regarding obesity management

*Ochije Okonya, BS, Bilal Siddiqui, BS, David George, DO, Colony Fugate, DO, Micah Hartwell, PhD, Matt Vassar, PhD
Ochije Okonya, BS, Medical Student; ookonya@okstate.edu*

Aims: We investigated the prevalence of behavioral change taxonomies in systematic reviews and metaanalyses related to obesity management. In addition, we analyzed the funding sources, author conflicts of interest statements, risk of bias, and favorability of the results in such studies to determine if there was a relationship between methodological quality and taxonomy use.

Methods: We searched several databases including MEDLINE, Epistemonikos, Cochrane EDSR, PubMed, and Embase for systematic reviews and meta-analyses regarding the behavioral treatment of obesity. Screening and data extraction was performed in a masked, duplicate fashion. We performed statistical analyses to determine any significant association between use of taxonomy and study characteristics.

Results: Fifteen (of 186; 8.06%) systematic reviews used a taxonomy—9 used the BCTTv1, 3 used OXFAB, 2 used the CALO-RE, and 1 used “Taxonomy of choice architecture techniques.” Most interventions that referenced taxonomy were self-mediated (6/60, 10%). Behavioral change taxonomies were mentioned in 10 (of 87, 11.49%) studies with a public funding source. Of the studies with favorable results, 14 studies (of 181, 7.73%) referred to taxonomy. We found no statistically significant relationships between the use of taxonomy and study characteristics.

Conclusions: We found that systematic reviews regarding the management of obesity rarely mention a behavioral change taxonomy. Given the global burden of obesity, it is crucial that behavioral change techniques are reproducible and translatable. We recommend that researchers look further into how taxonomies affect the quality and reproducibility of behavioral interventions in an effort to improve patient outcomes.

Keywords: obesity, behavioral change, taxonomy, systematic review, weight loss

Using shell ornamentation to document Pan-Trionychid turtle diversity and distribution across the K-Pg Boundary

Nathan Ong, BS Nathan Ong, BS, Graduate Student; nong@okstate.edu

At the end of the Cretaceous, a bolide impact and its resulting winter caused one of the largest extinctions in Earth's history. Despite the devastation, freshwater vertebrate ecosystem recovered quickly; Brownstein and Lyson (2022) recently described a new species of macropredatory gar in sediments deposited just 1.5-2.5 thousand years following the extinction event. The brief duration of this biological perturbation, in conjunction with the limited stratigraphic control of museum specimens, limits the extent to which the millenia following the extinction can be studied. Additionally, lithofacies changes at the boundary make it difficult to ascertain if any observed assemblage changes are climatic or taphonomic in nature.

Even so, coarse grouping of specimens into the several million years before and after the extinction (i.e. Maastrichtian vs Danian specimens), yields some broad, macroevolutionary patterns. It is generally agreed that members of Pan-Trionychidae show minimal change across the boundary both in terms of relative abundance and gross anatomy (Holroyd et al 2014). Large, terrestrial nanhsiungchelyids like *Basilemys* are the only Pan-Trionychid group to definitively go extinct during the K/Pg event, but adocids, carettochelyids, and crown trionychids cross the boundary (Holroyd et al 2014) with modest gross anatomical adaptations.

This study tests if the general consensus of Pan-Trionychid K-Pg survivorship holds true when examining an independently-gathered dataset: fragmentary specimens that were identified using shell ornamental morphology. The highly unique ornamentation on the external surface of the trionychid shell can often be used to identify even fragmentary specimens down to a genus and even species. Some genera, like *Helopanoplia*, *Adocus* and *Basilemys*, are readily identifiable with a high degree of confidence, while distinguishing amongst other closely-related genera like *Aspideretoides*, *Gilmoremys*, and *Atopsemys* can prove more challenging. Over 3,000 photos of fragments were collected across seven institutions, from which over 1,000 specimens were generically identified. These occurrence data, in conjunction with associated locality data like the specimen's geologic age, formation, and latitude, were statistically analyzed in R.

Welch two-sample t-test reveals that *Plastomenus* shows a preference for higher latitudes ($t = -2.8$, $p = 0.003375$) as compared against other Pan-Trionychids, regardless of geologic age. Pearson's chi-squared test demonstrates that there is a significant difference between the assemblage of Maastrichtian and Danian Pan-Trionychids ($\chi^2 = 98.091$, $p = 0.0004998$). Extinction patterns broadly resemble those described by Holroyd et al (2014), where all Pan-Trionychids cross the boundary, with the exception of *Basilemys*. Ornamentation consistent with *Helopanoplia distincta* was identified within 22 deposits of purported Danian age, suggesting that the genus spans the boundary, though finer stratigraphic control is still needed. *Compsemys victa* increases in relative abundance across the boundary, comprising 18.9% of total Danian specimens, as opposed to 8.7% of total Maastrichtian specimens. Danian turtles also show a significant decrease in their latitudinal range ($t = -2.7709$, $p = 0.003375$). Further taphonomic work is needed to determine the extent to which these correlations are driven by climate, as opposed to changes in lithofacies across the boundary.

Keywords: Cretaceous Paleogene Trionychid Extinction

The interaction of MeCP2/H3K4me3 in the hypermethylated promoter alters the expression of NGF gene during colon inflammation

Radhika D. Pande MS, Subhas Das, PhD Radhika D. Pande MS, Graduate Student;
radhika.pande@okstate.edu

Background: Ulcerative colitis (UC) is associated with symptoms like abdominal pain, diarrhea, fatigue, reduced appetite, and weight loss. According to CDC, approx. 1 million Americans are reportedly diagnosed with UC every year. It has been well established that nerve growth factor (NGF) is significantly elevated in several inflammatory and autoimmune conditions, including UC, and is essential for a robust inflammatory response. However, the epigenetic mechanisms involved in the regulation of NGF during UC are yet to be fully characterized. Epigenetic processes such as DNA methylation and histone modification are essential modulators for maintaining cell homeostasis and play an important role in the epigenetic regulation of key biomarkers in developing several inflammatory conditions. The epigenetic factors like Methyl-CpG-binding protein 2 (MeCP2) and tri-methylation of lysine 4 on histone H3 (H3K4me3) have been shown to crosstalk in the regulation of the gene expression.

Aim: In this study, we determined the MeCP2 interaction with histone modification (H3K4me3) for epigenetic regulation of the NGF gene during colonic inflammation.

Method: Colon inflammation was induced by intracolonic administration of 2,4,6-trinitrobenzene sulfonic acid (TNBS) solution containing a 1:1 dilution mixture of 5% TNBS solution and 50% ethanol in 8- 10 weeks old Sprague-Dawley rats. The colon tissue was extracted after 24 hours of inflammation. Azacitidine (Aza), a hypomethylating agent, was pre- and co-administered with or without TNBS in the colon. RNA and protein expression of NGF and MeCP2 was determined by qualitative, quantitative PCR and immunoblot techniques. Bisulfite-converted DNA was used for Methylation-specific PCR (MSP) to analyze the DNA methylation patterns in CpG islands of the NGF promoter. H3K4me3 and MeCP2 protein interaction with DNA methylation of NGF gene promoter was analyzed using ChIP assay, while the protein - proteins' interaction was analyzed using Immunoprecipitation (IP) assay.

Results & Conclusion: Here, we show that MeCP2 and H3K4me3 are significantly elevated in the animal model of ulcerative colitis. In addition, MeCP2 interacts with H3K4me3 in the NGF gene's hypermethylated promoter region, thereby modulating its expression. These results indicate that the MeCP2/H3K4me3 epigenetic interaction is crucial for regulating the NGF transcription and plays an important role in the development of inflammation during ulcerative colitis. With unknown etiology and a lack of pharmaceutical interventions for UC, establishing the underlying mechanisms would provide a novel approach to the treatment of this disease.

Keywords: Inflammation, Nerve growth factor, Epigenetic regulation, DNA methylation, histone modification

Pediatric Autoimmune Clinical Trial Discontinuation: an Analysis of the National Library of Medicine

Gunner Parent, BS, Rachel Wilkins, BS, Ashton Gatewood, MPH, Micah Hartwell, PhD Gunner Parent, BS, Medical Student, gunner.parent@okstate.edu

Background: With the rise in pediatric autoimmune diseases in the United States, it is both clinically relevant and timely to analyze the safety, cost-effectiveness, and efficacy of treatment options. The methodical research and study of health care services can lead to improving outcomes for patients with pediatric autoimmune diseases. Further, clinical trials are the gold standard for discovering and evaluating these often novel treatment options. Our primary objective was to assess select characteristics – phase, intervention, autoimmune disease type – of studies examining pediatric autoimmune clinical trials registered with the National Library of Medicine between 2008 to 2021. Our secondary objective assessed the rates of discontinuation of the clinical trials.

Methods: Using ClinicalTrials.gov, we performed a cross-sectional study on all pediatric autoimmune clinical trials conducted from 2008 to 2021. Inclusion criteria were pediatric autoimmune trials with interventional treatment. We extracted the following data: the trial's phase, intervention, autoimmune disease type, trial status (terminated, completed, active, recruiting), and intervention type. We then assessed rates of discontinuation by trial characteristics. **Results:** 2009 trials returned from the search “pediatric autoimmune disease” on ClinicalTrials.gov, 1098 of which met inclusion criteria for our research. The most common autoimmune disease was Type I Diabetes Mellitus (DM; 664 trials, 60.5%) followed by arthritis (164 trials, 15.03%). Nearly half (542, 49.4%) of the studies used pharmacologic interventions; other frequently used interventions were medical devices (200, 18.21%) and behavioral therapy (156, 14.21%). We found that 17.1% (188) of the pediatric autoimmune clinical trials were discontinued during this timeframe— the highest rates being among Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections (PANDAS; 2 of 7, 28.57%) and celiac disease (8 of 28; 28.57%).

Conclusion: In reviewing the substantial body of research on pediatric autoimmunity, our investigation revealed clinical trials focusing on Type I DM and drug interventions were most prevalent. This is an important finding since autoimmune diseases constitute a significant emotional, physical, and financial strain for patients and their caregivers. Therefore, it is necessary to determine which specific diagnoses constitute the majority of societal burden to best direct resources. For advancements in medicine to be made, clinical trials must make it to completion and have their results published. The discontinuation of clinical trials delays advancements in the medical field and is not a productive use of research funding.

Keywords: Pediatrics, Autoimmune Disease, Clinical Trials, Discontinuation

Demographics of individuals refusing cancer treatment and reported pain compared to those in treatment: An analysis of the 2017-2020 Behavioral Risk Factor Surveillance System

Hunter Park, BS, Linda Nguyen, BS, Kelsi Batioja, BS, Natasha Bray, DO, Benjamin H. Greiner, DO, Micah Hartwell, PhD

Background: More than 1.6 million people are diagnosed with cancer each year.¹ Despite the different treatment options available for cancer, many individuals refuse treatment for various reasons. However, there is little known about the cumulative group of individuals who refuse treatment. Thus, our objective was to assess characteristics and associations among this group of individuals compared to those who receive cancer treatment.

Methods: We performed a cross-sectional study using the 2017 to 2020 Behavioral Risk Factor Surveillance System (BRFSS) to analyze the prevalence of individuals who refuse or delay cancer treatment by type of cancer and sociodemographic using chi-square tests. Additionally, we used logistic regression to determine whether individuals who refused treatment were more likely to report cancer related pain.

Results: The sample included 6,238 individuals of whom 83% were White, 53% were female, and over half reported attending college or technical school. Individuals with cancer of internal organs had higher rates of cancer treatment refusal at 8.43%, compared to 4.41% of breast cancer, 5.94% of skin cancer, and 4.15% of other types. Individuals who did not graduate high school were nearly twice as likely to refuse cancer treatment than other education groups (11.57%; $p < 0.01$).

