

Rocky Vista University presents

RESEARCH DAY 2022

Communicating Science to All Audiences

October 21, 2022

Event Program

ROCKY VISTA UNIVERSITY

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WELCOME LETTER

Welcome to Rocky Vista University's 11th Annual Research Day!

Thank you to both our visitors and participants for making Research Day a memorable event as we explore the Biomedical, Medical Education, Clinical, Public Health, COVID-19, Case Report, and Review studies that our students and faculty have produced.

We are pleased to have Dr. Aaron Panofsky as the keynote speaker at this year's Research Day. Aaron Panofsky is an Associate Professor in the Institute for Society and Genetics, Public Policy, and Sociology. He is a sociologist of science, knowledge, and culture with a special interest on the history, intellectual organization, and social implications of genetics. He will present his talk titled, "What is scientific misappropriation? What can we do about it? The case of white nationalists and human genetics."

Research Day will begin with Opening Comments at 8:00 am with Ed Bilsky, PhD, Provost at RVU. Immediately following his comments will be the Keynote presentation from 8:10-9:10 am. The Poster Session will be in-person this year from 9:35-11:00 am. The Utah Poster session will be held throughout the first floor, and the Colorado session will be held on the first and second floor atria. Oral Presentations will take place on Zoom from 11:20-12:40 pm. The Awards Ceremony and Dr. Brooks' closing remarks at 12:40 pm will conclude Research Day.

We would like to express our gratitude to Rick Hann and Gary Pippin who have helped with this year's event. Again, thank you for joining us today and we hope you find yourself intellectually entertained.

Happy Researching!
Amanda Brooks, PhD



Mike Jorgensen, PhD
Darcy Salanyk, MS, PA-C
Francina Towne, PhD
Qing Zhong, MD, PhD
Jennifer Montemayor, PhD
Matt McEchron, PhD
Amanda Troy, PhD
Qamrul Choudhury, PhD
Judy Simmons
Emily Cox



SCHEDULE OF EVENTS

8:00 AM - 8:10 AM	Welcome to RVU's 11th Research Day Zoom: https://rvu-edu.zoom.us/j/96994447528
8:10 AM - 9:10 AM	Keynote Speaker Zoom: https://rvu-edu.zoom.us/j/96994447528
9:10 AM - 9:35 AM	Break
9:35 AM - 11:00 AM	Poster Session <i>In Person - CO - 1st & 2nd Floor Atria</i> <i>In Person - UT - 1st Floor</i>
11:00 AM - 11:20 PM	Break
11:20 PM - 12:40 PM	Oral Presentations CO Zoom: https://rvu-edu.zoom.us/j/96994447528 UT Zoom: https://rvu-edu.zoom.us/j/96802472070
12:40 PM - 1:00 PM	Awards Ceremony & Closing Remarks Zoom: https://rvu-edu.zoom.us/j/96994447528



STUDENT ORAL PRESENTATION SCHEDULE

Room 1 Oral Presentations Zoom Link: <https://rvu-edu.zoom.us/j/96994447528>

- 11:20 AM #111 *A Molecular Epitope Analysis of Cytomegalovirus Vaccine Candidates*
Ellison Barlow
- 11:35 AM #18 *Epigenetic Changes Associated with Stress: A Narrative Review*
Garrett Dee OMSII
- 11:50 AM #147 *Genotype-Phenotype Relationships in Marfan Syndrome and Atrial Fibrillation*
Erin Robbins
- 12:05 AM #35 *Using Quantitative Biomarkers to Re-Define Postural Instability in Patients with Movement Disorders*
Jacob T Hanson, BA, OMSII
- 12:20 AM #77 *Neuroimaging of Vestibular and Oculomotor Capacities in Athletes with Recent Sports Related Concussion*
Madison Propp

Room 2 Oral Presentations Zoom Link: <https://rvu-edu.zoom.us/j/96802472070>

- 11:20 AM #8 *Point-of-Care Ultrasound Identification of Hepatic Abscess in Emergency Department Case Report*
Michael Blomquist
- 11:35 AM #133 *The Effect of Physical and Psychological Stress on the Oral Microbiome*
Alexandra McMillan, OMS-III
- 11:50 AM #32 *Lipids and Cancer: Can they be Used to Predict Immune Checkpoint Response in Melanoma?*
Alexander C. Goodman
- 12:05 AM #154 *Amiodarone-Induced Anaphylaxis*
Michelle Tang
- 12:20 AM #112 *Does Physical Exercise have a Positive Effect on the Academic Performance of First Year Medical Students?*
Keenan Barr



Abstract

What is Scientific Misappropriation? What Can We Do About It? The Case of White Nationalists and Human Genetics

Dr. Aaron Panofsky

We often think of scientific misappropriation as outsiders to science engaging pseudoscience or antiscience to undermine legitimate scientific truths and confuse the public. Drawing from my ongoing research project on how white nationalists have sought to misappropriate genetics research, I complicate this view by showing misappropriation to be an array of practices. These include 1) public denial of mainstream conclusions, 2) alternative and selective curation of scientific materials to support racial hereditarianism, 3) elevating heterodox, racial hereditarian figures within science, 4) public participation or citizen science including lay theorizing on discussion boards and blogs, and, notably, 5) the creation of a parallel counterscience with research projects and institutions that aims to compete with and influence the scientific mainstream. What's crucial is that each of these represent different ways of challenging the boundary between scientific insiders and outsiders and between pseudoscience, antiscience, and legitimate science. The talk concludes by discussing lessons and dilemmas about scientific and public responsibility for researchers committed to challenging the misappropriation of their science.



Abstract #8

Point-of-Care Ultrasound Identification of Hepatic Abscess in Emergency Department Case Report

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Case presentation

A 92-year-old female with past medical history of hypertension presented to the emergency department with pain in her right shoulder, right flank, and right upper quadrant of her abdomen. Point-of-care Ultrasound and computed tomography imaging showed concerns for multiple large hepatic abscesses. Percutaneous drainage removed 240cc of purulent fluid that identified *Fusobacterium nucleatum*; a rare cause of pyogenic liver abscess.

Discussion

Emergency physicians should keep hepatic abscess on their differential for right upper quadrant abdominal pain and can utilize point-of-care ultrasound for expeditious diagnosis.

Key words:

Point-of-care Ultrasound, hepatic abscess, pyogenic liver abscess, case report



Abstract #18

Epigenetic Changes Associated with Stress: A Narrative Review

Garrett Dee OMSII (Rocky Vista University) and Rebecca Ryznar PhD (Rocky Vista University)

Stress is associated with changes to the epigenome. In some cases, these epigenetic changes are highly dynamic but in others, there is evidence to suggest that depending on the nature of the stressful exposure, along with the timing during development, a lasting mark can be made to the epigenome. A comprehensive narrative review of the literature was performed by investigating the epigenetic changes that occur as a result of acute stress, chronic stress, early childhood stress, and traumatic stress exposures, along with examining those observed in post-mortem brains or blood samples of suicide completers and attempters. In addition, transgenerational effects of these changes are reported. For all types of stress studies examined, the genes *Nr3c1*, *OXTR*, *SLC6A4*, and *BDNF* reproducibly showed epigenetic changes and moreover certain modifications were passed down to subsequent generations following various types of stress exposures. The aforementioned genes are known to be involved in neuronal development, hormonal regulation and are all associated with susceptibility to mental health disorders including depression, anxiety, personality disorders and PTSD. Epigenetic personalized therapies are mentioned as an approach to treating individuals with these particular epigenetic changes. Further research is warranted in order to determine the scope of epigenetic actionable targets in individuals suffering from long lasting effects of stressful experiences.



Abstract #32

Lipids and Cancer: Can They be Used to Predict Immune Checkpoint Response in Melanoma?

Alexander C. Goodman, RVUCOM-CO

Immunotherapies, such as immune checkpoint blockers (ICBs), are the current first line treatment for advanced malignant melanoma. While these treatments have provided promising outcomes, many patients show primary or acquired secondary resistance to these therapies. Mechanisms behind ICB resistance are not yet fully understood, but growing evidence suggests lipids may be involved. Specifically, an increase in the function of several lipids has shown to be tumorigenic across many cancers, including melanoma, by promoting cell proliferation and migration. Lipids can also suppress anti-tumor immune responses by altering cell signaling. Given the vast diversity of lipids and their functions, it is important to identify specific tumorigenic lipids to gain a better understanding of ICB resistance mechanisms in melanoma. In this study, we assessed serum levels of 56 lipids in a cohort of nine patients with malignant melanoma undergoing ICB treatment, both before and after treatment. Serum lipids were also measured in a cohort of three healthy control patients. Although several lipids showed significant differences in abundance, prostaglandin E2 (PGE2) was the only lipid that we found to be consistently different between healthy controls and melanoma patients as well as between ICB responders and non-responders. Specifically, patients with malignant melanoma showed higher levels of serum PGE2 when compared to healthy controls ($p = 0.037$). There was also a significant difference in PGE2 levels over the course of the ICB treatment between responders (decreased, $p = 0.011$) and non-responders (increased, $p = 0.089$). This suggests that the change in PGE2 during treatment could be predictive of ICB response in patients with malignant melanoma. Currently, we are measuring PGE2 levels in a larger cohort of patient serum samples to validate our initial findings. We are also examining the correlation between melanoma genotype and subtype on the effect of exogenous PGE2 on melanoma cells in vitro. Understanding the mechanisms behind the influence PGE2 has on melanoma will provide novel insight into a potential mechanism of ICB resistance, allowing for more effective therapies in the future.



Abstract #35

Using Quantitative Biomarkers to Re-Define Postural Instability in Patients with Movement Disorders

*Jacob T Hanson, BA, OMSII, RVUCOM, University of Minnesota Department of Neurosurgery;
Alec Jonason, BS, University of Minnesota Dept of Neurosurgery;
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Reid Johnson, BS, University of Minnesota Dept of Neurosurgery;
Robert A McGovern, MD, University of Minnesota Dept of Neurosurgery, MVAHCS Dept of Neurosurgery*

Background

Parkinson's disease (PD) and normal pressure hydrocephalus (NPH) are neurological disorders characterized by gait and balance problems, which lead to falls. These motor symptoms are evaluated during ON/OFF medication testing and lumbar drain trial (LDT) for PD and NPH patients, respectively. Postural instability (PI) among PD and NPH patients is not well known, especially after surgical intervention.

Hypothesis

We hypothesized that the effect of surgical intervention (Deep Brain Stimulation (DBS) for PD patients, VPS for NPH patients) on PI would significantly improve compared to baseline and would also be indistinguishable from healthy age-matched controls.

Methods

Seven PD patients, 11 NPH patients, and 20 healthy age-matched controls wore inertial measurement units (IMUs) and underwent 10-20 pull-tests of varying intensities performed by a trained clinician. Patients were evaluated OFF/ON medication (PD), pre-LDT and post-LDT (NPH) and then also again at 12 months post-operatively.

Results

Groups were compared using the relationship between peak COM acceleration (pull intensity) and step length (slope), and the overall step length (y-intercept). At baseline, PD and NPH patients demonstrated similar ability to scale their step length reaction to pull intensity (i.e., no significant difference in slope of OFF meds, pre-LDT). NPH patients demonstrated a significant increase in slope but no change in Y-intercept post-LDT compared to pre-LDT. At follow-up, VPS significantly improved the overall reaction time and step length. Conversely, PD patients showed a significant increase in Y-intercept but a decrease in slope upon taking dopaminergic medication. Before DBS, PD patients reacted slower and took smaller steps as pull intensity increased, opposite of a healthy response.

Conclusions

Prospective kinematic evaluation demonstrated postural stability profiles for PD and NPH patients undergoing ON/OFF testing and LDT, respectively, are distinguishable from healthy age-matched controls at baseline and respond differently to intervention. Before VPS, NPH patients showed severe PI, but with normal scaling responses. Before DBS, PD patients have mild PI, but abnormal scaling responses. DBS has a complex relationship with postural response leading to improved scaling responses. This indicates that single, standardized perturbations are not adequate when evaluating PD patients as the results vary with perturbation intensity.



Abstract #77

Neuroimaging of Vestibular and Oculomotor Capacities in Athletes with Recent Sports Related Concussion

Madison Propp M.S. (Rocky Vista University College of Osteopathic Medicine), Sydney Lacy (Colorado State University), Jaclyn Stephens PhD OTR/L (Colorado State University)

Approximately 60% of athletes with a sports related concussion (SRC) experience vestibular and/or oculomotor symptomatology (e.g., blurred vision) (Kontos et.al., 2017). These symptoms can linger and cause significant disruptions in daily activities, such as reading, as well as during sports (Kontos et. al., 2017). Additionally, athletes with vestibular or oculomotor symptomatology can have extended recovery periods compared to athletes without these types of symptoms (Quintana et. al., 2021). Currently, there is limited understanding of the neural underpinnings of these deficits (Kerr, Bakken & House, 2022). Thus, our study is designed to evaluate neural activity during simultaneous vestibular and oculomotor tasks using portable functional near infrared spectroscopy (fNIRS) in athletes with recent SRC. FNIRS is a neuroimaging tool that uses near-infrared light to measure oxygenated, deoxygenated, and total hemoglobin as proxies of neural activity in superficial cortical structures. Unlike other neuroimaging tools (e.g. fMRI), portable fNIRS devices, like ours, can assess neural activity during movement-based tasks. In our study, we will use items from the Vestibular Ocular Motor Screening (VOMS) measure (Mucha et. al., 2014) to assess vestibular and oculomotor capacities in athletes with recent SRC. Specifically, we will use smooth pursuit, vertical and horizontal saccades, near point convergence, vestibuloocular reflex in the horizontal and vertical planes, and visual motion sensitivity. These items will be repeated four times in a randomized block design, so neural activity can be averaged from four trials of each item. Based on previous studies (Urban et. al, 2020; Helmich et. al., 2020; Wu et. al., 2017), we anticipate observing hyperactivity in superficial cortical regions associated with vestibular and oculomotor capacities (e.g. frontal eye fields) in participants with recent SRC compared to healthy controls. Ideally, our findings could inform evaluation and treatment practices for individuals with recent SRC and improve recovery trajectories for athletes experiencing vestibular or oculomotor symptomatology.



Abstract #111

A Molecular Epitope Analysis of Cytomegalovirus Vaccine Candidates

Ellison Barlow¹, , Mckenzie Frye¹, Adelene Morrow¹, and Benjamin Brooks¹

¹Department of Biomedical Sciences, Rocky Vista University, Ivins, UT USA

A MOLECULAR EPITOPE ANALYSIS OF CYTOMEGALOVIRUS VACCINE CANDIDATES

Cytomegalovirus (CMV) is a β -herpesvirus with broad seroprevalence, low morbidity and costly burden of disease. The hCMV genome consists of ~240 kb of double-stranded DNA with approximately 150 open reading frames that encode 41 essential proteins. The size, strain variation, and genome complexity of hCMV, in addition to the diversity of the immune response, have made vaccine development difficult. Numerous promising vaccine candidates have undergone clinical trials, but none have survived clinical trials much less the FDA gauntlet for approval. Vaccine candidates have focused on the envelope glycoproteins that induce the strongest virus-neutralizing antibody generation. While glycoprotein B (gB) is the most common vaccine candidate, numerous other glycoproteins generate neutralizing titers. The presentation will summarize our work detailing the history of vaccines developed, analyze glycoproteins gH/gL, gM/gN, UL128-131 Pentamer Complex, and gO/gH/gL Trimer Complex as vaccine candidates, and assess the structure-biological relationships. In this discussion we hope to emphasize that vaccination development of HCMV will progress with inclusion of combination certain glycoprotein structures.



Abstract #133

The Effect of Physical and Psychological Stress on the Oral Microbiome

Savanna Stoy OMS-III Rocky Vista University; Alexandra McMillan OMS-III* Rocky Vista University; Jennifer Wu OMS-IV, Rocky Vista University; Dellvin Nguonly OMS-IV, Rocky Vista University; Aaron Ericsson PhD, University of Missouri Metagenomic Center; Amanda Brooks PhD, Rocky Vista University*

Background: The oral microbiome is incredibly complex, containing a diverse complement of microbiota that has previously been categorized into 6 broad phyla. While techniques such as next-generation sequencing have contributed to a better understanding of the composition of the oral microbiome, the role it plays in human health and disease is still under investigation. Previous studies have identified that a more diverse microbiome is advantageous for health. Therefore, alterations to the physical or mental health that are of interest in this study, such as stress, are the factors that decrease microbial diversity, leading to the potential for dysbiosis and disease disposition. Intensive Surgical Skills Week (ISSW) is a hyper-realistic simulation training week for military medical students that takes place at the Strategic Operations (STOPS) facility in San Diego, CA. This training week puts students through mass causality simulations and requires them to work through distinct roles within the healthcare team, providing an almost ideal environment to assess the impact of acute stress on oral microbiome diversity.

Hypothesis: Based on the literature on stress and microbiota, we hypothesized that the high stress simulation events at ISSW will impact the composition and diversity of the oral microbiome.
Methods: To investigate this hypothesis, thirty-seven (n=37) second-or third-year medical students who are enlisted in a branch of the military and who attended ISSW in July of 2021 were included in the study. Student participants were divided into 7 teams to complete the hyper-realistic simulations (SIMs) at ISSW. A pilot of 64 buccal samples (n=64) from 3 of the 7 teams were sent for analysis at the University of Missouri Metagenomic Center.

Results: We saw an overall increase in species richness at the end of ISSW when looking at all samples (n=64). Additionally, third year medical students appear to have a greater species richness compared to second year medical students.

Conclusion: Our preliminary data indicates that physical and psychological stress can impact the composition of the oral microbiome. The analyses in this study show that using the oral microbiome as an indicator of stress is promising and may provide evidence to support stress management practices.



Abstract #147

Genotype-Phenotype Relationships in Marfan Syndrome and Atrial Fibrillation

Cody Majeskie¹; Erin Robbins¹; James Turney¹; Nicholas Maier¹; Isain Zapata, PhD²; and Benjamin Brooks, PhD¹

¹Rocky Vista University College of Osteopathic Medicine (Ivins, UT)

²Rocky Vista University College of Osteopathic Medicine (Parker, CO)

Marfan syndrome (MFS) is an inherited connective tissue disorder whose major features involve abnormalities in the cardiovascular, ocular, and skeletal systems. Mutations in the Fibrillin-1 (FBN1) gene, which codes for fibrillin, are hallmarks of MFS. Fibrillin is an extracellular matrix (ECM) protein that provides scaffolding for elastin deposition responsible for the integrity and regulation of specific growth factors, such as Transforming Growth Factor Beta 1 (TGF- β 1), in connective tissue. Mutations in FBN1 leading to dysregulated TGF- β 1 signaling is a main contributor to disease progression in MFS and related diseases.

Although the pathogenesis of MFS is complex, the major morbidities and premature mortality in MFS are cardiovascular-related events. Patients with MFS are at an increased risk of developing atrial fibrillation (AF) secondary to atrial fibrosis. AF is commonly associated with congestive heart failure (CHF) and has been linked to further atrial remodeling resulting in increased fibrosis.

This fibrosis is thought to be mediated by TGF- β 1, a powerful stimulator of cardiac fibroblasts (CF) and regulator of cardiac fibrosis. When CF are activated and become myofibroblasts, they express contractile proteins and secrete excessive ECM proteins. Cardiovascular disease (CVD) is exacerbated by extensive fibrosis, which results in decreased tissue elasticity, conduction, and cardiac output. Over 2900 pathogenic variants of FBN1 are known, however, little is known regarding the genotype-phenotype relationship. Analysis of biobanks and electronic health records from the All of Us Database may increase our understanding of the genotype-phenotypes associated with FBN1 mutations and AF. By providing a more comprehensive view regarding genetic factors underlying complex diseases, such as MFS, we hope to improve the information for disease risk assessment, screening, prognosis, and therapeutic treatments.



Abstract #154

Amiodarone-Induced Anaphylaxis

Michelle Tang (Rocky Vista University, Ivins, UT)

Nitya Nunna (Rocky Vista University, Parker, CO)

Kodee Rasmussen (Rocky Vista University, Ivins, UT)

Qing Zhong (Bioscience department, Rocky Vista University, Ivins, UT)

Background:

Atrial fibrillation is a cardiac arrhythmia that affected 46.3 million individuals in 2016. It is often treated with amiodarone for ventricular rate control. Amiodarone, a class III-antiarrhythmic, may cause many adverse effects, including thyroid disorders, photodermatitis, and pulmonary fibrosis, but Amiodarone-induced anaphylaxis is seldomly reported. The mechanism of this anaphylaxis is unknown, and systematic investigation has not been reported.

Hypothesis:

Multiple factors may contribute to the development of amiodarone-induced anaphylaxis.

Methods:

A literature search was carried out on databases of PUBMED, WorldCat, Google Scholar, and Scopus. The keywords were “Amiodarone” and “Anaphylaxis”.

Results:

There are a total of 10 cases of amiodarone-induced anaphylaxis in the literature. Six patients were male and four were female. Ages ranged from 15-86, with a median age of 56. Nine cases were triggered by intravenous injection (IV) of amiodarone, and one case was triggered by oral administration of amiodarone. The trigger time for IV amiodarone was 1-150 minutes after initiation of the injection. All nine cases (90%) of IV amiodarone resulted in hypotension, with seven cases (70%) developing pulselessness and an immeasurable blood pressure. Six cases (60%) had bronchospasm or a skin rash, and four cases (40%) had angioedema. Only one case had a history of allergy to penicillin and sulfonamide. An amiodarone skin test was only done on one patient and had a positive result. Increased blood tryptase (4 cases), positive basophil activation test (3 cases), increased eosinophil (2 cases), and increased serum IgE (1 case) were reported. Amiodarone was terminated in 80% of the patients. Epinephrine, norepinephrine, antihistamine-1, or steroids had been used to rescue patients. Four patients were intubated, and one patient required a ventricular assist device. All patients (100%) fully recovered.

Conclusions:

Amiodarone-released iodide, amiodarone injection solvents, and amiodarone-induced antibodies may contribute to anaphylaxis. Although amiodarone-induced anaphylaxis is rare, physicians should be aware that amiodarone can cause life-threatening anaphylaxis with prompt treatment being the key to saving patients.



Abstract #112

Does Physical Exercise have a Positive Effect on the Academic Performance of First Year Medical Students?

Keenan Barr (1), Meghana Kethireddy (1), Jaysen Hatch (1), John Bosak (1), Izabela Dziedic (1), Dale Woodbury (2), Matthew Linton (3)

(1) Affiliation 1: Student Doctors of the College of Osteopathic Medicine, Rocky Vista University, Ivins, Utah

(2) Affiliation 2: Associate Professor of Structural Medicine, Rocky Vista University, Ivins, UT

(3) Affiliation 3: Assistant Dean of Preclinical Curriculum, Rocky Vista University, Ivins, UT

This study seeks to examine the relationship between exercise duration, frequency, and style and academic performance at an American Osteopathic medical school. We hypothesized that duration of exercise during the academic year would correlate with increased performance on medical school examinations. First year medical students were recruited to wear a Fitbit Inspire and answer surveys after each course during the 2022 Spring Semester at Rocky Vista University College of Osteopathic Medicine in Ivins, UT, USA. Fitbit data was deidentified after being combined with exam performance data after each course. An analysis of the recorded active zone minutes and examination performance showed that the average duration of exercise during the semester was positively correlated with increased academic performance ($r^2 = 0.295$, significance $p = 0.0133$, $N = 20$). An analysis of survey responses and examination performance showed that academic performance was not significantly correlated with the environment, time of day, or number of exercise partners. This study provides further evidence of the potential positive effect that exercise may have on academic performance of medical students.