Conclusion: Our findings showed that low educational attainment and being of a minority group were associated with higher rates of cancer treatment refusal. Previous research has shown these groups are more likely to have low health literacy. Therefore, focused efforts on educating these groups will improve cancer screening and treatment awareness.

Keywords: cancer, education, treatment

Lack of Reporting Guidelines and Clinical Trial Registration In Physical Medicine & Rehabilitation

*Eli Paul, BS, Annes Elfar, BS, Caleb Peters, BS,
Caleb Smith, BS, Danya Nees, BS, Griffin Hughes, BS,
Matt Vassar, PhD Eli Paul, BS, Medical Student; caleb.petersosu@gmail.com*

Background: Research surrounding Physical Medicine and Rehabilitation (PMR) is a growing field, yet previous studies have shown that the quality of evidence regarding research in PMR is deficient and can be attributed to poor methodological quality of the research and lack of reporting guidelines. Reporting guidelines and clinical trial registration have been shown to improve scientific research by ameliorating bias and promoting transparency. Therefore, the purpose of our study was to assess the top 100 journals in Physical Medicine and Rehabilitation to determine the requirement/recommendation for authorship use of reporting guidelines and clinical trial registration.

Methods: We identified the top 100 journals in PMR using the 2021 Scopus CiteScore tool. In a blind, duplicate fashion, two investigators explored submission guidelines of each included journal for the presence or absence of statements germane to reporting guidelines and clinical trial registration. A standardized email was sent to each journal inquiring what study designs they do not accept for publishing to avoid unfair assessment. Additionally, we extracted journal name, five-year impact factor, region of journal publication, and mention of the ICMJE: an organization of medical journals setting publication and peer-review standards.

Results: Clinical trial registration was required by 50% (50 journals) of the top 100 PMR journals. Of the reporting guidelines analyzed, Quality of Reporting of Meta-analyses (QUOROM) was the least mentioned guideline of our included journals. Consolidated Standards of Reporting Trials (CONSORT) was the most required guideline with 24% (24 journals) journals requiring its use and 38% (38 journals) recommending use. Overall, all guidelines analyzed fell below 50% adherence by the journals included in this study for investigation. **Conclusion:** Our investigation into the top 100 journals of PMR found that the majority of journals do not require reporting guidelines or clinical trial registration. Further, we found the mention of specific reporting guidelines to be largely variable. Journals should adopt more rigorous policies in regard to adherence to reporting guidelines and clinical trial registration in efforts to enhance research within PMR.

Keywords: Physical Medicine Rehabilitation

“Do all bunions need surgery?” An Investigation of Google Searches for Hallux Valgus

*Cole R. Phelps BS, Samuel Shepard, BS, Griffin Hughes, BS,
Jake Checketts, DO, John Gurule, DO, Jared Scott, DO, Brian Hawkins, MD,
Wesley Stotler, DO, Matt Vassar, PhD Cole R. Phelps, BS, Medical Student;
cole.phelps@okstate.edu*

Introduction: Hallux valgus (HV) or a bunion is one of the most common forefoot deformities. Approximately one in four adults will develop HV with a higher prevalence in adult females. Given the high prevalence of HV along with the wide variety of non-surgical and surgical treatment options for it, we believe patients are likely turning to internet search engines for questions germane to HV. Previous orthopaedic investigations have used Google’s “People Also Ask” box to characterize frequently asked questions (FAQs) regarding total knee and hip arthroplasty. Yet, no such investigation has been conducted for HV. Using Google’s Frequently Asked Questions (FAQs), we sought to classify these questions as well as assess their levels quality and transparency.

Methods: On October 9, 2022, we searched Google using these four phrases: “Hallux Valgus Treatment,” “Hallux Valgus Treatment Surgery,” “Bunion Treatment Surgery,” and “Bunion Treatment Surgery.” We refreshed search results until a minimum of 100 FAQs were produced; we extracted the sources of these 100 questions for content analysis. Information transparency was assessed using the Journal of the American Medical Association’s (JAMA) Benchmark tool, question classification was defined using the Rothwell Classification of Questions, and information quality was assessed using Brief DISCERN. This study was approved by an IRB.

Results section: Our Google search returned 299 unique FAQs after removing duplicates and unrelated FAQs. The majority were classified as fact based questions (149/299, 49.8%), followed by value (92/299, 30.8%) and policy questions (58/299, 19.4%). Overall the most common topic searched was related to the evaluation of treatment or surgery (79/299, 26.4%). The frequent answer sources were medical practices (158/299, 52.8%), followed by commercial (69/299, 23.1%) and academic (38/299, 12.7%). The one-way analysis of variance revealed a significant difference in mean quality scores among the 5 source types ($F= 54.49, P<.001$) with medical practices averaging the worst score (12.1/30) compared to academic sources which were found to have the highest score (21.8/30).

Discussion: Patients seeking online information concerning treatment options for HV appear to search Google for questions related to treatment efficacy and restrictions. The most common source type encountered by patients are small medical practices; these were found to have both poor transparency and poor quality. Our study has several limitations, JAMA benchmark and Brief DISCERN do not assess the accuracy of the information. Secondly, our study is cross-sectional in design limiting the generalizability of our findings to the time when the search was performed.

Significance/Clinical Relevance: In order to increase the transparency and quality of online information regarding HV treatment, online sources should refer to established rubrics such as JAMA benchmark and Brief DISCERN when publishing online information. Physicians should be aware that patients are commonly searching for information related to the evaluation of treatments or surgeries for HV.

Keywords: Outcomes, Hallux Valgus, Bunion, Foot, Orthopaedics

Health Inequities in Dialysis Care: A Scoping Review

*Lindsey Purcell, BS, Joseph Schnitker, BS, Ty Moore, MS,
Andriana Peña, BS, Mitchell Love, BS, Alicia Ito Ford, PhD,
Matt Vassar, PhD Lindsey Purcell, BS, Medical Student; lindsey.purcell@okstate.edu*

Background: Dialysis is a life-sustaining treatment that thousands of Americans with end-stage renal disease (ESRD) rely upon. Understanding the health inequities that exist within dialysis treatment is integral to the improvement of care — especially for those in historically marginalized groups. Our scoping review’s objective was to identify potential gaps in the current literature on inequities in dialysis as well as explore future research that could contribute to more equitable care.

Methods: Following guidelines from the Joanna Briggs Institute (JBI) and the Preferred Reporting Items for Systematic reviews and Meta Analyses extension for Scoping Reviews (PRISMA-ScR), we conducted a scoping review of health inequities in dialysis. PubMed and Ovid Embase were searched in July 2022 for articles published between 2016 and 2022 that examined at least one of the following health inequities as defined by the NIH: race and ethnicity, sex or gender, LGBTQ+ identity, underserved rural populations, education level, income, and occupation status. Frequencies of each health inequity as well as trends over time of the 4 most examined inequities were analyzed.

Results: In our sample of 69 included studies, gaps were identified in LGBTQ+ identity and patient education. Inequities pertaining to race and ethnicity, sex or gender, underserved rural populations, and income were sufficiently reported. No trends between inequities investigated over time were identified. **Conclusions:** Our scoping review examined current literature on health inequities pertaining to dialysis and found gaps concerning LGBTQ+ and patients with lower levels of education. To help fill these gaps, and possibly alleviate additional burden to these patients, we recommend cultural competency training for providers and dialysis center staff as well as community-based educational programs to improve dialysis patients’ health literacy.

Keywords: Dialysis, Inequities, Access, Outcomes

Analysis of Protein-Protein Interaction of ADAMTS7 with Cardiomyocytes using the Yeast Two-Hybrid System

*Bhuvanesh Kumar Raju, MS, ThomasOmboga Momanyi, MS,
Joshua Muia, PhD Bhuvanesh Kumar Raju, MS, Graduate Student; braju@okstate.edu*

Background: Coronary artery disease (CAD) is one of the most prevalent diseases in the USA. About 20.1 million adults of age 20 and above have CAD which makes up 7.2% of the population. A disintegrin and metalloproteinase with thrombospondin motifs-7 (ADAMTS7) is found to be associated with many inflammatory diseases such as CAD and atherosclerosis. Previous studies have shown ADAMTS7 enzyme interacts with the COMP proteins present in the cardiac region and causes degradation of COMP protein which induces CAD in both knock-out and wild-type hyperlipidemic mouse models. This study focuses on finding the domain interaction of ADAMTS7 enzyme with cardiomyocytes using the Yeast 2 hybrid system (Y2H). The Y2H system is one of the powerful methods to find protein-protein interactions in in vitro studies. The study will be conducted to ascertain strong interaction of ADAMTS7 domains and variants with cardiomyocyte proteins causing CAD in humans.

Methods: Two yeast strains are grown, mated to generate a yeast 2 hybrid system used to determine the ADAMTS7 and CAD relationship. The ADAMTS7 encoding gene cloned into the frame of bait plasmid and the prey plasmid generated using cDNA of c-myc gene from a CAD patient. Following, the bait and prey plasmids transformed into Y2H Gold Yeast Strain and Y187 Yeast Strain vectors. After mating they are screened on DDO, DDO/X/A and QDO/X/A drop out media. Then transformed yeasts are plated on SD media containing QDO/X/A.

Results and Discussions: Yeast grown on DDO, DDO/X/A and QDO/X/A media and observed as blue or white colonies. Therefore, yeast containing interactive plasmids grew as blue colonies while the negative interaction colonies as white. The yeast strain employed contained a reporter gene whose regulatory regions contained DNA binding sites for protein X fusion (Bait) and the second hybrid protein Y fusion (Prey). Positive interaction between ADAMTS 7 and cardiomyocytes would result into bait and prey interactions activating upstream activating sequence (UAS). The interaction allows yeast to grow into blue colonies as it selectively expresses enzymes utilizing histidine amino acids. Therefore, if there is an ADAMTS7 enzyme interaction with cardiomyocytes then it confirms the relationship between ADAMTS7 and CAD.

Keywords: ADAMTS7, Coronary Artery Disease (CAD), Yeast 2 Hybrid

Assessment of the harms reporting in systematic reviews focused on hallucinogens: a cross-sectional study

Kaylin Ray, BS, Lauren Kramer, Micah Kee, BS, Holly Flores, BA, Audrey Wise, BA, BS, Morgan Garrett, BS, Brayden Rucker, BS, Ryan Newhardt, BS, Jason Beaman, DO, Matt Vassar, PhD Kaylin Ray, BS, Medical Student;
kaylinr65@gmail.com

Objective: To investigate the reporting of harms in systematic reviews (SRs) focused on hallucinogen use.

Methods: A search was conducted in May 2022 using MEDLINE, Embase, Epistemonikos, and Cochrane databases to retrieve SRs focused on the use of hallucinogens. Investigators screened the titles and abstracts from the search for study inclusion in a masked, triplicate fashion. Investigators analyzed the included SRs for reported harms linked to hallucinogen use via a pre-established harms reporting assessment. Methodological quality of SRs were graded using the AMSTAR-2 (AMSTAR-2) in a masked, duplicate manner. Study characteristics for each review were extracted in duplicate. Corrected covered area (CCA) was measured for SR dyads.

Results: Our search returned 908 articles, and 32 SRs met eligibility criteria for final harms reporting analysis. Of the included reviews, 28 SRs (56.2%) indicated harms as a primary or secondary outcome, 2 SRs (6.3%) reported predetermined methods to grade, collect harms data, or statistically analyze harms. A significant relationship was found between completeness of harms reporting and whether harms were listed as a primary or secondary outcome.