INDEX OF POSTER PRESENTATIONS

1	<i>Colorism and Health Outcomes</i>	CO
2	<i>Perceptions of Surgical Wound Care in Diabetic Adults</i>	CO
3	<i>Impact of the USMLE Step 1 and COMLEX Level 1 Transition to Pass/Fail on Osteopathic Medical Student Stress Levels and Board Preparation</i>	CO
4	<i>Longitudinal Outcomes of Short-Acting Contraception in Adolescent Female Patients</i>	CO
5	<i>Screening for Prenatal and Postpartum Depression: A guideline Review</i>	CO
6	<i>Hepatic Encephalopathy in Adult Acute Lymphoblastic Leukemia: Case Report</i>	CO
7	<i>Rice Method Debunked: A Guideline Review</i>	CO
9	<i>An Innovative Design for the Vaginal Speculum</i>	CO
10	<i>Current Concussion Protocols, Sleep, and Glymphatics: How Integrating OMT into Standard of Care Can Augment Recovery Times in Post Concussion Syndrome</i>	CO
11	<i>Canfield Reveal Imager Utilization to Determine UV Changes from Acute Sun Exposure</i>	CO
12	<i>A Rare Adult Presentation of a Congenital Tumor Discovered Incidentally After Trauma</i>	CO
13	<i>Diminished Health Outcomes Among Minors with Non-English Speaking Caregivers</i>	CO
14	<i>An Inexplicable Pain in the Posterior Calf: A Case Report</i>	CO
15	<i>Solitary Extramedullary Plasmacytoma of the Soft Palate: A Case Report</i>	CO
16	<i>Virtual Reality Education versus Traditional Learning Module in the Female Genitourinary Exam</i>	CO
17	<i>The Effect of Spaced Repetition Learning through Anki on Medical Board Exam Performance</i>	CO
19	<i>Evaluating the Reporting of Patient-Reported Outcomes in Clinical Trials on Erectile Dysfunction: A Cross-Sectional Analysis</i>	CO
20	<i>An Overview of Hypertension Screening Guidelines</i>	CO
21	<i>Improving Access & Quality of Care for Muslim Women in Primary Care: Acknowledging and Honoring Cultural & Spiritual Beliefs & Practices of Muslim Women and Reducing Barriers to Care in the United States</i>	CO
22	<i>Guideline Review of Carotid Artery Screening in chronic Tobacco Users</i>	CO
23	<i>Evaluating Educational Modalities in a Simulated Model of Obese Patient Endotracheal Intubation</i>	CO
24	<i>Aspirin eluting bone void filling putty</i>	CO
25	<i>Understanding and Factors Influencing Physician Assistant Student Interest in Postgraduate Fellowship Programs upon Graduation</i>	CO
26	<i>Low-Grade Serous Ovarian Carcinoma in a Pregnant Patient</i>	CO



INDEX OF POSTER PRESENTATIONS

27	<i>Influence of Mental Health on Maternal Mortality: A Literature Review</i>	CO
28	<i>Delay of Medical Care in the Privately Insured</i>	CO
29	<i>Young Adults' Comfort and Understanding of End-of-Life Choices</i>	CO
30	<i>Prevalence of Type-1 Interferon Autoantibodies in Adults with Non-Covid-19 Acute Respiratory Failure</i>	CO
31	<i>Evaluating Perspectives, Knowledge and Behaviors of Osteopathic Medicine in DO Schools: A Study in Employee Education and Changes in Understanding</i>	CO
33	<i>Routine Cervical "Checks" in Final Prenatal Visits for the Uncomplicated Pregnancy: A Search for Guidelines</i>	CO
34	<i>Diagnosis of Concussion in the Acute Setting: A Guideline Review</i>	CO
36	<i>Portal Vein Thrombosis in Acute Pancreatitis: A Case Report</i>	CO
37	<i>Supportive Preference for National Electronic Health Record Database between Providers and Patients</i>	CO
38	<i>Efficacy of Virtual Reality in Teaching Health Professional Students Clinical Case Scenarios</i>	CO
39	<i>Accounting for Altitude in CVD and Stroke Risk - A Cross-Sectional Study</i>	CO
40	<i>Improving Survivability among Head Trauma Patients through Pre-Hospital Biomarker Measurements</i>	CO
41	<i>"Needle Phobia" in Patients with Parkinson's Disease (PD) Experiencing OFF Episodes Is Uncommon</i>	CO
42	<i>The Role of the GABAA receptor α Subunit in Sex Specific Hypnotic Effects of 3α-OH</i>	CO
43	<i>Neuropeptide Oxytocin Level Influences Altruism and Adverse Life Events under the Function of Oxytocin Receptor Genotype SNP rs53576</i>	CO
44	<i>COVID-19 Hospitalization and Mortality Rates, A Comparison between Rural and Metropolitan Populations</i>	CO
45	<i>Anabolic Steroid Use and Cutaneous Manifestations in BodyBuilders and a Dermatologists Role</i>	CO
46	<i>Novel Portable Training Model for Skull Trephination by Non-Neurosurgeons</i>	CO
47	<i>Provision of Equitable Palliative Care for American Indians and Alaskan Natives in the US: A scoping review</i>	CO
48	<i>The State-Based Financial Reality of Women's Health</i>	CO
49	<i>The Sapien Lifestyle and Its Effects on the Markers of Metabolic Disease</i>	CO
50	<i>Barriers to Interpretation for Limited English Proficiency Populations in the Clinic Setting</i>	CO
51	<i>Medical Student Led Community Health Fair: A Community Academic Partnership</i>	CO
52	<i>An Analysis of Factors Impacting Cervical Cancer in Women in Nepal, China, India and the United States of America</i>	CO



INDEX OF POSTER PRESENTATIONS

53	<i>Does SARS-CoV-2 Transmit through Breast Milk?</i>	CO
54	<i>Utilization of Behavioral Health Services Among Online and In-Person Students Prior to and During the COVID-19 Pandemic</i>	CO
55	<i>Barriers to Care For Obstructive Sleep Apnea in Rural Areas</i>	CO
56	<i>A Review of Abdominal Aortic Aneurysm Screening Guidelines in Women with Smoking History</i>	CO
57	<i>Bilateral Patellar Avascular Necrosis Following Total Knee Arthroplasties: A Case Report</i>	CO
58	<i>Analysis of Diversity and Academic Backgrounds Among Emergency Medicine Residency Leadership</i>	CO
59	<i>A Case Report: The Uncommon Syphilitic Alopecia?</i>	CO
60	<i>Distinguishing Gender Identity from Biological Sex in Dermatologic Healthcare: Methods, Harms, and Paths Forward</i>	CO
61	<i>A Case Report: The Atypical Klebsiella Meningitis</i>	CO
62	<i>Free Sunscreen Dispensers: A Readily Available Asset for the Primary Prevention of Skin Cancer</i>	CO
63	<i>Anabolic Steroid use and Cutaneous Manifestations in BodyBuilders and a Dermatologists Role</i>	CO
64	<i>Skin of Color Representation in the American College of Mohs Surgery Educational Cases on Social Media</i>	CO
65	<i>Reducing Intraoperative Radiation Exposure During Periacetabular Osteotomy: The Use of Flat Panel Detector Fluoroscopy</i>	CO
66	<i>Perceptions of Family Planning and Contraception by Maasai Women</i>	CO
68	<i>Gown and Glove Survey Results: Preparation for Third Year Rotations</i>	CO
69	<i>Pulmonary Embolism Diagnostic Criteria: A Data Analysis Comparing Two Clinical Decision Rules</i>	CO
70	<i>Effects of CACNA1G Knock Down in the Central Medial Nucleus of the Thalamus in Mice on Contextual Fear Conditioning following Neonatal Exposure to Sevoflurane</i>	CO
71	<i>The Relationship between Microbiota and the Most Commonly Prescribed Medications in the United States: Future Considerations for Personalized Medicine: A Review</i>	CO
72	<i>Skin Tone and Racial Disparities in Dermatology Educational Resources</i>	CO
73	<i>Retrospective Analysis on the Influence of Mental Health on Maternal Mortality Rates</i>	CO
74	<i>Do Healthcare Providers in Colorado Meet the Recommended Physical Activity Guidelines as Recommended by the American Medical Association and Set by the Physical Activity Guidelines Advisory Committee</i>	CO
75	<i>Case Report: Anca-Positive Minocycline Induced Lupus in a Young Female Adult</i>	CO



INDEX OF POSTER PRESENTATIONS

76	<i>Knowledge of Palliative Care among Young Adults with and without Chronic Medical Conditions</i>	CO
78	<i>Salivary Hormones Trend Synchronously in Response to Repeated Stress Exposures</i>	CO
79	<i>Ways to Approach the Growing Language Barrier in the United States</i>	CO
80	<i>Mild COVID-19: A Silent Threat</i>	CO
82	<i>Worsening Shortness of Breath after a mild case of COVID</i>	CO
83	<i>Review of Aspirin in Non-Obstructive Coronary Artery Disease Diagnosed via CCTA Imaging</i>	CO
84	<i>Potential Benefit Effects of Low Dose Naltrexone Use in Patients with Breast Cancer</i>	CO
85	<i>The Postoperative Problem: Community Specific access to Care and Implications for Post Surgical Outcomes</i>	CO
86	<i>Determination of Number of COM Applications Mentioning Tracks and Importance of Track Availability in Decision to Attend RVU</i>	CO
87	<i>Combating Period Poverty in Kenya</i>	CO
88	<i>A Pilot Program Evaluation on a Backcountry Search and Rescue Stress Injury Awareness Course</i>	CO
89	<i>Automated Video and Audio Seizure Detection: A Scoping Review</i>	CO
90	<i>Management of a 3rd Degree Heart Block in 33 Week Pregnant Patient in a Rural Critical Access Hospital</i>	CO
91	<i>Investigating the Link Between Sleep Quality and Resilience in First Responders</i>	CO
92	<i>Patient Reported and Clinical Outcomes in Total Ankle Arthroplasty: The CU Total Ankle Registry</i>	CO
93	<i>Reversible Cerebral Vasoconstriction Syndrome and its “Thunderclap Headache”</i>	CO
94	<i>Barriers to Primary Care and Non-Urgent Emergency Department Visits</i>	CO
96	<i>Evaluating a Hospital-Based Service and Care Plans for Children with Medical Complexities</i>	CO
97	<i>An Exploration of Hiking Preparation and Injuries Acquired while High Altitude Hiking on Colorado’s 14,000 ft Peaks</i>	CO
98	<i>Surveying Pet Owners to Compare Attitudes Toward Human vs. Pet Vaccination</i>	CO
99	<i>An Innovative Approach to Coronary Microvascular Disease in a Patient with an Anomalous Left Main Coronary Artery</i>	CO
100	<i>Immunological Findings Associated with Post-Acute Sequelae of COVID-19</i>	CO
101	<i>Can Healthcare Technology Improve Health Equity for Reproductive Health? A Systematic Review of the Literature</i>	CO
102	<i>A Structured Review of Colorectal Cancer Prevention Dietary Guidelines</i>	CO



INDEX OF POSTER PRESENTATIONS

103	<i>How Exercise Effects the Well Being and Academic Performance of Post-Graduate Health Professions Students</i>	CO
104	<i>Nanotechnology in the Diagnosis and Treatment of Osteomyelitis?</i>	CO
105	<i>Comorbidities, Sociodemographic Factors and Determinants of Health on COVID-19 Fatalities in the United State</i>	CO
106	<i>COVID-19 Infection and Simultaneous Worsening of Pre-Existing Neurologic Conditions: A Case Report Series</i>	CO
107	<i>Acne Clinical Management Guideline Review</i>	CO
108	<i>Macintosh versus Miller Blade in Intubation of Pediatric Airways: A Review</i>	UT
109	<i>Anesthetic Management in a Patient with a Stanford Type A Aortic Dissection</i>	UT
110	<i>Gaining a better Understanding of Hell's Itch</i>	UT
113	<i>Disparities in Leadership Training in Osteopathic Medical Education</i>	UT
114	<i>Methylnaltrexone Used in the Treatment of Acute Colonic Pseudo-Obstruction: A Case Study</i>	UT
115	<i>Overcoming Healthcare Barriers: Identification of Health Determinants in the Unhoused Population</i>	UT
116	<i>Utilizing Digital Predictive Biomarkers to Identify Veteran Suicide Risk</i>	UT
117	<i>Effective Post-Cesarean Pain Management to Reduce Opioid Abuse/Addiction</i>	UT
118	<i>Multi-ligamentous Knee Injury in a Female Skier including a Lateral Meniscal Root Avulsion- Case Report</i>	UT
119	<i>CRISPR-Cas9 Mediated Elimination of Fermentative S. Cerevisiae</i>	UT
120	<i>Medication Concordance of Low-Income, Hispanic Patients in the United States</i>	UT
121	<i>Quantitative Biomarkers to Assess Upper Trapezius Muscles in Chronic Neck Pain</i>	UT
122	<i>An Osteopathic Approach to Head Impact Mitigation in Collegiate Lacrosse Players</i>	UT
123	<i>A Case Report of Late-Onset Hereditary Angioedema in a Patient with Non-Hodgkin's Lymphoma, Common Variable Immunodeficiency, and Antiphospholipid Antibody Syndrome</i>	UT
124	<i>Post-Cesarean Pain Management to Reduce Opioid Abuse/Addiction</i>	UT
127	<i>Unique Leg Muscle Discovered and Defined in a Cadaveric Specimen</i>	UT
128	<i>BRCA Gene Mutations and Testicular Cancer</i>	UT
129	<i>Osteopathic Practice and Principles 3-D Educational Videos</i>	UT
130	<i>Case Study: Can Digital Wearable Device Detect and Monitor Coronary Artery Disease in a Male Triathlete?</i>	UT
131	<i>The Impact of Global Health Outreach Experiences on Medical Student Burnout</i>	UT



INDEX OF POSTER PRESENTATIONS

132	<i>Does the Study of Radiology Early in Medical School Contribute to Higher Scores in Anatomy-Based Courses?</i>	UT
134	<i>Osteoarthritis and Aquaporin Dysregulation, the Unrecognized Link with Idiopathic Intracranial Hypertension and Glaucoma</i>	UT
135	<i>Dermatologic Applications of Cenegermin</i>	UT
136	<i>Ultrasound-Guided Carpal Tunnel Release: A Comparison to Open Carpal Tunnel Release</i>	UT
137	<i>Manual Labor and Chronic Pain and the Risk of Opioid Addiction</i>	UT
138	<i>Utilizing Syringe Exchange Services as the Primary Intervention for Conduction Hepatitis C Micro Elimination Studies: A Systematic Review</i>	UT
139	<i>Colonoscopy CPT Code Trends in Medicare Patients: 2000 - 2020</i>	UT
140	<i>Reducing Risk of Respiratory Illness Associated with Traditional Cookstoves in Rural Communities of India - An Initial Assessment</i>	UT
141	<i>Exploratory Analysis of Droperidol for Excitable Delirium in Emergency Medical Services: A Systematic Review and Retrospective Analysis</i>	UT
142	<i>Yoga as an Educational Aid for Osteopathic Medical Students Studying Musculoskeletal Anatomy</i>	UT
143	<i>A Comparison of The Bouquet Speculum and Traditional 2-Bladed Speculum</i>	UT
144	<i>Development of B7-H3, Midkine Vectors to Investigate Immune Regulation in Tumor Microenvironments</i>	UT
145	<i>Research Output among Dermatology Residency Candidates Pre- and Post-COVID-19 Pandemic Era</i>	UT
146	<i>Socioeconomic Implications of Price Differences between Tinted and Non-Tinted Sunscreens</i>	UT
148	<i>Early-Life Stressors and Their Prolonged Negative Effects on Adolescents</i>	UT
149	<i>Diagnostic Ultra-sound in Juvenile Scleroderma</i>	UT
150	<i>Pneumatosis Intestinalis Induced by Alpha-Glucosidase Inhibitors in Diabetic Patients</i>	UT
151	<i>Prevalence and Progression of Ametropias in Medical Students</i>	UT
152	<i>Effects of Oral Probiotics on the Skin Microbiome of Healthy Individuals</i>	UT
153	<i>Cordyceps Improve Insulin Resistance and Hepatic Steatosis via Inhibition of Intrinsic Ceramide Biosynthesis</i>	UT
155	<i>One for the Ages: Advanced Glycation End Products Cross-Link Collagen Fibers in the Dermis Changing the Extra-Cellular Matrix Architecture Leading to Impediment of 3D Macrophage Migration and Prolonged Healing in Diabetic Foot Wounds</i>	UT
156	<i>Case Report of Incidentally Discovered Metastatic Renal Cancer in a Fighter Pilot</i>	UT



INDEX OF POSTER PRESENTATIONS

157	<i>Pre-Cesarean Screening to Reduce Opioid Use In Patients High-Risk for Depression</i>	UT
158	<i>Psychological Distress and Urological Symptom Prevalence in the Pediatric Population</i>	UT
159	<i>Defining the MCID, PASS, and SCB for Patients Undergoing Hip Arthroscopy with Periacetabular Osteotomy at Minimum 1-Year Follow-Up</i>	UT
160	<i>Antibacterial Activity of Fungal Endophytes: A Systematic Review</i>	UT
161	<i>Cage Enrichments Negatively Impact the Reproductive Brain in Male Mice</i>	UT
162	<i>Pain Improvement Post Percutaneous Tenotomy with Tenex Tool for Calcific Tendinitis</i>	UT
163	<i>Genetic Disorders and Aortic Dissection: The Man with an Air Compressor in His Chest</i>	UT
164	<i>Hydration Status and Cognitive Performance Among Medical Students</i>	UT
165	<i>Effects of Oral Probiotics on the Skin Microbiome of Healthy Individuals</i>	UT
166	<i>Amyloid Pet Scanning for Alzheimer's Disease Diagnosis Remains Effective Despite Retracted Studies</i>	UT



Abstract #1

Colorism and Health Outcomes

Sonia Abraham - Rocky Vista University

Daniela Suarez - Rocky Vista University

Jacqueline Powell PhD - Rocky Vista University

The effects of colorism are prevalent in American society and have deleterious effects on the health of minorities. The purpose of the review is to elucidate aspects of health that are affected by an individual's skin tone beyond a dermatologic lens. It is predicted that darker skin tone will correlate with an increased incidence of comorbidities and adverse outcomes in healthcare. A literature review was performed using keywords "skin tone", "bias", "health", "medicine", and "colorism" on two databases (PubMed and Google Scholar). The review found that darker skin was commonly evaluated negatively in implicit bias studies and, especially in women, was associated with increased prevalence of hypertension, obesity, cardiovascular disease, anxiety, and depression. This review highlights the effects of colorism on health and calls for the necessity of increasing research into this field to reduce health disparities.



Abstract #2

Perceptions of Surgical Wound Care in Diabetic Adults

Christopher Ahumada - Rocky Vista University

Darcy Solanyk - Rocky Vista University

Background: Diabetics have the odds stacked against them physiologically when it comes to wound healing, but patient autonomy is an aspect of wound healing that could be fortified to give diabetic patients a better chance of healing their wounds without complications. It is standard practice to educate patients on proper wound care following any type of surgical procedure, but patients take away certain information with variable levels of understanding and emphasis. Of note, patients should be educated on the signs of infection as infected wounds are unable to heal appropriately and may lead to dehiscence. Additionally, importance of blood sugar control should be reviewed with patients, as wound-area healing rate has been shown to be decreased by elevated HbA1c values. Similarly, patients should receive guidance on proper nutrition as malnutrition negatively impacts wound healing. Furthermore, patients should be taught how to properly clean and/or bandage their wounds, as it has been suggested that educational wound care programs likely reduce the wound infection rate in emergency patients.

Hypothesis: Patients who rate their received patient education as less than “somewhat clear” are more likely associated with having wound complications.

Methods: A completely anonymous survey created in Qualtrics was distributed to ask diabetic participants to rate how clearly wound education was given to them on four topics: signs of infection, importance of blood sugar management, importance of proper nutrition, and proper cleaning/bandaging instructions. Responses were collected from March 2022 through the end of June 2022. The data was analyzed by computing Goodman and Kruskal’s Gamma and respective z score for each topic to measure the strength of association between clarity of education and wound outcome. An alpha of 5% was chosen, which corresponds to a Z score of 1.96.

Results: Ten responses total. Signs of infection: gamma of 0.88 and z of 2.6. Blood sugar: gamma of 0.25 and z of 0.33. Nutrition: gamma of -.03 and z of -0.48. Cleaning/bandaging: gamma of 0.13 and z of 0.16.

Conclusion: There is no statistically significant association between the clarity of education on said topics and the outcomes of wound healing. Larger study necessary.



Abstract #3

Impact of the USMLE Step 1 and COMLEX Level 1 Transition to Pass/Fail on Osteopathic Medical Student Stress Levels and Board Preparation

Jacquelyn Waller - Rocky Vista University

Jennifer Montemayor - Rocky Vista University

Background

The United States Medical Licensing Examination (USMLE) Step 1 and Comprehensive Osteopathic Medical Licensing Exam (COMLEX) Level 1 transitioned from numeric scoring to Pass/Fail (P/F) in January 2022. This transition intended to decrease stress and improve medical student wellbeing, as well as encourage residency programs to emphasize other aspects of residents' applications.

Hypothesis

Investigators hypothesize students under the P/F grade scale will experience less stress during the intensive study period leading to USMLE Step 1/COMLEX Level 1 and devote more time to other aspects of their residency applications.

Methods

To examine the impact on osteopathic medical student stress and approach to board preparation, two surveys were administered to Rocky Vista University College of Osteopathic Medicine (RVU-COM) students before (Class of 2023) and after (Class of 2024) the transition to P/F. The Cohen Perceived Stress Survey (PSS) was administered at the beginning of the focused board study period in May 2021 and 2022 to Class of 2023 and 2024, respectively. The Licensing Exam Questionnaire (LEQ), designed to examine board preparation patterns, perspective on residency applications, and wellness during examination preparation, was administered immediately after the board examination deadline in July 2021 and 2022 to Class of 2023 and 2024, respectively.

Results

Approximately one-third of the Class of 2023 (PSS: n=86; LEQ: n=93) and 2024 (PSS: n=89; LEQ: n=92) responded. No difference was detected in mean PSS score or in LEQ-reported stress or wellness-maintenance between Class of 2023 and 2024. Class of 2023 reported more weeks studying ($p<0.001$), more practice exams taken ($p<0.001$), and a greater proportion scheduled exams after June 20 compared to Class of 2024 ($p<0.001$). No difference existed in hours studying per day, sequence of Step 1/Level 1, time between exams, money spent or type of study resources utilized.



Abstract #4

Longitudinal Outcomes of Short-Acting Contraception in Adolescent Female Patients

Delaney S. Bacon, PAS3, Rocky Vista University

Background: Short-acting reversible contraception such as oral contraceptive pills (OCP) and Medroxyprogesterone acetate injections (DMPA) are often default options for contraception because of accessibility, however these methods are presumably less effective because they require a degree of compliance from the patient. OCP must be taken at the same time every day, and DMPA must be administered every 3 months at a healthcare facility for full efficacy. Noncompliance and discontinuation rates of these methods should be understood in depth when prescribing them to adolescent patients.

Hypothesis: It is hypothesized that the rate of discontinuation between OCP and DMPA will differ and consequently impact longitudinal outcomes of pregnancy and contraceptive use among female patients between 11-25 who initiate the short acting contraceptive methods.

Methods: This study is a retrospective cohort chart review collected from Children's Hospital of Colorado BC4U clinic. Charts are selected for initiation of OCP and DMPA, age 11-25 years old, and date of initial visit between 1/1/2009 and 12/31/2019. Subsequent visits are analyzed for outcomes of continuation vs discontinuation of method, pregnancy, or loss to follow-up. A 2-tailed unpaired T test compares the length of time of compliance of OCP vs. DMPA. Additionally, frequency of longitudinal outcomes are compared using percentage differences.