Conclusion: Harms were largely underreported in scientific literature regarding hallucinogen use, despite many studies designating them as a primary or secondary outcome. Inadequate reporting is unlikely to provide credible evidence used to evaluate the benefit-harm trade-off. Therefore, steps should be taken to improve reporting of harms in studies concerning hallucinogen use.

Keywords: Hallucinogens, harms, psychedelics, adverse effects

Comparative Analysis of Opioid-induced Microbiome Alterations in Rat Small Intestine, Cecum, and Colon

Gwen Reilly BS, Senait Assefa1 PhD, Alejandro Torres, BS, Songjukta Chakraborty, MS, Shilpa Dange, MS, Halla Hamdan, BS, Ayomide Ishole, BS, Serene Lim, MS, Joe McCreary, MS, Thomas Momanyi, MS, Bhuvanesh Raju, MS, Logan Swope, MS, Dolores Vazquez Sanroman, PhD, Gerwald Koehler PhD Gwen Reilly BS, Graduate Student; greilly@okstate.edu

Background: Trillions of bacteria, archaea, fungi, and viruses comprise the animal microbiome and virome. The composition and diversity of these complex communities have a profound impact on the health of their animal host. Conversely, microbiome profiles can be affected by multiple host factors such as diet, health, or medication. Embedded in these communities might be groupings such as individual bacterial species/strains or consortia that have key roles and could serve as biomarkers for host health and disease.

Methods: We have been collecting microbiota and/or microbiome profiles from rat small intestine, cecum, and colon after chronic oxycodone administration to assess the impact of the drug on the resident microbial communities and identify such specific markers. Next-generation sequencing systems are used for 16S ribosomal RNA analyses and whole-genome shotgun metagenomics to determine taxonomic profiles and predict functional profiles of the microbial communities. **Results:** Alpha and beta diversity analyses of the microbiota showed differences in the gastrointestinal regions when using location, sex, or treatment as metadata. Differential abundance analyses of datasets from control and oxycodone-treated animals revealed specific alterations in the microbiota composition within these experimental groups. Examples of workflows and bioinformatic approaches are presented that illustrate how biomarker discovery within different gastrointestinal regions could lead to deeper understanding of the impact oxycodone has on the animal and human microbiomes. **Conclusions:** Correlation of microbiome profiles with host metadata will aid in the identification of potential biomarkers of oxycodone use in the different host organ environments. The resulting biomarker discoveries may aid in diagnosis, prevention, and treatment of drug-induced gastrointestinal dysbiosis.

Keywords: Microbiome, Bioinformatics, Oxycodone

Molecular Analysis of the Systemic Dermatoses of Morgellons Disease

Samantha G. Rice, BS, Randy S. Wymore, PhD Samantha G. Rice, BS, Graduate Student; samantha.rice@okstate.edu

Morgellons disease (MD) is a multisystem infectious disease historically viewed as controversial and poorly understood by the medical community. These contentions involve difficulties in diagnosis, as symptoms of MD have similarities consistent with a psychiatric disorder involving the false beliefs of infestation by parasites, also known as delusional parasitosis or delusional infestation. Currently, the factors determining the etiology and transmission of MD are still unknown and the dispute surrounding Morgellons is substantial. MD doesn't discriminate – it affects people of all ages, genders, and ethnicities. In MD patients, a distinct feature of near-microscopic and microscopic fibers is visual within the dermopathy, possessing unique characterizations and formations within the cutaneous and subcutaneous layers of the skin. These unique fibers are spontaneous and consist of a multitude of colors. Although the color of fibers is not fully understood, fiber-like filaments are perceived to be caused by an overproduction of keratin and collagen, with blue filaments containing granules of melanin. However, analysis from past research has given mixed results from unknown to keratin. Other signs and symptoms of MD include crawling sensations on and under the skin, intense itching, severe fatigue, cognitive difficulties, and behavioral effects.

The aim of this study is to investigate if an infectious etiology of the systemic dermatoses is present. Previous research endeavors suggest MD is a disorder associated with a tick-borne illness caused by the bacterium *Borrelia burgdorferi*. A pathogenic spirochete and the causative agent of Lyme disease (LD), transmitted to humans through the bite of an infected black-legged tick (*Ixodes scapularis*). MD studies are currently focused on spirochetes as the causative agent to understand if a coinfection exists and/or multifactorial etiology is a cohort. Recognition of the potential coexistence of multiple pathogens in MD etiology may stimulate the development of novel approaches to diagnosis and treatment. Therefore, allowing multiple diagnostic approaches to be applied simultaneously to detect for the major pathogens in MD.

Epithelial tissue samples are collected and deidentified for DNA extraction and polymerase chain reaction (PCR) is performed using specially designed primers to detect if *Bartonella henselae*, *Borrelia burgdorferi*, *Helicobacter pylori*, and *Treponema denticola* are present. After amplification, PCR products are visualized on a 1-2% agarose gel, stained with SYBR Safe, and visualized on the GelDoc Imager. Positive bands are excised and purified from gels using chemical and centrifugal measures. Eluted DNA is quantified using a NanoDrop spectrophotometer and then sent to OSU's core facility for Sanger Sequencing. Bioinformatic tools are implemented, and nucleotide sequences interpreted for verification of our genes of interest.

Our results indicate the presence of multiple pathogenic organisms found in dermatological specimens, suggesting an infectious etiology of dermopathy is present. Replication of preliminary data is ongoing for credibility of scientific claims. Future research needs to be conducted to continue the exploration of etiologic causes to support our findings. Through further analysis, the potential coexistence of multiple pathogens in MD may hold the answers to this unsolved mystery and bring a better understanding for MD to be recognized in the medical community.

Keywords: Morgellons disease, Lyme disease, fibers, etiology, *Borrelia burgdorferi*

Bilateral inguinal hernias versus osteitis pubalgia: A Case report

Raleigh Ricken, BS, Dr. James Cornwell, Dr. Adam Bradley, Jennifer Volberding, PhD, ATC, NREMT
Raleigh Ricken, BS; Medical Student; rleigh.ricken@okstate.edu

A 31-year-old male ice hockey player presented with symptoms consistent with an inguinal hernia further confirmed with imaging. After undergoing surgical excision of the bilateral inguinal hernias, the patient continued to report pain. Upon further investigation, it was determined that the patient's pain seemed to be more concentrated around the pubic region. Upon MRI re-assessment it was suspected that the patient had mild inflammation of the pubic symphysis and was diagnosed with osteitis pubalgia. Following the new diagnosis, a new course of treatment was advised with patient symptom improvement. This new course of treatment included steroid injection into pubic symphysis and eliminated the patient's pain. It is essential to take into consideration not only the physical presentation but also the activities that exacerbate the pain when making a clinical diagnosis. While the bilateral inguinal hernias were addressed, ultimately the pain resulted from osteitis pubalgia, which is common in ice hockey.

Keywords: Osteitis Pubalgia

The impact of the first year of medical school on anthropometric measurements

Rileigh Ricken, BS, Emily Madrak PhD, ATC, Jennifer L. Volberding PhD, ATC, NREMT Rileigh Ricken, BS; Medical Student; rileigh.ricken@okstate.edu

Background: First-year medical students are placed under a great amount of stress upon starting their medical education. Chronic stress has negative impacts on the mental and physical condition of individuals. Persistent stress can lead to lead increases in various physiological measurements including blood pressure, BMI, resting heart rate, respiration rate, and pulse oximetry. In addition, medical students also have stressors outside the walls of medical school that cause increases in these measurements. The purpose of this study was to track first-year medical students' BMI, blood pressure, heart rate, respiratory rate, and pulse oximetry over the first semester of medical school.

Methods: Medical students were solicited to participate. At the beginning of the semester data collection, participants were asked to complete an online survey for demographic information, and then their blood pressure, heart rate, pulse oximetry, respiratory rate, height in cm, and weight in kg were collected. At the end of the semester, participants returned to have their anthropometric measurements retaken. BMI was calculated using height and weight. Data were uploaded into SPSS for analysis. Means, standard deviations, and frequencies were calculated for variables. Paired samples ttests were conducted to determine differences over the course of the semester. T-tests were also used to determine differences in variables at each individual data collection point for parametric data and Mann-Whitney analyses were run on non-parametric data.

Results: A convenience sample of 28 medical students (male = 16, female = 12, age = 24.86 + 4.16) participated in the study. The paired samples t-test demonstrated statistical significance. for BMI ($t = -2.362$, $p < 0.05$) and weight ($t = -2.364$, $p < 0.05$) with students demonstrating an increase in both. T-tests analyzing differences in variables at the initial data collection demonstrated differences in sex assigned at birth and systolic blood pressure ($t = 2.39$, $P = 0.02$), gender identity and systolic blood pressure ($t = 2.39$, $p = 0.02$), and children in the house and BMI ($t = -2.10$, $p < 0.05$). This demonstrated that males (both sex assigned at birth and gender identity) had higher levels of systolic blood pressure while those individuals who had children living in the home had a higher BMI. Additionally, within the first data collection, a statistical difference was determined by a Mann Whitney between Being Affiliated with a Native Tribe and diastolic blood pressure ($Z = -2.26$, $p = 0.02$), with non-natives having higher diastolic blood pressure. T-tests for the second data collection demonstrated differences between children in the house and BMI ($t = -2.12$, $P = 0.04$) and children in the house systolic blood pressure ($t = -2.41$, $p = 0.02$), demonstrating those with children had higher values.

Conclusions: Attending medical school, although a privilege, ultimately can have negative impacts on students. This study was able to show that the overall rigor and lifestyle of a medical student along with outside factors can negatively impact one's health in terms of weight, BMI, and blood pressure. With that, schools should be encouraged to offer health and wellness programs that students can utilize to improve their overall health. These resources can include but are not limited to, on sight gym, fitness classes, counseling, nutrition classes, mental health resources, and support for habits outside of medical school. You need a statement here on what medical schools can do to mitigate the impact of stress on these measures.

Keywords: Anthropometric changes first year medical students

Novel treatment for *Clostridioides difficile* using *Clostridium butyricum* Mayairi bacteriocin

Jessalyn Rivet-Tissot, BS, Hsiang-Ning Chang, Yuan-Pin Hung, Jenn-Wei Chen, I-Hsiu Huang, PhD
Jessalyn Rivet-Tissot, BS, Graduate Student; jrivett@okstate.edu

Clostridioides difficile is the leading cause of antibiotic-associated diarrhea worldwide and infects approximately 200,000 people annually in the United States. *C. difficile* is a gram positive, anaerobic, spore forming bacterium that takes advantage of the disruption of the gut microflora during antibiotic treatment. *C. difficile* spores germinate in the small intestine and rapidly proliferate in the colon leading to infections that can lead to sepsis and death if left untreated. Vancomycin and metronidazole are the antibiotics of choice for *C. difficile* infections (CDIs). However, relapsing cases are often common while the risk of developing antibiotic resistance is high. Therefore, it is critical to develop alternative treatment strategies against *C. difficile*. Previously, our lab screened multiple non-pathogenic commensals for their ability to inhibit *C. difficile* in vitro. Currently commercialized as a probiotic, *Clostridium butyricum* Mayairi bacteriocin (CBMB) was shown to have the highest inhibitory effect on multiple strains of *C. difficile* in vitro. Currently we have successfully cloned and purified recombinant CBMB. Results from our laboratory show an equal to greater effectiveness of the bacteriocin compared to the current antibiotics. In this study, our goal is to assess the activity of the bacteriocin on several strains of *C. difficile* as well as other similar bacterium. The goal of the research would be to find a novel treatment for CDIs that would avoid reoccurring cases and antibiotic resistance risks.