Results: From a sample of 263 OCP and 292 DMPA users, the duration of use is significantly longer with OCP vs. DMPA (mean 14.3 months vs 7.5 months respectively, $p=5.327E-10$). Despite the longer duration of use, OCP discontinuation has a higher rate of unplanned pregnancy than DMPA discontinuation (5.7% vs 3.1% respectively, percent difference 59.7%). However, DMPA discontinuation has a higher rate of expiration without follow-up than OCP discontinuation (41.8% vs 18.3%, percent difference 78.4%).

Conclusion: The study illustrates that the success of long-term use of DMPA and OCP notably differ due to patient compliance, therefore consideration of the patient's goals, needs, and behaviors should go into prescribing and educating about contraceptive methods, particularly with adolescents. It is necessary to improve accessibility and education of contraceptive methods and reduce barriers and stigmas around these methods to provide equitable and effective contraceptive healthcare to our youths.



Abstract #5

Screening for Prenatal and Postpartum Depression: A Guideline Review

Julia Baranczyk - Rocky Vista University

Perinatal depression is defined by the American College of Obstetrics and Gynecology (ACOG) as having an onset after time of conception to delivery (prenatal) or up to 12 months after delivery (postpartum). Perinatal depression is considered to be the most common complications of the prenatal and postpartum period, yet ACOG recommends screening only once during pregnancy and once postpartum. The purpose of this review is to evaluate the current ACOG screening guidelines for perinatal depression, evaluate research underpinning the organizations recommendations, and identify primary research within the field to determine how that evidence aligns with current recommendations. To conduct this review, Perinatal screening guidelines put forth by the American College of Obstetrics and Gynecology were read and reviewed. The primary research underpinnings for the above guideline were read and reviewed. Primary research was found using PubMed and Google Scholar by searching topics related to prevalence of screening for depression prenatally and postpartum, onset of depression during pregnancy and postpartum, risk factors for perinatal depression, and effects of perinatal depression on mother and child. Overall, it seems that methods of screening and treatment that were recommended initially are still the most efficacious and should continue to be used. However, although the guideline suggests a minimum for screening incidence, there is evidence that incidence of screening for women is only at or below that minimum. It is imperative that providers and clinics work to prioritize screening for these women as it is free, quick, accessible, and the benefits far outweigh the adverse effects if perinatal depression goes undiagnosed. Based on this review, it may be time for ACOG to revisit the guideline and consider increasing their recommendation for incidence of screening.



Abstract #6

Hepatic Encephalopathy in Adult Acute Lymphoblastic Leukemia: Case Report

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Yasmeen Bierwirth, Rocky Vista University

A 25-year-old female with acute lymphoblastic leukemia (ALL) developed severe hepatic encephalopathy that required coma induction for four days. The subject did not have any liver issues until after receiving a second stem cell transplantation following multiple cycles of Inotuzumab ozogamicin for management of relapsed ALL. The cause of hepatic encephalopathy in this subject is currently unknown. The blood ammonia levels were more than ten times the upper limit of normal. The blood ammonia levels returned to normal range with clinical intervention including Rifaximin and hemodialysis. Following hospitalization, the patient had refractory ascites definitively managed with a TIPS procedure. We consider the unknown cause of hepatic encephalopathy following the combination of Inotuzumab ozogamicin and a second stem cell transplant a rare and interesting presentation. The next step in research would be to analyze the incidence of hepatic encephalopathy following the combination of Inotuzumab ozogamicin and stem cell transplant to consider if Inotuzumab ozogamicin may be a catalyst for hyperammonemia leading to hepatic encephalopathy.



Abstract #7

Rice Method Debunked: A Guideline Review

Cierra Black, Rocky Vista University PA Program
Sarah Neguse, Rocky Vista University

The RICE method (rest, ice, compression, elevation) has been a popularly prescribed method for the treatment of musculoskeletal injuries. While this method can aid to decrease the pain associated with these types of injuries, it will slow and hinder the healing process. What is the best use of RICE in medicine today for the treatment of musculoskeletal injuries?

To balance both pain relief and to promote healing, the HAM method (heat, analgesics, movement) should be adopted instead. A guideline review was used to compare the efficacy and treatment goals of different treatment methods, including RICE, to determine the best overall procedure for the treatment of musculoskeletal injuries. While no single study used heat, non-NSAID analgesics, and movement as one overall procedure, several sources used each of these methods individually and showed better results in the healing of musculoskeletal injuries than the RICE method. Overall, the use of different modalities such as heat, non-NSAID pain relief, and movement therapy is more beneficial for the healing of musculoskeletal injuries than the RICE method. Providers, parents, coaches, and the average laymen should choose HAM over RICE when faced with an acute musculoskeletal injury in order to promote healing and provide pain relief.



Abstract #9

An Innovative Design for the Vaginal Speculum

Jean M. Bouquet, DO-RVUCOM

The design of the “duck-billed” bi-valved vaginal speculum has not changed in almost 2,000 years. There are practical and comfort limitations to the existing design for both the provider and the patient. The Bouquet Speculum is a newly designed, 5-petaled vaginal speculum that claims to overcome these limitations. This novel speculum design will allow healthcare providers to detect and subsequently treat cervical cancer and pre-cancers and perform other gynecologic procedures more efficiently and accurately while improving the patient experience. The gynecologic implications for this innovative change in the design of the vaginal speculum could save hundreds of thousands of lives every year, provide a more comfortable exam for the patient, and result in a more efficient and user-friendly experience for the provider.

The purpose of this study is to compare the existing, 2-bladed speculum to the Bouquet Speculum (in vitro) assessing for: visualization the cervix under various simulated, intrapelvic pressures, use of instruments through the devices, and the relative forces exerted on the speculum.



Abstract #10

Current Concussion Protocols, Sleep, and Glymphatics: How Integrating OMT into Standard of Care Can Augment Recovery Times in Post Concussion Syndrome

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1. College of Osteopathic Medicine, Rocky Vista University, Parker, CO

Concussions are a common injury disproportionately affecting active children and young adults. In 2020, 6.8% of children have had symptoms of a concussion according to the CDC. Concussions, while usually self-limiting in progression, can predispose individuals to long-term consequences including symptoms affecting quality of life, mental health, and work or school performance. When these symptoms persist past the expected recovery time, it is then referred to as post-concussion syndrome (PCS). Symptoms of PCS include but are not limited to depression, anxiety, headaches, sleep disturbances, and vertigo, while also increasing the risk of long-term neurological disease in the form of chronic traumatic encephalitis (CTE). The current reality of concussions and PCS care is that there is a lack of standardized protocols to facilitate recovery, with the only agreed upon approach being patient education and rest. We have analyzed and reviewed current research in concussion protocols, the glymphatic system, the effects of sleep on glymphatic flow, and osteopathic manipulative medicine's (OMM) role in augmenting lymphatic flow. In this poster presentation, we will link the theory of how OMM techniques address somatic dysfunction and promote lymphatic drainage to how it can be used similarly to improve glymphatic drainage. This poster proposes a standard concussion protocol utilizing OMM and sleep to help in the recovery of PCS through increased clearance of toxic byproducts of the metabolic cascade of a concussion from the brain through the glymphatic system. Through our research, we hope to establish the role of abnormal sleep and glymphatic stasis in concussion and PCS management to hopefully improve patient outcomes.



Abstract #11

Canfield Reveal Imager Utilization to Determine UV Changes from Acute Sun Exposure

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Background: Skin sun exposure has been reported and studied as the accumulation of UV damage via repeated exposures leading to collective dermatologic changes called actinic damage, but there is limited understanding about the impact of each independent, acute sun exposure as opposed to chronic exposure.

Hypothesis: The purpose of this qualitative case study is to determine if there will be a change in photographic representation of sun damage after acute sun exposure.

Methods: The Canfield Reveal Imager was used to visualize a subject before and after a minimum of six consecutive hours of direct UV exposure without sunscreen or any external barrier to the skin to examine the acute impact on the skin. Photos were taken before and after direct facial sun exposure over the course of two hours. The study time was shortened by the subject due to discomfort of sunburn, and a hat was added to electively complete the remaining four hours of the study time.

Results: The photographs showed notable increase in sun damage and brown spots indicative of sun damage between the before and after photos confirming each sun exposure can add noticeable changes in the cumulative composition of actinic damage.

Conclusion: The significance of this study can visually demonstrate to the public the importance of sun protection consistently if one is expected to be in the sun despite duration. The findings of this study will better allow the field of dermatology to understand and have visual representation of the effects of acute exposure over specified time courses for patient education.



Abstract #12

A Rare Adult Presentation of a Congenital Tumor Discovered Incidentally After Trauma

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Background: Rhabdomyomatous Mesenchymal Hamartoma (RMH) is a rare, congenital, benign tumor historically seen midline on the face and neck, and complete removal of the tumor has been the course of action among the 80 documented cases. It can appear as a subcutaneous growth or plaque grossly, and it is a mixture of haphazard skeletal muscle, adnexal elements, vessels, and nerve bundle collections histopathologically. There has been recent addition of adult presentation of RMH, but reasons for later presentation are still being developed. Herein, we present a case of an adult patient with a slow growing RMH at the exact site of blunt trauma located on the forehead.

Patient denied associated symptoms or sensation to the area and was healthy otherwise without medical conditions. Physical examination found an approximately 2.0 cm rubbery, non-transilluminant, slightly mobile nodule without overlying epidermal changes on the right forehead. No frontalis muscle motor deficit or loss of sensation to touch was found in the area. Further examination included a targeted ultrasound of the mass showing a subdermal hypoechoic area measuring 1.7x1.4x0.3cm appearing immediately anterior to the outer table of the calvarium with a prominent superficial artery coursing over the examined area.

Methods/Results: An excisional biopsy was conducted and histopathologic examination revealed features seen in RMH as mature fibroadipose tissue with admixed, haphazard skeletal muscle and nerve bundles. Based on the histological data, the diagnosis of RMH was made. The patient returned approximately four months later with no evidence of recurrence.

Conclusion: This case report can be a heralding addition to the underdeveloped understanding of RMH when considering presentation outside of congenital literature. Adding this case to the small population of known RMH documented cases will allow clinicians and pathologists to further develop differentials when considering similar patient presentations. It leaves further development of the etiology and understanding of RMH open among possibly acquired cases. Future addition of such case reports collectively could further change the understanding of RMH presentation.



Abstract #13

Diminished Health Outcomes Among Minors with Non-English Speaking Caregivers

Mario Chavez

Background

Functional health literacy (HL) can be defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions”. The National Assessment of Adult Literacy (NAAL) gives us abundant information regarding the demographic distribution in patients’ HL. When comparing the racial/ethnic health literacy statistics, nearly 2/3rds of Hispanic adults in 2003 had basic or below basic HL, while 28% of Caucasian(non-Hispanic) adults fell in this category. Of the estimated 77 million people in the below basic category, 11 million were considered nonliterate in the English language. Along with being ~14% of the below basic population, not being a native English speaker appears to be the second largest risk factor for being in this category behind not graduating high school

Hypothesis

Most studies will suggest using universal HL precautions for all patients. These precautions assume that every patient has the lowest HL proficiency.

Methods

The PubMed database was searched for pertinent publications using the terms “health literacy” and “language barrier” in association with “health outcomes”, “caregiver” and “pediatric”. Meta-analyses, reviews, randomized controlled trials within the last 10 years were included.

Results

A review of several relevant articles shows that low HL is associated with frequently missed appointments, lack of follow through on tests/referrals and asking fewer questions about their own health. These factors then carry over to their children. In order to best allow the provider to be efficient with patient visits, it has been suggested that the rest of the multidisciplinary team, specifically medical assistants, get involved with health coaching. Other strategies included using the teach-back method, using pictures and other visual diagrams, and using medical translators.

Conclusion

With the continued research on HL by the Program for the International Assessment of Adult Competencies and the increase in use of previously mentioned strategies, there has been, and continues to be, significant improvement in mitigating the language barrier to optimal healthcare.



Abstract #14

An Inexplicable Pain in the Posterior Calf: A Case Report

Brandon Christnovich- Rocky Vista University, Colorado Campus

History: A 24 yo male presented with calf pain of seven months and an unknown mechanism of injury. This pain was located in the left posterior-medial region, and aggravated by running and explosive movement causing a sharp tearing sensation, ultimately preventing these activities. It failed to resolve with rest and conservative treatment including five weeks of physical therapy and osteopathic manipulation. Initial ultrasound examination showed no abnormalities.

Exam: On inspection there were no visible masses, lesions, swelling, erythema, ecchymosis or atrophy present. The patient had normal gait, full strength, and an intact neurovascular exam in both lower extremities. There was slight tenderness to palpation in the left posterior calf. Upon instructing the patient to sit on his heels, a three by three cm protrusion appeared just below the aponeurosis of the gastrocnemius and the achilles tendon.

Differential:

1. Tissue Herniation
2. Muscle strain
3. Hematoma
4. Degloving injury
5. Compartment syndrome

Discussion: Ultrasound was performed to confirm the clinical diagnosis of a Morel-Lavallee lesion. A Morel-Lavallee lesion is a sheering trauma, degloving injury separating the skin and subcutaneous tissue from the underlying fascia. This creates a space containing blood, lymph, or even necrotic fat that impedes healing. It commonly occurs over the femur or greater trochanter, and due to the rarity of the lesion is often misdiagnosed or delayed in treatment.

After conservative measures failed, ultrasound-guided aspiration of the lesion was performed followed by doxycycline injection between the affected layers. The patient was made non-weight bearing and was instructed to use continuous compression. This was followed by a gradual return to activity involving a month of walking progression followed by light jogging and strengthening. Currently, there is no standardized treatment for Morel-Lavallee lesions. However, literature shows aspiration and injection of doxycycline for its tissue sclerosing properties combined with compression has been more successful in reducing the lesion than conservative treatment alone.

Outcome: Following the treatment and a gradual return to activity, there was a noticeable reduction in the lesion and a return to full activity.

Final Diagnosis: Morel-Lavallee lesion



Abstract #15

Solitary Extramedullary Plasmacytoma of the Soft Palate: A Case Report

Bailey Cook, OMS III, Rocky Vista University

Jennifer McCabe Lentz, MD, Direct Primary Care of Northern Colorado

Introduction

Plasmacytoma is a rare clonal neoplastic disorder of bone marrow that originates from plasma cells. A small minority of plasma cell neoplasms are solitary extramedullary plasmacytomas (SEP). SEPs are commonly located in the nasopharynx. To make a diagnosis of SEP, other plasma cell dyscrasias including multiple myeloma need to be excluded.

Case Presentation

We present a case of a 48-year-old female presenting with a mass of the soft palate evolving for over a year. Initial presenting symptoms included postnasal drainage and voice changes unresponsive to fluticasone propionate nasal spray. Laryngoscopy was used to visualize and excise the mass. Pathology revealed sheets of atypical plasma cells. Thus, diagnosis of SEP of the soft palate was established. The patient was treated with direct radiation to the area with no evidence of recurrence 6-months post-therapy.

Discussion

SEP may arise in any organ but are most commonly found in the nasopharynx and commonly presents with non-specific symptoms such as postnasal drainage. Although risk of progression to multiple myeloma is low at 10-15%, patients must be closely monitored with frequent imaging, bone marrow aspirates, and serological testing to look for evolution.

Conclusion

SEP is a rare condition that requires stringent diagnostic and therapeutic management. Prognosis for SEP is better than the other two forms of plasma cell neoplasm: multiple myeloma and solitary bone plasmacytoma.



Abstract #16

Virtual Reality Education versus Traditional Learning Module in the Female Genitourinary Exam

Laura Cooper, MSBS & Michaela Snow, BS; Jaelyn Gabel, BS; Julianne McGough, BS; Kathryn Ozan, BS; Nastassja Michel, BS; Brian Schwartz, PhD

Background

Virtual reality (VR) can be especially important in the field of medicine. In a study conducted in 2019, investigators found that VR led to greater student success in a respiratory distress case than other teaching modalities. As for specifically VR program preparation before a female genitourinary exam, a study from 2019 involving a RCT to assess the efficacy of a VR anatomic model on resident information retention of pelvic anatomy showed that those who participated in the VR simulation had enhanced short term learning. This sparked the motivation for our project as we did not see any studies specifically preparing second year medical students using the interventions of a VR program or a traditional learning method before performing a female genitourinary exam on a live actor.

Hypothesis

We hypothesize that the use of VR prior to this training session will increase student comfortability, success, and knowledge retention as it pertains to this sensitive physical exam.

Methods

RVU Class of 2025 volunteers recruited to participate. Each participant will be given a unique identifier number through a randomized generator. Students will be randomly assigned to VR or supplemental educational group and will learn the female genitourinary exam using that modality. After the training, each group will take a quiz assessing the knowledge and skills learned. A rubric will be used to grade students during their exam on a live actor. Students will then complete a survey and the same quiz. Quiz scores will be compared to rubric scores.

Results

RVU has access to both Oxford and Perspectus VR systems that are effective in training students in anatomy and several physical exams. However, neither program has detailed female genitourinary anatomy nor a simulation for this physical exam. This research has led us to advocate for a VR program that can be accessible to students that teaches them this sensitive exam.

Conclusions

VR can augment medical education. The major future direction from this project will be an opinion piece detailing the need for students to have access to a female genitourinary exam VR simulation in order to effectively prepare for their in-person exam.



Abstract #17

The Effect of Spaced Repetition Learning through Anki on Medical Board Exam Performance

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Background

Spaced repetition learning is a method of learning that relies on a fixed formula for spacing out flashcards to ensure long term retention of a topic. Anki is one such application available online that utilizes spaced repetition learning. This retrospective cohort study analyzed incorporating Anki with medical school curriculum and its effect on board examination scores. The hypothesis is that students who engaged in spaced repetition learning through Anki scored higher on licensing board exams than students who did not engage with this method.

Methods

The hypothesis was tested through comparison of USMLE Step 1 scores, COMLEX Level 1 scores, and GPA. The samples were selected from the Rocky Vista University Class of 2023 and split between 35 students in the experimental group 256 students in the control group.

Results

1 (2.8%) student failed USMLE Step 1 in the Anki group compared to 28 (10.94%) students who failed Step 1 in the control group (P-value 0.13) The Anki group scored higher on both USMLE Step 1 (223.71 versus 222.58) and COMLEX Level 1 (569.51 versus 559.99). The control group had a higher GPA (85.60) than the Anki group (83.82) (p-value 0.0098).

Conclusion

The results of the study suggest a benefit of using spaced repetition to pass the USMLE examination. This is the first study to evaluate for a correlation between COMLEX level 1 scores with use of spaced repetition learning. Additionally, the study pointed towards an improvement in USMLE Step 1 and COMLEX Level 1 scores that can be investigated in the future.



Abstract #19

Evaluating the Reporting of Patient-Reported Outcomes in Clinical Trials on Erectile Dysfunction: A Cross-Sectional Analysis

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Background: Erectile Dysfunction (ED) significantly affects quality of life, which is often measured by patient-reported outcomes (PROs). PROs used in randomized controlled trials (RCTs) offer clinician's insight from a patient's perspective. Given the continued proliferation of PROs in clinical trials, our objective was to evaluate the completeness of reporting according to the Consolidated Standards of Reporting Trials Patient-Reported Outcome (CONSORT-PRO) checklist.

Hypothesis: We hypothesized that trials that adhered to CONSORT-PRO would have a higher percentage of completeness of reporting.

Methods: We used MEDLINE, Embase, and Cochrane Database of Controlled Trials for published RCTs focused on ED that included a PRO measure. After masked, duplicate screening, two investigators evaluated the included RCTs using CONSORT-PRO checklist and assessed risk of bias using the Cochrane Risk of Bias 2.0 tool. Mean percent completion of an adaptation of CONSORT-PRO was calculated to address completeness of reporting.

Results: Our search returned 2653 records, of which 44 met inclusion criteria. The overall mean CONSORT-PRO completeness was 45.8% (SD=16.0). We found no statistically significant associations between completeness and risk of bias, nor did we find significant improvement after the publication of the CONSORT-PRO checklist in 2013.

Conclusion: Overall PRO reporting is inadequate in trials on erectile dysfunction and therefore indicates a need to adhere to reporting guidelines. Trialists should use the CONSORT-PRO checklist to assess their studies to enhance reporting of study findings.



Abstract #20

An Overview of Hypertension Screening Guidelines

Melvin Diaz - Rocky Vista University

Hypertension affects approximately 45% of the United States population. Of the 87 million adults in the US, approximately 71% have uncontrolled hypertension (>130/80 mmHg) leading to at least 500,000 with hypertension. This is a significant burden on the healthcare system since hypertension is known to contribute to peripheral artery disease, kidney disease, heart disease, and ischemic stroke, all of which lead to increased mortality as one ages. The goal of this research is to familiarize readers with hypertension screening guidelines in average-risk patients provided by the JNC, USPSTF, and the American College of Cardiology/ American Heart Association (ACC/AHA). Additionally, the research underlying current guidelines will be addressed and future considerations will be discussed. Electronic literature searches were performed utilizing PubMed and Google Scholar. Boolean searches contained "hypertension AND guidelines AND JNC", "hypertension AND guidelines AND USPSTF", and "hypertension AND guidelines AND AHA/ACC". Results were excluded that did not contain language specific to hypertension screening and BP goals. JNC does not update on a set schedule, does not explicitly state screening recommendations or diagnosis method, but includes goal blood pressure at < 140/90 without comorbidities or with diabetes or chronic kidney disease, and < 150/90 for age > 60 years old. USPSTF updates every 5 years with 18-40 year-olds screened every 3-5 years and adults > 40 and/or at increased risk for hypertension annually. ACC/AHA mirrors the same screening recommendation as USPSTF with the same goals of < 130/80 without comorbidities, and < 140/90 with comorbidities. The USPSTF aims to keep all recommendations current and review each topic every 5 years for either an update or reaffirmation. With change from National Heart, Lung, and Blood Institute to designating ACC/AHA as joint responsible bodies for management of guidelines, JNC may soon become lesser utilized reference for screening recommendations. No significant evidence to support maintaining BP < 120/80 without introducing risk with aggressive pharmacologic treatment, however, in populations of adults > 50 years old with hypertension and without diabetes, there is evidence to support a goal of < 120 systolic BP to reduce mortality from the Systolic Blood Pressure and Intervention Trial (SPRINT).



Abstract #21

An Overview of Hypertension Screening Guidelines

Jessica Dowgiert, PAS-III - Rocky Vista PA Student

Carrie Chanos, PA-C - Professor of Physician Assistant Studies, Rocky Vista University

Objective: Identify barriers to care in Primary Care for Muslim women that occur as a result of their culture and faith, to evaluate methods and their effectiveness in reducing these barriers, and to suggest future implementation of such methods to increase access and quality of care for Muslim women.

Methods: Literature review of scholarly articles concerning barriers to health care for Muslim women and trialed solutions, using Pubmed.

Findings: Numerous barriers have been identified and can be grouped into themes of absence of gender concordant care, poor cultural competency from medical providers, and gaps in understanding and expectations of primary and preventative care by providers and patients. Data has not shown efficacy of cultural competency training or increasing gender and cultural diversity in increasing patient satisfaction or health outcomes at this point, and there are additional methods that have yet to be researched as well. Rapport and relationship building however have demonstrated correlated effects on patient satisfaction.

Conclusion: Improving access and quality of care for Muslim Women in Primary care in the US necessitates pursuing cultural competency, gender and cultural diversity in medicine, but most importantly a focus on delivering individualized, patient centered care per patient preferences and rapport.