Keywords: clostridium, bacteriocin, protein, inhibition

Disparities in Diabetic Foot Examinations: A Cross-Sectional Analysis of the Behavioral Risk Factor Surveillance System

Kristyn Robling, BS, Kristen McPherson, MPH, Douglas Nolan, DO, Micah Hartwell, PhD Kristyn Robling, BS, Medical Student; krrobli@okstate.edu

Introduction: Diabetes Mellitus (DM) is a growing problem in the US and causes serious health complications such as cardiovascular disease, end-stage renal disease, peripheral neuropathy, foot ulcers, and amputations. There are guidelines in place for prevention of foot ulcers in individuals with diabetes; however, adherence to these guidelines appears to be poor due to financial barriers, time and resource constraints among physicians, and lack of education among patients. Poor mental health and poor physical health often arise from DM and also contribute to development of other complications. Thus, our objective was to identify how frequent poor mental health days, a depressive disorder diagnosis, frequent poor physical health days, or physical inactivity affect annual foot examinations in individuals with diabetes.

Methods: We performed a cross-sectional analysis of the 2021 Behavioral Risk Factor Surveillance System (BRFSS) datasets to determine the relationship between annual foot examinations and frequent poor mental health days, a depressive disorder diagnosis, frequent poor physical health days, or physical inactivity. We used a bivariate logistic regression model to determine these associations using odds ratios (OR). The regression model was controlled for age, sex, race/ethnicity, health insurance, level of education, current smoking status, and BMI category.

Results: Our results showed 72.06% of individuals with frequent poor mental health days received a foot check, compared with 76.38% of those without poor mental health days—a statistically significant association (AOR: 1.25; 95%CI: 1.09-1.43). Of those reporting a sedentary lifestyle with no physical activity, 73.15% received a foot check, compared with 77.07% of those who were physically active which was also statistically significant (AOR: 1.31; 95%CI: 1.14-1.49). Although having a depressive disorder diagnosis and reporting frequent poor physical health days had lower rates of annual foot examinations, these results were not statistically significant. Rates of foot checks were also lower among individuals who were female ($X^2 = 6.22$, .013), Hispanic ($X^2 = 7.91$, < .0001), lacked insurance ($X^2 = 51.24$, < .0001), were currently smoking cigarettes ($X^2 = 12.24$, < .003), or were less than 35 years of age ($X^2 = 14.97$, < .0001).

Conclusions: Individuals reporting frequent poor mental health days or a sedentary lifestyle were statistically less likely to obtain an annual foot examination. These results are likely explained by a decrease in motivation to partake in self-care among those with poor mental health or sedentary lifestyles. The critical nature of foot ulcer prevention highlights the need to identify groups that do not utilize preventive care so further complications may be avoided. Interventions such as increased mental health screening, counseling or support groups, exercise classes, and educational materials may increase utilization of preventive services among individuals with diabetes, and thus increase the rates of annual foot examinations and prevent foot ulcer development and amputations.

Keywords: Diabetes, Feet, Ulcer, Examination, Prevention

An analysis of Patient Reported Outcomes among Congestive Heart Failure Clinical Trials

*Drayton Rorah, BS, Jonathan Pollard, BS, Corbin Walters, DO,
Will Roberts, DO, Micah Hartwell, PhD, Christian Hemmerich, BS,
Matt Vassar, PhD Drayton Rorah, BS, Medical Student; christian.hemmerich@okstate.edu*

Background: More than 6.2 million Americans have congestive heart failure (CHF) and expected to increase to 8 million by 2030. Owing to the high prevalence of CHF, research efforts are essential for investigating therapies that decrease morbidity and mortality and improve patient reported outcomes (PROs) among individuals with CHF. Randomized control trials (RCTs) are commonly used to investigate therapeutic efficacy, but can also be used to examine PROs. The CONSORT Statement created evidenced-based recommendations to be used by authors as a tool to ensure complete and appropriate reporting of trials. One extension of the CONSORT statement is the International Society for Quality of Life Research (ISOQOL), which is used to improve the reporting of PROs in RCTs. In this study, we focus on examining the reporting quality of RCTS that evaluate PROs for individuals with CHF using the ISOQOL screening guideline.

Methods: We searched PubMed for pharmacological intervention RCTs reporting PROs for the treatment of CHF. We included cluster designs, crossover designs and parallel arm studies designs with PROs and excluded all non-randomized study designs, as well as RCTs with a sample size less than 50. Using a pilot tested Google Form, two investigators independently and blindly applied the 28 item ISOQOL checklist to each RCT to evaluate for the completeness of PRO reporting.

Results: Our search returned 1114 studies, of which, 65 are included in the analysis. The average completion of the ISOQOL reporting standards was 44.51%. Higher completion of the ISOQOL PRO standards was observed in the RCTs with PROs as primary endpoints compared to the RCTs with PROs as a secondary endpoint. The multivariable regression model showed that RCTs with PROs as a primary endpoint had a 21.46% better completion percentage ($t=4.45$, $p < 0.001$), when controlling for PRO recording duration and trial registration. Eight (8/65, 12.31%) of the RCTs met the satisfaction criteria of completing $\frac{2}{3}$ of the ISOQOL PRO reporting standards. All of these RCTs had a PRO as a primary endpoint.

Conclusion: Our analysis of the reporting of PROs in CHF RCTs with drug interventions suggests that the quality of reporting is suboptimal. This evidence of substandard reporting of PROs is disconcerting as it reduces the transparency of RCTs, which are considered the foundation of evidenced based medicine. Inadequate reporting may result in clinicians implementing misrepresented or incomplete evidence into clinical practice. Validated reporting tools, such as the ISOQOL, can be used by trialists and clinicians alike to improve and critically appraise the reporting of PROs in RCTs.

Keywords: Congestive Heart Failure, Patient Reported Outcomes, CONSORT

The Effects of Soft Tissue Flossing (Voodoo Flossing) on Ankle Range of Motion in Athletes: A Critically Appraised Topic

Cheyann Sales, BS, ATS, Amber Sons, BS, ATS, Jennifer Volberding, PhD, LAT, ATC, NREMT Cheyann Sales, BS, Graduate Student; cheyann.sales@okstate.edu

Clinical Scenario: Limited ankle range of motion may put athletes at increased risk of injury. Soft tissue flossing is a newer technique used to increase range of motion (ROM) and promote joint health. This critically appraised paper looked at the effectiveness of this technique on athletes and ankle ROM. Clinical Question: How does soft tissue flossing effect ankle range of motion in athletes?

Summary of Findings: A search was performed for articles investigating the effects of soft tissue flossing on ankle range of motion. All three studies included in this critically appraised topic determined that tissue flossing was effective in increasing ankle range of motion, specifically dorsiflexion. However, when compared to traditional ankle stretching, there was not a statistically significant difference.

Clinical Bottom Line: There is evidence to support that soft tissue flossing can be a beneficial technique for athletes to increase ankle dorsiflexion range of motion. Further research is needed with other joints and larger patient populations to increase the validity of the technique.

Strength of Recommendation: These studies are graded as a B on the SORT scale based on the limited patient populations.

Keywords: soft tissue flossing; voodoo wrapping; ankle range of motion; athletes; ankle mobility

Reporting of harms in systematic reviews focused on naltrexone: a cross-sectional study

Joseph Schnitker, BS, Lindsey Purcell, BS, Morgan Garrett, BS, Holly Flores, BA, Audrey Wise, BA, BS, Micah Kee, BS, Brayden Rucker, BS, Jason Beaman, DO, Matt Vassar, PhD Joseph Schnitker BS, Medical Student; joseph.schnitker@okstate.edu

Background: Naltrexone is a commonly used pharmacologic intervention for Alcohol Use Disorder (AUD), Opioid Use Disorder (OUD), and several off label indications. Due to its popular use, it is important for both benefits and harms of naltrexone therapy to be adequately assessed within the medical literature. Systematic reviews (SR) often provide physicians with up-to-date information regarding the safety profile of a given therapy. Therefore, we sought to assess the completion of harms reporting in SRs related to naltrexone, the methodological quality of included systematic reviews, and primary study overlap among included systematic reviews.

Methods: Our study searched MEDLINE (Pubmed and Ovid), EMBASE, Epistemonikos, and Cochrane Database for Systematic Reviews. We included SRs assessing naltrexone for both FDA-approved and offlabel uses. Screening and data extraction were performed in a masked, duplicate fashion. Overlapping primary studies among included SRs were assessed using the corrected cover area (CCA). Additionally, we appraised each included SR using the AMSTAR-2 checklist.

Results: Out of the 87 included SRs, one study used a grade or severity scale to assess harms (86/87, 99.0%) and 4 studies used terminology to describe harms from naltrexone therapy (4/87, 4.6%). Additionally, AMSTAR-2 appraised 72 SRs as “critically low” (72/87, 82.8%) and 2 SRs as “high” (2/87, 2.3%). A Kruskal-Wallis test showed a significant relationship between studies graded “critically low” via AMSTAR-2 and harms reporting completeness ($P=.0486$), as well as studies that specified harms as a secondary outcome and completeness of harms reporting ($P=.0001$). Our study found 4 pairs of included SRs had a “high” (>50%) overlap of primary studies.

Conclusions: Our study demonstrates that underreporting of harms is prevalent among SRs on naltrexone therapy. We suggest implementing changes to improve harms reporting within medical literature which will aid physicians in better interpreting a study’s results.

Keywords: Naltrexone, cross-sectional analysis, systematic reviews, harms

Trends in influenza immunization among pregnant women: A cross-sectional examination of the Behavioral Risk Factor Surveillance System from 2017-2020

*Allisyn Shed, MS, Kelli Swank, BS, Kristen McPherson, MPH,
Micah Hartwell, PhD Allisyn Shed, MS, Medical Student; allisyn.shed@okstate.edu*

Background: Maternal influenza vaccination is a vital aspect of prenatal care and is recommended by the CDC's Advisory Committee on Immunization Practices (ACIP) and the American College of Obstetricians and Gynecologists (ACOG). Pregnant individuals with influenza are at a higher risk of serious illness, intensive care unit admission, and many other adverse maternal and neonatal outcomes. As of December 2021, data indicates that among women of childbearing age, nearly 50% of flu-associated hospitalizations have been among those who were pregnant. This may be due in part to declining flu vaccination uptake among pregnant individuals. Receiving the flu vaccine in pregnancy can decrease the risk of hospitalization by approximately 40% and can also provide infants with protection for their first few months of life. Given the declining rates of vaccination and the increased risk of serious illness in pregnancy, we sought to examine trends in influenza immunization among pregnant individuals from 2017-2020 and determine if disparities exist by race/ethnicity.

Study Design: For this cross-sectional study, we utilized data from BRFSS from 2017-2020 to examine trends in influenza immunization uptake among pregnant individuals overall and by race/ethnicity. Respondents were included if they identified as being pregnant and responded to a question about flu vaccination, and race/ethnicity was self-reported. We then assessed the prevalence of flu vaccination among pregnant individuals for each BRFSS cycle and then tested for disparities between race/ethnicity groups using χ^2 -square tests of independence.

Results: From 2017-2020, less than half of individuals did not receive a flu vaccine during their pregnancy (4702 of 10,933; 43.01%). Among pregnant individuals, flu vaccine uptake differed significantly by year, with the lowest rate seen in 2018 (27.34%) and the highest in 2020 (44.23%)-- during the COVID-19 pandemic. There was also a statistically significant association between flu vaccination during pregnancy and race/ethnicity ($\chi^2_{(5)} = 59.93$, $P = .002$). Between 2017-2020, only 29.87% of American Indian/Alaskan Native and 29.89% of pregnant individuals received a flu vaccine, compared with 47.72% of individuals who reported as Asian and 38.82% of whom reported as White.