Abstract #22

Guideline Review of Carotid Artery Screening in chronic Tobacco Users

Jessica Dusebout, Rocky Vista University PAS-III

Background: Stroke is the leading cause of death and disability in the United States.⁸ Approximately 795,000 strokes occur per year and 76% of these incidents are the first attack, which indicates that the individual has never had a prior stroke or TIA (often referred to as a mini stroke) and will not receive stroke screening measures under any current guideline.^{8,10,17} Ischemic strokes account for 90% of all strokes.¹⁰ A known risk factor for carotid artery stenosis (CAS) and subsequent ischemic stroke is tobacco use, but the extent that smoking contributes to stroke morbidity and mortality is not completely understood.^{8,11}

Hypothesis: Primary prevention remains the most effective and important tool in combating stroke incidence.⁸ Further research is warranted to investigate if carotid artery doppler ultrasound screening for individuals with a significant tobacco history would lead to lower stroke incidence.

Methods: The CAS screening guidelines put forth by USPTF, AHA, ASA, American College of Radiology, American College of Cardiology and the Society for Vascular Surgery were reviewed, including the primary literature for each guideline. The most prominent sources from each guideline were also reviewed. A Google Scholar search was conducted including: “carotid artery stenosis screening”, “carotid artery stenosis and tobacco use”, “early onset carotid artery stenosis” and “early carotid artery stenosis detection”. Articles published after 2014 were then evaluated.

Results: There is a connection between cigarette smoking, CAS and stroke due to the studied pathogenesis of irregular high-risk atheroma development.⁵ Smokers are found to be at much higher risk of irregular plaque formation containing hypoechoic and ulcerative properties and this type of irregular plaque correlates with increased embolic events and stroke incidence.^{1,5,14}

Conclusion: Without screening asymptomatic chronic tobacco users, it is unlikely that cases will be identified at an early enough stage to allow for multiple effective treatment options.^{1,14} While the threshold for screening is not known, my recommendation is to conduct further research with the goal of developing an updated screening guideline to include specific recommendations for chronic tobacco users. If nothing changes, individuals with a history of tobacco use will continue to suffer at a higher rate from preventable strokes.



Abstract #23

Evaluating Educational Modalities in a Simulated Model of Obese Patient Endotracheal Intubation

David Ross, DO; Sarah Boulos, DO, RVUCOM; Gene Eby, MD, Centura Health; Kimball Eggett, BA, RVUCOM; Emma Curtis, BS, RVUCOM; Alayna Knutson, BS, RVUCOM; Stacy Forbes, BS, RVUCOM; Orrin Chambers, BS, RVUCOM

Background: Patients with a Body Mass Index (BMI) > 30 kg/m² are more frequently associated with difficulty during orotracheal intubation when compared with patients with a BMI < 30 kg/m². In these patients, Bed Up Head Elevated (BUHE) intubation combined with head positioning that aligns the plane of the ear with the sternal notch, referred to as ramping, has been recommended. This combination of intubation techniques results in an improved laryngeal view, and is associated with significantly fewer complications. A majority of practitioners do not receive formal training on these techniques. This study aims to evaluate the efficacy of two learning modalities in teaching providers BUHE and ramping during endotracheal intubation.

Hypothesis: We postulate that a 5-minute video learning demonstration of BUHE and ramping will be more effective than written instructions alone for study subjects.

Methods: Participants were practicing physicians, nurse practitioners, and physician assistants who attended a critical care skills lab. Subjects were randomly placed in a control or experimental group. The control group received written instructions on BUHE and ramping techniques during endotracheal intubation, while the experimental group received both written instructions and a 5-minute demonstration video. Each practitioner was given 5 minutes to complete an intubation on a simulated obese patient model. Using a 14-parameter rubric, performance was scored by one co-author (SB) who was blinded to the educational modality. We also assessed provider confidence intubating patients with BMIs > 30 before and after, either training modality, utilizing a point assignment of 1 for Not Confident, 2 for Fairly Confident and 3 for Very confident.

Results: The average rubric scores for the control and experimental groups were 22.9 and 23.1, respectively. Post-survey confidence intubating patients with a BMI > 30 was significantly increased from pre-survey confidence among both the control and experimental groups ($p = .025, .005$, respectively).

Conclusions: Data suggests that confidence while intubating patients with BMIs >30 increased from pre and post-survey within both experimental and control groups with a trend towards higher confidence in the experimental group. BUHE and ramping are important procedural steps that can minimize potential complications in elevated BMI patients.



Abstract #24

Aspirin Eluting Bone Void Filling Putty

Kyle Emery (RVUCOM); Glynnis Page (RVUCOM); Johnathon Olivas (RVUCOM); Ben Sanderford (RVUCOM)

BACKGROUND:

Bone grafting has been studied extensively due to the economic burden and poor patient outcomes resulting from bony defects such as comminuted fractures, bone cysts, hardware removal, etc. Many solutions have been proposed, both organic and synthetic, to mitigate this issue; however, most have met with limited success some of the most successful strategies have coupled a pharmaceutical, typically an antibiotic, with a bone restorable scaffold and a rate controlling polymer membrane. Nevertheless, infection is not the only threat to the success of bone grafting. After such bone grafting procedures, patients can also be prone to blood clots. Aspirin (ASA), which is used primarily for its anti-inflammatory and anti-thrombotic properties, has been found in numerous in vitro and in vivo studies to stimulate bone growth. These observations provide a solid scientific premise for our

HYPOTHESIS:

Hypothesis that extended release of ASA from a synthetic bone graft void filling putty can prevent coagulation while simultaneously stimulating skeletal progenitor cells and mesenchymal endothelial cells to promote regeneration of bony defects.

METHODS:

To investigate this hypothesis, an FDA-approved, coralline, hybrid bone graft material (ProOsteon 500R from Biomet) was combined with a cocktail of medically relevant polymers (polycaprolactone (PCL), polyethylene glycol (PEG), and polylactic glycolic acid (PLGA)) to fabricate a bone void filling putty capable of releasing ASA over several weeks.

RESULTS:

Pharmacokinetics will be determined using high performance liquid chromatography (HPLC) while pharmacodynamics will be assessed with an activated thromboplastin assay.

CONCLUSION:

This approach will provide the groundwork for future studies applying this model for bone regeneration and could have a significant clinical impact in orthopedic surgery.



Abstract #25

Understanding and Factors Influencing Physician Assistant Student Interest in Postgraduate Fellowship Programs upon Graduation

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This research will be looking at the factors which influence a PA student's interest and understanding in physician assistant fellowships, and whether an increased understanding of these fellowships lead to a greater likelihood that a student will apply for after graduation. This knowledge can be used in the future to help determine if students would benefit from PA programs providing more education regarding fellowship options into the existing curriculum. This research hypothesized that the more knowledge a student had regarding PA fellowship programs the more likely they would be to apply to such programs following graduation.

For this project, an anonymous survey was created and sent to current physician assistant students through the Qualtrics system. Subjects were recruited from various platforms including Facebook, GroupMe, and internet forums. A total of 75 responses were collected and were then analyzed using a chi-square test with the VASP platform.

Of the responses, only 21% of the population felt they had a good understanding (scoring themselves at least a 7 out of 10 in terms of understanding) of physician assistant fellowships. Meanwhile, 84.93% of participants said they would consider completing a postgraduate fellowship following graduation. However, no correlation was found between a PA student's knowledge on PA fellowships and how likely they are to apply for these fellowship programs.



Abstract #26

Low-Grade Serous Ovarian Carcinoma in a Pregnant Patient

Garrett Furth, BS

Daniel Donato, Jr., MD, FACOG, FACS

Ovarian cancer is a rare malignancy that typically affects older women around the age of 65. The vast majority of ovarian cancers are epithelial in nature, often affecting surrounding structures before invading the ovary itself. Most epithelial ovarian tumors are known as serous ovarian carcinomas (SOC), which are further divided into high-grade and low-grade tumors. Low grade serous ovarian carcinoma (LGSOC) makes up a much smaller subset and in contrast with high grade, is actually more common amongst young patients. Here we present a case involving a 34-year-old woman at 13 weeks IUP, who presented with an ovarian cyst found on prenatal ultrasound. The cyst was then biopsied, with pathological evaluation indicating LGSOC. Prompt salpingo-oophorectomy and full surgical staging was then performed by GYN-ONC, with all lymph nodes returning as negative for malignancy. We believe this rare case of LGSOC in pregnancy highlights the importance of timely surgical intervention in its treatment, as well as the need for increased data in order to better understand it.



Abstract #27

Influence of Mental Health on Maternal Mortality: A Literature Review

Jaelyn Gabel, BS; Laura Cooper, MSBS; Julianne McGough, BS; Kathryn Ozan, BS; Michaela Snow, BS; Nastassja Michel, BS; Isain Zapata, PhD; Qamrul Choudhury, PhD

Maternal mortality is a rising concern in the field of obstetrics and continues to increase in prevalence in the United States. Many factors contribute to this increase, and of particular note, mental health. According to some studies, as many as 25% of pregnant women experience a psychiatric illness during the antepartum and postpartum periods and a large percentage of maternal mortality cases are due to suicide. The purpose of this literature review is to establish a foundation for the research conducted on maternal mortality in the United States since 2020 and its association with mental health. Due to the lack of data and information on maternal mortality and its association with depression, the study was shifted from being a systematic literature review to a scoping review. This information is vital to understanding the recent increase in maternal mortality in the United States and provides a framework for moving forward with interventions to stop this upward trend.



Abstract #28

Delay of Medical Care in the Privately Insured

Erika Gallardo, PA-S III (Physician Assistant Program - Rocky Vista University)

Sarah Neguse, MS, PA-C (Physician Assistant Program - Rocky Vista University)

Background: Encountering patients who delay care is not uncommon in America. Many of these patients who delay care are thought to delay for many reasons including lack of access, cost, uninsured status, etc. However, there are a large portion of patients who have “access” to this care (via private insurance) but are still delaying receiving it.

Hypothesis: Adults who are privately insured are delaying medical care due to cost.

Methods: Literature review: Google Scholar was utilized and keywords of “outpatient utilization healthcare,” “delay of care + cost,” “private medical insurance + cost” were searched. Additional studies were found utilizing bibliographies of previous articles found. Exclusion criteria included any article over 10 years old, articles that focused on uninsured delay of care, articles that focused on “high cost health care users,” articles that focused on countries other than the United States, and articles that compared patients with disease to those without disease in delay of care.

Results: Individuals who were privately insured reported poor access to care, higher costs of care and less satisfaction with care when compared to those who receive public insurance (Medicare/Medicaid). Moreover, individuals with employer sponsored medical insurance coverage were more likely to completely neglect needed care and have issues accessing the care because of cost.

Conclusion: Researchers are working on computer programs that can take into account a variety of variables to predict an individual’s health care cost that can be utilized for not only the individual picking the plan, but also the insurance companies to create more individualized insurance plans.



Abstract #29

Young Adults' Comfort and Understanding of End-of-Life Choices

Chelsy Gentry, Rocky Vista University - Colorado Campus

Death is inevitable. However, in a culture such as the United States where death is a far-removed concept, it can be shocking to family and friends of the deceased. For those who do not spend their days working in critical healthcare, emergency care, or farms and slaughterhouses for example, death may be a rare occurrence in their life, particularly a death they would witness. As Carleton explored in his research study, "One fear to rule them all?," the basis of all fears from arachnophobia to speech anxiety is the fear of what we do not know (2016). And yet when it comes to death, we do little in our society to assuage the fears surrounding them. By avoiding this necessary conversation, patients lose their autonomy when it comes to end-of-life decision making.

The patient is not the only person who can suffer from a lack of end-of-life planning. When a proxy must make care decisions for a patient without knowing their desires, they tend to choose longevity over comfort (Lovell et al., 2015). This results in increased, complex grief, as well as trauma for the proxy. The surrogacy for end-of-life decision making often goes to family members. Their decision-making ability is complicated by their own feelings towards the patient's condition and possible demise, identified as anticipatory grief (Cholbi, 2019).