Conclusion: Our study showed that pregnant individuals who identified as American Indian/Alaskan Native or Black were less likely to receive the flu vaccine. These findings indicate clear disparities in flu vaccine uptake in pregnancy based on race/ethnicity. Further research into these disparities would be beneficial in order to identify specific factors that could be addressed in order to improve flu vaccination rates among pregnant women overall, as well as for specific groups. The overall low rate of flu vaccination among pregnant individuals from 2017-2020 is concerning and may indicate a need for improvements in patient education and awareness regarding the importance of receiving this vaccine during pregnancy.

Keywords: Influenza, Vaccination, Pregnancy

What are patients asking about shoulder arthroplasty? An investigation of Google Searches

Samuel Shepard, BA, Griffin Hughes, BA, BS, Landon Stallings, DO, J. Michael Anderson, DO, Jeremy Scott, DO, Chad Hanson, DO, Clint Basener, DO, Brian Chalkin, DO, Matt Vassar, PhD Samuel Shepard, BA, Medical Student;samuel.shepard@okstate.edu

Introduction: The utilization of shoulder arthroplasty has been increasing steadily over the last few decades. Given this continuous increase, we expect that patients will increasingly search the internet for sources of information regarding shoulder arthroplasty. The primary objective of this study is to characterize the content of the most frequently asked questions (FAQs) regarding shoulder arthroplasty. The secondary objective is to assess both the quality and transparency of the suggested information for shoulder arthroplasty.

Methods: On October 9th, 2022 the following search terms were searched using Google “shoulder arthroplasty”, “total shoulder arthroplasty”, “reverse shoulder arthroplasty”, and “reverse shoulder surgery.” For each search the “people also ask” function was queried until a minimum of 150 FAQs were generated for each search term. We recorded the individual FAQs along with the linked answer sources. All FAQs were classified using the Rothwell Classification. All sources were assessed for transparency using JAMA Benchmark and quality with the Brief DISCERN tool.

Results section: Our search returned a total of 1275 FAQs. After removing duplicates and unrelated FAQs our included sample size was 173. Fact questions were the most common classification type (102/173, 59%) followed by value questions (52/173,30%) and policy questions (19/173, 11.0%). The most common fact questions were related to technical details (42/103, 40.7%). Medical Practices (67/173, 38.7%) were the most encountered source type followed by Academic sources (60/173, 34.6%). Both Academic and Medical Practices were associated with poor transparency (Table 1.). The one-way analysis of variance (ANOVA) revealed a significant difference in mean quality scores among the 5 source types ($F = 18.6, P < .001$) with Medical Practices averaging the lowest score (16.1/30) compared to Commercial sources which were found to have the highest quality of all included sources (24.1/30). (Table 1)

Discussion: Patients seeking online information for shoulder arthroplasty appear to search Google for questions related to a plethora of technical details and restrictions. The most common source type encountered by patients are those of Medical Practices; these were found to have both poor quality as well as poor transparency as measured by JAMA Benchmark and Brief DISCERN. Our study has several limitations, JAMA benchmark and Brief DISCERN do not assess the accuracy of the information. Secondly, our study is cross-sectional and cannot be generalizable to other fields or other topics. Lastly, this study assessed online sources from one moment in time. Given the large amount of internet traffic Google experiences, web sources provided by the platform may change with time and search trends. Moving forward, medical practices should use validated tools as guidance for increasing the transparency and quality of the medical information they publish online. Physicians should know that their patients may be informing themselves about shoulder arthroplasty risks and management with low quality internet sources. Our findings reinforce the importance of well-informed, evidence-based patient counseling before and after shoulder arthroplasty.

Keywords: Cross-sectional, Google, Shoulder Arthroplasty

Acute Rehabilitation Protocol for Recovering COVID-19 Patients

P. Drake Short, BS, Carli Williams, BS, Kara Bunting, DO P. Drake Short, BS, Medical Student; drake.short@okstate.edu

Myocardial infarctions are a very common occurrence that have a wide range of potential causes. In the inpatient setting, more specifically in the intubated and sedated patients, myocardial infarctions can often go missed if a high level of suspicion is not present to obtain serial troponins and EKG's.

This patient is a 83 year old female who initially presented due to increasing abdominal pain in association with nausea, vomiting, and diarrhea. Patient has a past medical history significant for hypertension, diabetes mellitus type 2, and ESRD. Patient was discharged two days prior to her most recent admission due to diverticulitis. She re-presented due to worsening symptoms. A clinical diagnosis of sepsis secondary to diverticulitis was established. Patient was started on empiric antibiotic treatment. Initial CT did not show any evidence of free fluid or abscess. As patients clinical course progressed her symptoms did not subside, and her WBC count continued to increase while on empiric antibiotic therapy. Infectious disease was consulted who broadened patients' antibiotics to ertapenem and recommended repeat CT abdomen pelvis due to patients continued symptoms in the setting of a persistently increasing WBC count. Repeat imaging showed evidence of moderate pneumoperitoneum and free fluid in the right lower quadrant due to sigmoid colon perforation. General surgery subsequently performed an ExLap with sigmoid colectomy. Patient was also noted to incidentally have an elevated troponin at this time of 0.06. Patient post-operative EKG showed right bundle branch block with inferior ST segment elevations consistent with acute coronary syndrome. Once patient had underwent surgery, she was taken for emergent PCI in the setting of an inferolateral STEMI. Due to patient being intubated, it is unknown if patient was experiencing concomitant anginal symptoms. Patient was found to have a 99% occlusion of the left circumflex, significant ulcerated plaque with associated thrombus was noted. She underwent successful IVUS guided PCI with mechanical thrombectomy and DES x2 placement to the LCx. Patients' post-op echocardiogram did show evidence of mild septal and inferior hypokinesis with a new reduced EF of 44%. Post PCI patient was started on rectal aspirin and IV cangrelor due to inability to use the upper GI tract post-op. Though patient could be on clopidogrel, ticagrelor was chosen as it is an easier transition from IV cangrelor. Patient was also started on a high intensity statin as this time as is indicated by guidelines. Due to patients complex clinical course and multiple comorbidities, goals of care discussions led to patients' family electing for CMO.

This case illustrates the importance of having a high level of suspicion for myocardial ischemia in patients with multiple risk factors who are unable to complain about chest pain. Physiologic stress in the setting of pneumoperitoneum with feculent peritonitis was likely the culprit of this patient's myocardial infarction. It is not indicated to obtain daily troponins on patients who have not complained of chest pain, but checking troponin and EKGs in severely ill patients with multiple cardiac risk factors, especially in those who cannot verbalize anginal symptoms could potentially save patients from prolonged cardiac ischemia.

Keywords: Coronavirus, COVID-19, Acute Rehabilitation

The Effect Menstrual Cycles Phases Have on Ligament Laxity as a Risk Factor for ACL Injuries in Female Athletes: A Critically Appraised Topic

Amber Sons, BS, Lauren Ford, BS, Matthew O'Brien, PhD, LAT, ATC, PES, CES Amber Sons, BS, Graduate Student; amber.l.sons@okstate.edu

Clinical Scenario: Women are 2-6 times at a higher risk of suffering from an Anterior Cruciate Ligament (ACL) rupture compared to men; hormonal factors are thought to predispose them to this injury. Given the ramifications of ACL injuries, prevention is critical, and clinicians are actively seeking ways to decrease the risk of ACL injuries. This critically appraised topic looked at the four unique phases of the menstrual cycle and the increase of risk ACL injury may have within each phase.

Clinical Question: In a normal menstrual cycle, what effects do each phase and hormone fluctuation play on ligament laxity regarding an increase in ACL injury risk in female athletes?

Summary of Key Findings: ACL laxity occurring in conjunction with the approximate time of ovulation phase in the menstrual cycle.

Clinical Bottom Line: There is moderate evidence to support the notion that there is a greater incidence of ACL injuries or risk in the ovulatory phase of the menstrual cycle. This phase occurs approximately in the middle of a female's cycle, around days 13-15 and when estrogen levels typically rise. Future research can expand on studying women with menstrual dysfunction and those taking contraceptive hormone therapy as well as investigate not only cis women but transgender, gender fluid, and nonbinary women.

Keywords: menstrual cycle, knee laxity, menstruation, ligament laxity, ligament, ACL, injury risk

How blood flow restriction (BFR) can assist therapeutic exercise in patients with chronic ankle instability (CAI)

Jared Spencer, BS, Cheyenne Sales, BS, Aric Warren, PhD, LAT, ATC Jared Spencer, BS, Graduate Student; jared.spencer@okstate.edu

Clinical scenario: The high recurrence of lateral ankle sprains progresses to chronic ankle instability and can affect many athletes in all sports. Chronic ankle instability (CAI) is often associated with a decrease in muscle strength, increase in pain, decrease in range of motion, and decrease in balance or neuromuscular control. The use of blood flow restriction with CAI can increase muscular outcomes and be used as a rehabilitation tool. Clinical Question: Is there evidence to suggest that blood flow restriction improves strength, muscle activation and (or) cross-sectional area (CSA) of the lower leg musculature in those with chronic ankle instability?

Summary of Key Findings: The three studies evaluated one of the muscular outcomes of either strength, CSA, or muscle activation in result of BFR training. Each of the three studies reported a type of significant improvement in muscular outcomes using BFR for CAI.

Clinical Bottom line: There is moderate evidence to support therapeutic exercise with low-intensity blood flow restriction in patients with chronic ankle instability. The evidence concluded a significant improvement in BFR to increase muscle activation of fibularis longus, anterior tibialis, vastus lateralis, and soleus.¹⁻² There is moderate evidence suggesting BFR can induce strength gains in the muscles dependent on the exercise selection.

Recommendation: Grade B exists for the use of blood flow restriction with therapeutic exercise for patients with CAI. Further research in exercise selection and regimen can change confidence in efficacy.

Keywords: blood flow restriction, BFR, chronic ankle instability, CAI, blood flow restriction and therapeutic exercise, ankle sprain, therapeutic exercise.

Endometrial Receptivity Testing and Subsequent Adjustment to Window of Implantation Timing Improve Pregnancy Success Rates of Women Undergoing Assisted Reproductive Technology

*Zak Rose-Reneau, DO, Rachel Terry, BS, OMS III, Ryan Riggs, MD,
Derica Anderson, BS Rachel Terry, BS, Medical Student; rachel.terry10@okstate.edu*

Introduction: For decades, REI research focused solely on the creation of a viable embryo to increase pregnancy rates. Recently, research has identified the impact of endometrial adhesion molecule expression during the Window of Implantation (WOI) as playing a major role in embryo implantation.

Methods: This is a retrospective case-control study of women undergoing Assisted Reproductive Technology (ART) and the effects of the Igenomix © Endometrial Receptivity Assay (ERA) on pregnancy success rates following frozen embryo transfer.

Results: ERA results showed 29 of 60 patients were normal, 20 of 60 patients were Early Receptive (WOI existing 12 hours later than expected), and 11 of 60 patients were Pre-Receptive (WOI existing 24 hours later than expected). Ninety-one percent of patients with a corrected abnormal ERA had successful pregnancies while only 72% achieved successful pregnancy without using ERA to assess for their WOI ($p = < 0.01$, OR 3.82).

Conclusions: Endometrial Receptivity Assay testing has a significant impact on successful pregnancy rates among patients undergoing ART. Women should be encouraged to undergo ERA testing to ensure accurate timing of their WOI for embryo transfer. While numerous medication changes can be made by the physician to improve implantation success rates, if the WOI timing is not accounted for, those changes are for naught because the endometrium is not prepared to receive the embryo and subsequent embryo implantation into the endometrium will not occur. The use of ERA could save the patient tens-of-thousands of dollars and shave years off their time to achieve successful pregnancies.

Keywords: Assisted Reproductive Technology, Endometrial Receptivity Assay, Implantation, Pregnancy, Reproductive Endocrinology

Laparoscopic Removal of Heterotopic Pregnancy with Subsequent Term Delivery of Intrauterine Fetus; A Case Report

*Rachel Terry, BS, Zak Rose-Reneau, DO, Zachary Mullins, DO,
Carlos Guevara, DO Rachel Terry, BS, Medical Student; rachel.terry10@okstate.edu*

Introduction: Heterotopic pregnancy has a reported incidence of 1 in 30,000 spontaneous pregnancies and 1 in 100 pregnancies using In-Vitro Fertilization (1). Although rare, the incidence is rising and a consensus for management has yet to be published. Expectant management, laparoscopy, laparotomy, and fetal reduction are current management methods, yet each presents unique risks to the mother and intrauterine pregnancy (2). Due to the lack of guidance, clinicians are left to decide the best route based on the clinical scenario and their individual comfort.

Case Presentation: A 42-year-old G5P3023 Hispanic female presented to the Emergency Department (ED) for vaginal bleeding and lower abdominal cramping. β -hCG on presentation was 15,000 mIU/mL. A transvaginal ultrasound (TVUS) showed an irregularly shaped sac within the endometrial cavity and a cystic structure adjacent to the right ovary. She was hemodynamically stable and instructed to return in 48 hours for reevaluation. Repeat β -hCG was 53,000 mIU/mL and the TVUS noted intrauterine and right-sided ectopic pregnancies consistent with gestational ages of 5 weeks and 6 days. She underwent a laparoscopic right salpingectomy without complications. She ultimately delivered a term neonate with no consequences from the early gestation laparoscopy.

Discussion: A Heterotopic pregnancy is defined as a multifetal pregnancy containing one conceptus with normal uterine implantation that coexists with one implanted ectopically (3). Consistent with numerous prior published data, our case report confirms laparoscopy as a safe and effective method for management of the extrauterine pregnancy of a heterotopic pregnancy while maintaining the integrity of the intrauterine pregnancy (4-9).

Keywords: Heterotopic pregnancy, Laparoscopy, In-Vitro Fertilization, Pregnancy

Simulating End-of-Life Scenarios: Interprofessional End-of-Life Communication

Rachel Terry, BS, Connor West, Kayli Nail, Sydney Martinez, Catherine Heith, Madison Meder
Rachel Terry, BS, Medical Student; rachel.terry10@okstate.edu

Introduction: Effective and compassionate End of Life (EOL) conversations between healthcare providers and patients and their families are an essential part of all medical care. However, many studies have found that medical students and residents often feel unprepared and uncomfortable to have EOL conversations with patients and their families. In addition, other healthcare providers such as nurses, respiratory therapists, and social workers feel unprepared to lead and participate in EOL conversations, especially early in their training. Evidence from previous studies points to a lack of consistent training in EOL conversations for healthcare providers. Caregivers receive irregular education, infrequent practice, and sporadic feedback on EOL conversations. Current medical educational practices and institutional culture in U.S. medical schools does not equip future physicians with the training and skills required for adequate EOL conversations. Training medical professionals to initiate and conduct effective and compassionate EOL conversations with patients and their families is crucial. Interprofessional simulation-based medical education was shown improve participant's self-efficacy and perceived abilities relating to communication/teamwork and leadership/management of clinical scenarios. This study examines the effectiveness of an Interprofessional EOL Training and Simulation with intervention (specific) feedback versus control feedback in decreasing caregiver anxiety, enhancing knowledge of the role of each team member, promoting future interprofessional collaboration, and improving participants' knowledge, skills, and performance during real EOL discussions.

Methods: All APPs (clinical nurse specialists (CNS), doctor of nursing practice (DNP), master of nursing education (MSN), nurse practitioners (NP), physician assistants (PA)) and APP students, chaplaincy students/trainees, chaplains, child life specialists, medical students, nurses, nursing students, physicians (residents, fellows and faculty), pharmacists and pharmacy students, respiratory therapists, social workers and social work students(henceforth referred to as 'caregivers') at the University of Oklahoma are eligible for participation in this study regardless of year of training/experience, sex, gender, race, or religion. Participation in this study was voluntary. Randomized groups of participants were placed into intervention (I Group) or control group (C Group). Participants were scheduled for a 145–165-minute simulation sessions with a Didactic Module, Pre-Simulation Huddle, an EOL communication simulation, and Debrief and Feedback sessions.

Results: The study team focused on interprofessional delivery of EOL news from participant simulations (n=18) and found that before feedback (n=10), 50% of EOL conversations were opened by the medical provider role, compared to 0% after feedback (n=8). Furthermore, prior to feedback 90% of EOL prognostic information was delivered by the medical provider role, compared to 100% following feedback. We found that teams with feedback were more likely to have a non-provider initiate EOL discussions with patients. However, teams with feedback were more likely to have the provider deliver the EOL news.

Conclusion: Future directions of this overall study include using conversational analysis to determine the effectiveness of the intervention on caregiver's knowledge, skills, and performance during EOL discussions. We will compare caregiver's improvement in delivering EOL news based upon changes from Simulation 1 to Simulation 2 from Intervention (IECTT) versus Control (Gap Kalamazoo) feedback using qualitative subgroup analyses. The overall goal is to use the findings to develop an educational framework for students from multiple disciplines of healthcare to effectively deliver EOL news and develop the skills required to initiate and lead EOL conversations with patients.

Keywords: End of Life, Interprofessional Communication, Simulation

Adherence to Reporting Guidelines by Pulmonary and Respiratory Medicine Journals

*Laura Tham, BS, Zohaib Thayani, BS, Garrett Jones, BS, Caleb Smith, BS,
Danya Nees, BS, Griffin Hughes, BS, Matt Vassar, PhD Laura Tham, BS, Medical Student;
laurayiletham@gmail.com*

Background/Objective: Reporting guidelines and clinical trial registration are implemented to ensure that only quality, unbiased research has effects on clinical practice and patient care. This present study sought to assess the extent to which scientific journals for pulmonary and respiratory medicine advise, or require adherence to reporting guidelines and clinical trial registration.

Methods: A web-based search, using the 2021 Scopus CiteScore tool, was performed to identify pulmonary and respiratory medicine journals to be included in our study. On the basis of impact factor, the top-100 Journals that met inclusion criteria were included in this study. Using the instructions for authors subsection of each Journal's website, we recorded data regarding clinical trial registration, mentioning of the EQUATOR network, and Journal policies regarding the following reporting guidelines: CONSORT, MOOSE, QUOROM, PRISMA, STARD, STROBE, ARRIVE, CARE, CHEERS, SRQR, SQUIRE, SPIRIT, TRIPOD, and PRISMA-P. Editors of each Journal were emailed to determine what study types they accept.

Results: Of the top-100 pulmonary and respiratory medicine journals, roughly 60% required clinical trial registration, whereas, less than one-quarter made no mention of clinical trial registration. Additionally, we found that 30% of our included Journals mentioned the EQUATOR network. The CONSORT (29%) and PRISMA (20%) reporting guidelines ranked as the most frequently required guidelines by Journals. STROBE was the third most frequently required reporting guideline, with nine Journals establishing it as a precondition. The QUOROM (99%), PRISMA-P (75%), COREQ (74%), and CHEERS (74%) reporting guidelines were most often to be unmentioned by Journal's instructions for authors. There was a significant association between a Journal's mentioning of the EQUATOR network and their mentioning of every reporting guideline, with the exception of the QUOROM guidelines. There was not a significant association with clinical trial registration and mentioning of the EQUATOR network.

Conclusion: We found that adherence to reporting guidelines, of any type, are not frequently required by pulmonary and respiratory medicine journals. Conversely, the majority (60%) of pulmonary and respiratory medicine journals do require clinical trial registration. Both clinical trial registration and adherence to research guidelines improve research quality and limit biased reporting. Current pulmonary and respiratory medicine literature stands to benefit from increased reporting guidelines adherence.

Keywords: Reporting guidelines, clinical trial registration, instructions for authors

Investigation of Treponeme spp.in Morgellons and Bovine Digital Dermatitis

Miranda Thibodeau, BS, Randy Wymore, PhD Miranda Thibodeau, BS, Graduate Student;
miranda.thibodeau@okstate.edu

Background: Morgellons disease is a rare disease and has been characterized by colorful fibers emerging from the skin in slow or non- healing skin lesions. The etiology of Morgellons disease is still unknown; however, there are some similarities Morgellons bovine digital dermatitis (BDD)- a disease in cattle that causes lameness and decreased milk production, among other adverse effects. Both diseases have lesions resembling those of yaws, a topical Treponema spp. infection characterized by papillomas. Treponeme spirochetes are associated with BDD and may have been with Morgellons, suggesting the possibility some species of the bacteria are related to the human and bovine symptoms. Literature review of BDD suggests the Treponeme spp. are candidates as Morgellons- associated bacteria. Nonetheless, further research is needed to suggest a BDD association with Morgellons disease.

Aim: In this study, we are using PCR and gel electrophoresis to determine if specific bacteria are present in-patient samples.

Method: Patient samples containing epithelial tissue were used for these experiments. DNA was extracted from six different patient samples. Polymerase chain reaction (PCR) was used to amplify DNA. Primers were used during PCR that are specific towards the bacteria of interest. After PCR was complete, samples were analyzed on 2% agarose gel and stained with SYBR safe. Results were viewed on UV IT Transilluminator.

Results and Conclusion: TBA

Keywords: Morgellons, Treponeme, BDD

Assessment of Empiric Outpatient Therapy and Readmission Rates from the Emergency Department for Community Acquired Pneumonia

*Jenna Thomason, PharmD, Kurtis Young, DO,
Caleb Jones, OMS-IV, Abigail Kee, OMS-II, Ana Fisher, DO,
Kelly Murray, PharmD Jenna Thomason, PharmD, Resident; jcthomason@osumc.net*

Background: Community acquired pneumonia (CAP) is a common reason for emergency department visits and is associated with high mortality and readmission rates. The Center for Medicare and Medicaid Services (CMS) aims to decrease readmission rates for pneumonia through their Hospital Readmissions Reduction Program (HRRP) that was initiated in 2012. One study investigated avoidable causes of CAP readmission and discovered that the highest percentage of avoidable causes of readmission was related to discharging patients with either missing or incorrect diagnosis or therapy (31.7%). Emergency department (ED) physicians are in a unique position to impact these factors, as they are often responsible for initial diagnosis and empiric therapy initiation. The purpose of this study is to identify adherence to guideline-recommended empiric therapy and utilize the data to develop targeted interventions to refine our current practices.

Methods: This study was performed as a single-center, retrospective, observational chart review. The study period was July 1, 2021-June 30, 2022, and the study included ED patients with an ICD-10 diagnosis code for pneumonia. Patients were independently reviewed by two investigators, with a third available for final statistical decision if needed. Each patient was reviewed for inclusion and exclusion criteria, and appropriateness of empiric therapy was evaluated according to the 2019 CAP guidelines. Patients were also reviewed for readmission within 30 days.

Results: Data collection and analysis is still ongoing for this project. There were 169 total patients with a diagnosis code for CAP discharged from the emergency department during the pre-specified timeframe. For preliminary results 39 charts have been completed. 29 charts met inclusion criteria. Of these, only 2 had received appropriate empiric therapy. There were 10 total readmissions, with 3 of them being due to worsening pneumonia. None of the patients readmitted for worsening pneumonia had received appropriate empiric therapy. Extended duration and incomplete regimens for patients with comorbidities were the most common reasons for inappropriate therapy. Based on preliminary data, only 6% of patients received appropriate empiric therapy for CAP. Readmission rate overall was 35%, and rate of readmission for worsening pneumonia was 10%.

Conclusions: Based on preliminary data, overall prescribing habits from the emergency department are not adherent with the guidelines. There is insufficient data to draw conclusions about the effect of this on readmission. Targeted provider education will be developed based on the most common reasons for incorrect therapy, with the goal of improving guideline adherence.

Keywords: CAP, pneumonia, antibiotics

BDNF levels affected by the synthetic cannabinoid WIN55,212-2 in adolescent rats

Alejandro Torres, BS, Dolores Vazquez-Sanroman, PhD Alejandro Torres, BS, Graduate Student;
alejandro.torres12@okstate.edu

Cannabinoids are molecules that bind to endocannabinoid receptors (eCBs) CB1 and CB2 present in the central and peripheral nervous system. The synthetic CB1 receptor agonist WIN55,212-2 (WIN) emulates the effects of delta-9-tetrahydrocannabinol (THC), the psychoactive component of cannabis. Interestingly, endocannabinoids and neurotrophins, play critical roles in mood, immune and endocrine homeostasis, stress/anxiety response, and neuroplasticity. Endocannabinoids (eCBs) and neurotrophins, particularly brain derived neurotrophic factor (BDNF), are potent neuromodulators that play critical roles in many behavioral and physiological processes. Disruption of either BDNF or endocannabinoid signaling is associated with an overlapping set of neurologic and psychiatric diseases. The chronic use of synthetic cannabinoids during adolescence, a vulnerable stage for brain development may affect or alter the homeostasis and neuroplasticity dependent on BDNF. Therefore, we evaluated the effect of adolescent exposure to WIN on blood and brain [periaqueductal gray (PAG), prefrontal cortex (PFC), hippocampus, and cerebellum] concentration levels of BDNF. Methods: adolescent rats received 5 twice-daily injections of saline (1 mL/kg i.e.) or WIN55,212-2 (0.8 mg/kg i.e.) every other day. Brains and truncal blood were collected, and ELISA immunoassay was used to determine pro and mature BDNF levels. Results: One way ANOVA revealed that WIN increased proBDNF [F 1,11= 12.57, p<0.05] and mBDNF levels [F 1,11= 2.63, p<0.05] in the dorsolateral PAG and periphery [F 1,11= 5.15, p<0.05]. PFC, hippocampus, and cerebellum results are being processed. Discussion: The chronic exposure of synthetic cannabinoid WIN during adolescence modifies the proBDNF/mBDNF ratio in the dorsal PAG and periphery, suggesting that proBDNF/mBDNF ratio are involved in endocannabinoid-mediated adolescence brain plasticity.

Keywords: BDNF, Cannabis, WIN55, Adolescence, Hippocampus

Adherence to reporting guidelines across clinical Neurology journals: a preliminary study

*Andrew Tran, BS, Kellen Stadler, BS, Zachary Ernst, BS,
Caleb A. Smith, BS, Danya Nees, BS, Griffin Hughes, BA, BS,
Matt Vassar, PhD Andrew Tran, BS, Medical Student; andrewtranresearch@gmail.com*

Background: High quality research is depended upon by clinicians for daily practice and advancement of medicine. Reporting guidelines (RG) and clinical trial registration help ensure that studies are performed in a transparent and unbiased manner. For example, the Consolidated Standards of Reporting Trials (CONSORT) is a RG for randomized control trials (RCTs) which has led to improved data reporting and increased usability by clinicians. Additionally, when authors submit a protocol to a public registry prior to commencement of their study, this increases transparency and is shown to reduce bias that may arise during the production of the study. Therefore, applying the use of RGs and clinical trial registration is indicated in all fields of medicine. However, the extent by which journals enforce these methods in the field of clinical Neurology is unknown. Therefore, the primary objective of this study was to examine the proportion of journals that require or recommend adherence to RGs for their study designs in the field of clinical Neurology.

Methods: We conducted a Systematic Review evaluating the top 100 journals in clinical Neurology according to the 2021 Scopus CiteScore tool. In a masked, duplicate fashion, data were obtained from each journal's "instructions to authors" webpage regarding mention of the Enhancing the Quality and Transparency of health Research (EQUATOR) Network and requirement/recommendation of popular RGs as outlined by the EQUATOR Network. Statements regarding clinical trial registration were analyzed in a similar fashion. To mitigate the risk of bias, the editorial team of each journal was contacted to confirm the article types that are accepted.

Results: Of the top 100 journals, 51/100 (51%) referenced the EQUATOR Network. The most referenced RG was CONSORT, with 42/100 (42%) journals recommending adherence and 22/100 (22%) requiring adherence. QUORUM was referenced in 2/100 (2.0%) journals, the least referenced RG in our study sample. Regarding Clinical Trial Registration, 12/100 (12%) journals recommended registration, while 53/100 (53%) required it.

Conclusion: There are inconsistencies in the adoption of reporting guideline requirements/recommendations and clinical trial registration policies across the top clinical neurology journals. Therefore, we recommend that journal editors better enforce policies regarding these tools to improve the quality of research published.

Keywords: Neurology, Reporting, Guidelines

Frequency and Severity of Depression amongst Pregnant Healthcare Workers before and during the SARS-CoV-2 Pandemic: an analysis of the 2019-2021 National Health Interview Survey

*Paula Tran, BBA, Rachel Terry, BS Avery Dutcher, BS,
Natasha Bray, DO, Micah Hartwell, PhD Paula Tran, BBA, Medical Student;
paula.tran@okstate.edu*

Background: The COVID-19 pandemic has intensified stressors and worsened mental health outcomes for healthcare workers (HCWs), which is often exacerbated in vulnerable groups such as those who are pregnant. Depression in HCWs is influenced by factors such as fears for personal safety, higher workload, and social isolation. Pregnant HCWs report a higher prevalence of psychological symptoms exacerbated by the COVID-19 pandemic. Despite increased efforts to expand the knowledge of negative health outcomes secondary to the pandemic, depression levels amongst pregnant HCWs during this time remain largely unknown. Thus, the aim of the study is to identify trends of depression frequency, severity, and medication use in pregnant healthcare workers throughout the stages of the COVID-19 pandemic in the United States (2019-2021).

Methods: We analyzed data from the National Health Interview Survey combining the 2019-2021 cycles. Determination of depression frequency, severity, and medication usage were compared between 128 pregnant HCWs and 485 pregnant non-HCWs(n=613). These associations were then categorized in COVID19 pandemic stages of pre-pandemic (2019), during (2020), and endemic (2021) via multivariable regression controlling for age, income-to-poverty ratio, and additional children in the home.

Results: We found no observable differences in the rates of pregnancy, reported depression or symptomatology between HCW and non-HCW. During the pandemic, pregnant HCWs in 2021 were more likely to report ever having depression compared to pregnant HCWs in 2019 (AOR: 3.33; CI:1.92-5.79). During 2021, HCWs were also more likely to report a moderate to severe level of depression compared to 2019 (AOR: 2.55; CI: 1.54-4.24).

Conclusion: Our findings indicate that rates of pregnancy amongst HCWs and non-HCWs were similar, as well as rates of depression and symptomatology in those who were pregnant. However, our results showed that amongst pregnant healthcare workers, rates of reporting ever having depression and severity was greater during the endemic stage of the COVID-19 pandemic compared to pre-pandemic. As depression in pregnant women may lead to postpartum depression along with other health concerns, exacerbated rates and severity amongst pregnant healthcare workers during the endemic stage should be prioritized to ensure positive maternal and child outcomes plus that they are able to return to the workforce when ready.

Keywords: COVID-19, healthcare workers, pregnancy, depression

Comparison of adverse event reporting between adolescent and young adults and older adults with cancer enrolled in Phase II/III clinical trials

*Cole Wayant, DO, PhD. Kyle Fitzgerald, BS, Christian Hemmerich, BS,
Michael Roth, MD Kyle Fitzgerald, BS, Medical Student; kyle.fitzgerald@okstate.edu*

Background: Momentum to improve cancer outcomes in adolescents and young adults (AYAs, diagnosed between 15-39 years of age) has been growing in recent years. However, there remains to be significant barriers to understanding differences in treatment response in AYAs compared with younger and older patients. Currently, it is unknown the extent to which AYA adverse event data is reported separately in oncology clinical trials that enroll AYAs and older adults. For this reason, this study investigates not only the reporting of disaggregated AYA clinical trial data in published oncology trials, but also the differences in treatment-related adverse events experienced by AYAs.

Methods: In our cross sectional analysis, we performed a comprehensive search using PubMed (which includes Medline) to identify all clinical trials that met eligibility criteria published from January 1, 2021 to December 31, 2021. Two independent investigators title and abstract screened, full-text screened, and extracted data from the final study sample using Google Forms. In addition to obtaining demographic data for each included trial, a further assessment was made to see if the trial distinguished outcomes between AYAs and older adults. Microsoft Excel was used for summary data and measures of central tendency. No further statistical analyses were planned.

Results: A total of 572 Phase II and Phase III cancer trials evaluating anti-cancer agent(s) or radiation interventions in either breast, colorectal, Hodgkin's lymphoma, non-Hodgkin's lymphoma, or melanoma met the inclusion criteria. Of these included trials, zero (0/572, 0.00%) disaggregated adverse event AYA clinical trial data.

Conclusion: There remains a substantial gap in understanding the adverse event profile regarding anticancer agent(s) or radiation interventions in the AYA population with either breast, colorectal, Hodgkin's lymphoma, non-Hodgkin's lymphoma, or melanoma. We recommend future clinical trials evaluate and disaggregate AYA adverse event clinical trial data from other age groups to assess the differences in treatment-related adverse events in AYAs and to improve guidelines and treatment protocols for AYA patients with cancer.

Keywords: cross-sectional analysis, adverse event reporting, oncology, clinical trials, adolescent and young adults

Quality Improvement Project on Global Health Trips- Student Orientation & Rotation Information

Liza Whitaker, BS, Berenice Jimenez, BS, Athena Chatzigiannidis, DO, Leah Bailey, DO, John Mumeey, MS, Rhonda Casey, DO Liza Whitaker, BS, Medical Student;
liza.whitaker@okstate.edu

Background: Medical student education varies widely from school to school. Some students, both osteopathic and allopathic, report feeling unprepared as they transition into junior doctors following graduation. This study looks at the impact of global health rotations on providing supplemental education and training to student doctors attending Oklahoma State University College of Medicine (OSU-COM). These rotations offer early hands-on opportunities to learn communication skills, clinical diagnosis skills, and cultural competency in a setting where technology and supplies may be scarce. Each rotation is unique in highlighting common diseases and public health concerns localized to specific regions or countries, especially for patients living in underserved communities. Previous studies have found that students who participate in global health rotations typically score higher in knowledge of preventive medicine and public health on exams such as NBME Part II. Methods: Pre- and post-rotation surveys were created to assess student level of confidence on important components of running a clinic on a global health trip. This is quantified using objective answer choices and Likert scales. The goal of this QI project is to measure an increase in student confidence by 10% over the course of the most recent 10-day global health rotation- with plans to expand this project for future use in medical student training. Specifically, medical student knowledge on common disease processes, common pharmacy abbreviations, and components of a SOAP note were evaluated. The pre-rotation survey was used to establish a baseline for student level of education and training before initiation of the trip. The post-rotation survey objectively quantifies change in student confidence and medical knowledge upon rotation completion.

Results: Survey data was collected from 20 medical students following a global health trip to Athens, Greece. Pre-rotation survey response rate was 50%. Students overall reported a mean pre-rotation score of 3.8 out of 9 respectively for confidence with prescription abbreviations, managing common disease processes, clinical use and dosage of common medications, and usage/presentation of SOAP notes. Post-rotation survey response rate was 85%. Students overall reported a significant increase in confidence for the aforementioned metrics with a mean post-rotation score of 5.7 out of 9. Students were also questioned on their perceived interest in a detailed pre-rotation packet covering all previously mentioned topics in preparation for an upcoming rotation. It is noteworthy to address the 100% response in favor of providing a detailed pre-rotation packet for future rotations.

Conclusions: Insufficient information from previous OSU-COM Global Health rotations exists to establish a baseline for approaching trips with students- especially for those with limited clinical experience. This project's preliminary data from a single global health rotation demonstrates a significant benefit to student confidence in prescription abbreviations, managing common diseases, the clinical use and dosage of common medications, and the usage/presentation of SOAP notes. It further reveals an overwhelmingly 100% positive perceived student interest in a pre-rotation packet covering these topics for future rotations. Thus, the systematic development of this approach to assess medical student knowledge will help guide subsequent preparation for future trips to come. Keywords: Clinical Skills, Quality Improvement, Knowledge Survey

Clinical Manifestations of Meckel's Diverticulum: A Case Series

Liza Whitaker, BS, Hannah Tully, BS, Jonathan Lowe, DO, Rhonda Casey, DO Liza Whitaker, BS, Medical Student; liza.whitaker@okstate.edu

Background: Meckel's Diverticulum (MD) is the most common congenital malformation of the gastrointestinal tract. The pathophysiology of MD stems from embryological origins. The typical developing anatomy of a fetus involves the vitelline or omphalomesenteric duct, which connects the midgut to the yolk sac. This duct normally involutes around the 5th-6th week of gestation as the bowel settles into the abdominal cavity. Meckel's Diverticulum is relatively uncommon, affecting around 2% of the population. MD typically involves males more commonly than females. The location of Meckel's diverticulum can vary; however, it is typically found in the middle to distal ileum. While MD can affect patients of any age, 25-50% of symptomatic patients present under 10 years. In this case series we present two cases of Meckel's Diverticulum that led to different complications at Kanti Children's Hospital in Kathmandu, Nepal, one being an intestinal obstruction and the other intussusception. Case presentation: A 3-year-old female with no prior medical history presented to Kanti Children's Hospital with three days of subjective fever, cough, vomiting, tachypnea, and one day of periumbilical abdominal pain. The patient was initially admitted for additional workup for pneumonia. Review of imaging suggested findings of multiple dilated loops throughout the peritoneal cavity with few loops showing edematous walls, consistent with features of an acute intestinal obstruction. Additionally, a 6-year-old male presented to Kanti Children's Hospital with ten days of abdominal pain and five days of vomiting. On the physical exam there was no fever or abdominal distension noted. CT scan of the abdomen suggested acute ileo-ileal intussusception.

Both patients were taken to the operating theater and the abdominal cavity was accessed via supraumbilical incisions. Once the abdominal cavity was accessed, volvulus and Meckel's Diverticulum was observed in the 3-year-old, who had resection and anastomosis performed. Wedge resection with ileo-ileal anastomosis for ileo-ileal intussusception secondary to Meckel's Diverticulum was performed in the 6-year-old patient. Postoperative course was uneventful in both cases and each patient was discharged home in improved condition.

Discussion: Meckel's Diverticulum can be challenging to identify given its non-specific presentation and findings, as well as several different complications that can arise. Asymptomatic MD can be found incidentally on imaging or, more commonly, while undergoing abdominal surgery for another GI pathology. Symptomatic MD typically presents with acute abdominal pain and distension, potentially mimicking appendicitis. Among symptomatic patients, 2-4% will potentially develop complications. One case series of 286 patients, 35% of patients presented with rectal bleeding or melena, 20% with perforation, 14% with intestinal obstruction, and 12% with intussusception. Both patients presented in this case series were treated surgically with traditional open laparotomy. In areas such as the United States, these cases are typically performed laparoscopically or via a hybrid approach. Interestingly, a retrospective review of the National Surgical Quality Improvement Program-Pediatric (NSQIP-Ped) database did not find differences in operating time, postoperative complications, or readmissions when comparing laparoscopic vs open resections. Additionally, this review found that up to 27% of laparoscopic cases required transition to an open approach.

Keywords: Meckel's Diverticulum, Pediatric Surgery, Embryology

The Usefulness of Eccentric Hamstring Strength as a Hamstring Injury Predictor

Kira Wicker, BS, Jared Spencer, BS, Jennifer Volberding, PhD Kira Wicker, BS, Graduate Student;
kira.wicker@okstate.edu

Clinical Scenario: Hamstring injuries are prevalent in sports and there have been many identified risk factors for hamstring injuries. Eccentric hamstring strength as a hamstring injury risk factor has been investigated.

Clinical Question: Is eccentric hamstring strength an effective predictor of hamstring injuries in athletes?

Summary of Key Findings: A search was performed on current literature on using eccentric hamstring strength as a predictor for hamstring injury. Three articles met the search criteria and were included in this critically appraised topic. Two studies found no correlation between eccentric hamstring strength and the prevalence of hamstring injuries. One study demonstrated that subjects who could not perform a nordic hamstring exercise beyond 30 degrees were at higher risk for injury.

Clinical Bottom Line: All the risk factors, not just eccentric hamstring strength, should be combined to identify those that are at risk of hamstring injury.

Keywords: Injury, Prediction, Hamstring

Microvascular free flap, head and neck reconstruction, harms reporting, cross-sectional analysis

Andrew Wilson, BA, Zachary Ernst, BS, Audrey Wise, BA, BS, Holly Flores, BA, Morgan Garrett, BS, Trevor Torgerson, DO, Tom Hamilton, DO, Matt Vassar, PhD Andrew Wilson, BA, Medical Student; andwils@okstate.edu

Objective: To evaluate harms reporting in systematic reviews of microvascular free flap in head and neck reconstruction.

Data Sources: This cross-sectional analysis included searches from the following major databases from 2012 to June 1, 2022: MEDLINE (Pubmed and Ovid), Embase, Epistemonikos, and the Cochrane Database of Systematic Reviews.

Review Methods: In a masked duplicate manner, screening was performed using Rayyan, and data was extracted using a pilot-tested Google form. AMSTAR-2 was used to appraise the methodological quality of reviews, and Corrected Covered Area was calculated to detect primary study overlap across all reviews. Reviews were then grouped in pairs of two, called dyads, and Corrected Covered Area was calculated again for each individual dyad. Dyads with high overlap ($\geq 50\%$) were further investigated for accuracy of harms reporting.

Results: Our initial search yielded 268 records, with 50 systematic reviews meeting inclusion criteria. A total of 46 (92%) of the included reviews demonstrated 50% or more adherence to the items assessed in our harms checklist. Our Corrected Covered Area tool revealed 0.6% primary study overlap across all reviews, and one dyad with high overlap ($\geq 50\%$). No statistically significant relationship was observed between the completeness of harms reporting and reviews listing harms as a primary outcome, reviews reporting adherence to PRISMA, or a review's AMSTAR rating.

Conclusion: This study identifies how harms reporting in systematic reviews of microvascular free flap reconstruction of the head and neck can be improved and provides suggestions with potential to mitigate the paucity in current literature.

Keywords: severe mental illness, dyslipidemia, statins

The Effectiveness of Global Postural Re-education in Reducing Chronic Non-Specific Low Back Pain and Improving Daily Function in Adults: A Critically Appraised Topic

Martha J Yost, BS; Rylee L Holman, BS; Matthew S O'Brien, PhD Martha J Yost, BS, Graduate Student; mayost@okstate.edu

Clinical Scenario: Low back pain (LBP) is one of the most common complaints in adults. Research indicates that the implementation of global postural re-education may decrease pain in those with chronic low back pain and improve daily function.

Clinical Question: How effective is the Global Postural Re-education technique in reducing chronic or non-specific low back pain in adults compared to conventional treatment methods?

Summary of Key Findings: A search was conducted for articles comparing GPR to standard physical therapy techniques. Three articles were included in this critically appraised topic; two randomized controlled trials and one quasi-randomized controlled trial. All compared GPR to standard physical therapy techniques including static stretching and motor control exercises. All three articles found a significant improvement in both control and treatment groups, but a greater improvement in pain, daily function, and range of motion.

Clinical Bottom Line: There is moderate level of evidence that clinicians may opt to use GPR and postural re-education methods when treating patients with chronic LBP to reduce pain levels, increase hip and back range of motion, and improve overall function with activities of daily living. **Strength of Recommendation:** The studies included in this review show level B evidence based on the SORT scale that GPR may be an effective treatment method for reducing chronic LBP short term compared to conventional treatment methods.

Keywords: Global postural re-education; chronic low back pain; function

Infectious disease journals' adherence to reporting guidelines: a preliminary study

*Alec Young, BS, Makenna Hittner, BS, Eli Oldham, BS,
Skylarr Beerman, MS, Matthew Chancellor, BS, Caleb A. Smith, BS,
Danya Nees, BS, Griffin Hughes, BA, BS, Matt Vassar, PhD Alec Young, BS, Medical Student;
alec.young@okstate.edu*

Background: Study results published in academic medical journals inform and influence healthcare decision making. Sufficient reporting of studies is primarily charged to those performing the research. However, academic medical journals can promote more complete reporting of their published studies. Recommending or requiring the use of reporting guidelines and prospective trial registration may be methods to ensure published studies adhere to rigorous reporting standards.

Objective: The main objective of this study is to evaluate the 'instructions to authors' pages of infectious disease journals to establish the rate of recommendation or implementation of reporting guidelines for common study designs used in the medical literature. In addition, we aim to assess the recommendation or enforcement of the registration of clinical trials and systematic reviews by these same journals.

Methods: We conducted a systematic review to evaluate the top 100 infectious disease medical journals according to the Scopus CiteScore tool. Editorial staff members of each journal were contacted via email once per week for three successive weeks to determine accepted study types by their journal. A pilot-tested google form was used to extract journal data, including reporting guideline requirements, from 'instruction to authors' pages in a masked, triplicate fashion.

Results: Results of the 100 infectious disease journals that were examined showed that 65 were published in Europe. The ICMJE was mentioned in 83 of these journals. Of the examined reporting guidelines, CONSORT was mentioned the most, with 52% of journals recommending this guideline. The only other reporting guidelines mentioned in over half of the journals were PRISMA (53%) and ARRIVE (62%). The MOOSE and QUOROM guidelines were the least mentioned as both were in less than 10% of the journals. Clinical trial registry statements were mentioned in over 70% of the journals, however only 62% required this.

Conclusions: This study found that CONSORT, PRISMA, and STROBE were the most often reported guidelines amongst infectious disease journals. Many reporting guidelines were not mentioned by journals, such as MOOSE and QUORUM. The requirement of reporting guidelines by infectious disease journals would aid in standardizing reporting data and increasing both transparency and reproducibility of studies.

Additionally, guidelines for authors were often difficult to find, with multiple links to follow at times. It may prove beneficial for journals to construct author instructions in ways in which prospective authors are able to know exactly what guidelines to use when attempting to publish their work.

Keywords: Reporting guidelines, infectious disease, preliminary study

Acknowledgements

**We would like to thank all of our judges and reviewers
for their contributions to this event.**

**Additional Thanks
Research Committee
External Affairs
Medical Library Staff
Research Office Staff**

Planning Committee Members

Rebecca Crandell, Assistant Director, Research Compliance
Kadin Falkensten, Research Compliance Coordinator
Amber Hood, Director, Regulatory Compliance & Research Facilities
Pat Kehres, Assistant Director Human Subjects Protection Program
Christin Standifird, Executive Assistant