There is also a financial loss to patients not knowing their end-of-life choices. Studies such as "Early Palliative Care Consultation in the Medical ICU:" (Ma et al., 2019), reveal that when given end-of-life options, the majority of patients would prefer less invasive treatments and have a preference for quality of life over quantity of life.

Based on the research, it appears there is a communication and education gap when it comes to end-of-life planning, particularly with young, healthy adults. This research strives to determine for a specific age range and level of health population the understanding of end-of-life planning decisions, and the sources this information was gathered from. The goal of this study is to discover if there are knowledge gaps that could be addressed by medical providers.



Abstract #30

Prevalence of Type-1 Interferon Autoantibodies in Adults with Non-Covid-19 Acute Respiratory Failure

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Background

Studies have established a link between type-1 interferons (IFN) auto-antibodies and Covid-19 severity. However, it is not well known if the linkage between type-1 IFN auto-antibodies is unique to COVID-19 or other types of severe respiratory illness.

Hypothesis

Our study aims to understand whether the presence of auto-antibodies to type I IFN is a general feature of severe illness or an unique phenomenon specific to COVID-19.

Methods

We measured type I IFN auto-antibodies on 284 non-COVID-19 subjects with acute respiratory failure admitted to the ICU. Auto-antibodies to IFN- α 2 were measured from plasma collected within 72 hours of intubation using a radioligand binding assay (RLBA).

Results

A total of 3 (1.1%) out of 284 patients with acute respiratory failure tested positive for type-I IFN auto-Abs while 281 (98.9%) patients did not test positive. The 3 patients who tested positive for type I IFNs auto-Abs were greater than 67 years old. Only 1 out of 13 patients with rhinovirus tested positive for auto-antibodies to IFN- α 2 and no other patients with other viral infections (influenza, parainfluenza, metapneumovirus, and seasonal coronavirus) tested positive.

Conclusions

Type I IFN auto-Abs are uncommon in critically ill patients with acute respiratory failure due to non-COVID-19 causes. Our data is in line with the observation that the presence of auto-Abs to type I IFN is associated with a higher risk of developing severe COVID-19.



Abstract #31

Evaluating Perspectives, Knowledge and Behaviors of Osteopathic Medicine in DO Schools: A Study in Employee Education and Changes in Understanding

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Although all osteopathic physicians (DO) receive training in Osteopathic Philosophy, Principles, and Practice (OPP), research suggests that the implementation of that training in clinical practice is highly variable and dependent on many factors, including the culture and attitudes that existed during the physician's undergraduate medical training. We hypothesized that knowledge, attitudes, and behaviors related to OPP could be influenced by an OPP educational intervention. To test this hypothesis, seven educational modules were created for employees of Rocky Vista University. The modules introduced the history, principles, modalities, and other key features of OPP. Additionally, employees were invited to complete a set of paired surveys: one before the educational intervention and one after. Participation in the surveys and the educational modules was completely voluntary and anonymous. Ninety-five employees completed the initial survey and 92 completed the final survey, out of 370 total. Ninety-three employees participated in any part of the educational intervention and 36 completed all seven modules. Preliminary research results indicated an increase in an understanding of OPP (pre-intervention: 84.2%, compared to post-intervention 95.7%), origin and history of OPP (66% to 85.9%), and connection to osteopathic culture at work (81.1% to 90.1%). Employees also indicated an increase in pride in working at an osteopathic institution (93.6 to 95.7%), preference to seeing a DO as their personal physician (90.4 to 94.6%), consideration of OMT as a valuable treatment (90.4% to 91.3%), experience OMT by a DO (74.7 to 90.4%), and a notice a benefit from OMT (88.6% to 93.2%). Understanding of the training required to become a DO increased among staff (83% to 95%). Early analysis indicates 92% of faculty intend to integrate OPP into teaching and 62% into assessment. Our results suggest that an offering of OPP educational modules at an osteopathic medical school may improve the institutional culture, knowledge, and use of OPP. Osteopathic medical schools should consider OPP training programs for their employees, which may lead to an increased understanding of the critical tenets of osteopathic medicine, and inspire osteopathic medical students to utilize osteopathic examination and OMT with their future patients. (RVU IRB approval # 2021-173).



Abstract #33

Routine Cervical “Checks” in Final Prenatal Visits for the Uncomplicated Pregnancy: A Search for Guidelines

Heidi Gruber, Physician Associate Program, Rocky Vista University, Colorado

Background

Increased emphasis on prenatal care has been fueled in part by increased maternal and infant morbidity and mortality¹. As part of prenatal care, a pelvic exam may be performed: at the beginning of pregnancy to assess anatomy, for irregularities, and for infections or malignancies; during labor to assess for changes in cervix ultimately monitoring the progression of labor; and indicated with concerning symptoms. Some providers also perform cervical evaluations during the last four prenatal visits of full-term pregnancy; however, there is ambiguity in the indication for cervical examinations in these patients in the absence of concerning symptoms, or signs of labor. This difference in practice was observed during rotations amongst specialties. This project seeks to compare guidelines about cervical examination indications during the last prenatal visits in uncomplicated pregnancies.

Methods

Library Database Resources, google scholar and discussions with prenatal providers were utilized as resources. Search techniques included the use of PubMed and UpToDate with the terms “cervical assessment” “pelvic examination” and “pregnancy” or “third trimester” and “prenatal care” or “antenatal care”. Sources focusing on general pregnancy complications were excluded.

Results

The research to compare guidelines and supporting evidence evolved into a search for any guidelines related to the practice. Of the sources found: one has a guideline against routine cervical assessment, several recommend against cervical assessment in relation to premature rupture of membranes (PROM), and a few have no recommendations but either include or exclude cervical assessment as part of prenatal care in the last four scheduled visits.

Conclusion

The results of this guideline comparison project show there are no present guidelines with associated strength of recommendation for routine cervical assessments in the final prenatal visits in uncomplicated pregnancies. Some sources had recommendations with little evidence to give support for a guideline for or against the practice. Research was limited secondary to researcher experience and access to relevant articles. It is recommended to have an encompassing search



Abstract #34

Diagnosis of Concussion in the Acute Setting: A Guideline Review

Michael T. Habliston, PASIII

Background:

Each year, 1.6 to 3.8 million people suffer concussions in the United States. 1,2 As it stands current guidelines for diagnosing concussion have not been updated since 2017. This research will provide a review of current screening and diagnostic tools for concussion and may be utilized for future research regarding concussion guideline revisions aiding practitioners in reducing cost and time for patients.

Methods/ Materials:

This study examined the literature underpinning current guidelines. Key terms search was performed in UpToDate, PubMed, DynaMed, the CDC and PubMed to identify original research related to concussion diagnoses.

Results and Discussion:

The CDC and American College of Emergency Physicians (ACEP) revised the 2008 guidelines to include the HEADS-UP Protocol. The current guidelines outline inclusion criteria, the HEADS-UP protocol and recommendations for further evaluation including use of CT imaging. 4,5 In addition to current guideline diagnostic tools, clinicians, athletic trainers, and parents alike utilize sideline tests and various neurological exams when suspicious of concussion. 1,3-9 These tools have been analyzed and were compared to the standard HEADS-UP protocol utilized by the current CDC/ ACEP Guidelines to determine their applicability for concussion in the acute setting. The cost of standard imaging was considered in this research and has been compared to recently FDA approved biomarkers for concussion and intracranial lesions. A cost analysis suggests significant savings potential for patients with Biomarkers costing between \$74-\$308 compared to the cost of a non-contrast head CT being \$170-\$1300. 13,14

Conclusion:

With new data regarding biomarkers, adding a 15-point neurological examination and Canadian Head CT rule to current concussion guidelines is a viable option when considering revisions. 4,5,13,14 Through a cost analysis and literature review it is evident that the goal of reducing cost for patient's and providers alike is plausible. Screening tools and sideline concussion tests are useful for practitioners and patients given the cost, reliability, and time of administration; however, they should not be used exclusively for diagnosis.



Abstract #36

Portal Vein Thrombosis in Acute Pancreatitis: A Case Report

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Portal venous thrombosis (PVT) secondary to acute pancreatitis is an uncommon phenomenon. Most cases of acute pancreatitis are mild and self-limiting. Roughly one quarter of patients with acute pancreatitis may have a vascular complication. These complications include hemorrhage into a pseudocyst, formation of varices, rupture of a pseudoaneurysm and thromboses of the portal venous system. Vascular complications in acute pancreatitis lead to a higher mortality and morbidity, and as such are an important complication of which clinicians should be aware of. Here we report a case of a young man who presented with acute pancreatitis and chronic portal venous thrombosis. A 25-year-old Caucasian male with a history of alcohol abuse presented to the emergency department with intractable nausea and vomiting for approximately 36 hours with multiple episodes of hematemesis. Physical exam revealed tachycardia and periumbilical tenderness. An ultrasound of the gallbladder demonstrated a portal vein thrombosis with cavernous transformation. Triple-phase computed tomography (CT) of the abdomen confirmed the presence of a portal vein thrombus. The patient received anticoagulation to treat his PVT, enoxaparin was given inpatient, and he was discharged on apixaban. Research suggests that the use of anticoagulation increases recanalization rates compared to no treatment. In this patient, portal venous thrombosis was associated with portal hypertension and esophageal varices underscoring the impact vascular complications have systemically. Necessary investigation of splanchnic venous thrombosis should be performed when acute pancreatitis is suspected. In the absence of complications, early treatment with anticoagulation can be used to improve recanalization and reduce mortality.



Abstract #37

Supportive Preference for National Electronic Health Record Database between Providers and Patients

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Background: The adoption of electronic health record (EHR) systems following the American Recovery and Reinvestment Act of 2009 changed healthcare administration, patient data storage, and data collection. Penalties set forth by Medicare and Medicaid reimbursement for clinics forced the adoption of EHR systems by the year of 2015. While standards for interoperability have been developed by the Office of the National Coordinator for Health IT, there has been no federal development of a singular system of operation. While interoperability standards are being maintained for back end development and information sharing, patient and provider experience does not always align.

Hypothesis: We believe there to be greater preference for a standardized EHR system among healthcare professions as compared to patients.

Methods: Data for this study was collected via survey with questions regarding demographics, current/ previous EHR experience, and opinions on a national EHR system. The survey was distributed on various social networks and provider communities via web links. A contingency table with Chi-square, and p-value of 0.05, was performed for respondents as providers or patients with their response in support or opposition to the development of a standardized EHR. Correlation between the subject's opinion and their level of experience with EHRs as well as other demographics was explored using Cramer's V.

Results: There was a total of 120 respondents, 58 healthcare workers and 62 patients. The hypothesis was rejected with a Chi-Square of 0.19. While 89.7% of healthcare workers supported a national EHR system, so did 87.1% of non healthcare respondents. The strongest correlation among demographics and beliefs was seen with a belief that EHRs made for, "Easier Data Management" with a Cramer V of 0.281.

Conclusion: The current study concludes that a large majority of individuals (88.3%), regardless of their professional involvement in healthcare, would prefer a nationalized EHR. This mainly pertains to individuals residing in Urban and Suburban communities. Only 6.7% of respondents were from rural communities. Further research should be focused on feasibility of such an EHR to include cost, complications, and operations.



Abstract #38

Efficacy of Virtual Reality in Teaching Health Professional Students Clinical Case Scenarios

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Background: Virtual reality (VR) has become popular within medical education in recent years due to its ability to simulate patient interactions, real life procedures, and teach complex spatial relationships. However, most studies have only been focused on anatomy, surgical practices, and psychomotor skill development. Very little research has been done to explore the efficacy of VR in teaching clinical management of disease when compared to traditional teaching methods. We believe a much broader application of VR education should focus on patient encounters and treatment of disease, especially because a large portion of pre-clinical medical education is dedicated to clinical medicine and interpersonal skills.

Hypothesis: We believe that students learning through a VR simulation will perform better than students learning via video-based and text-based modalities when given a written, standardized examination assessing their competence on the subject both immediately after the learning session and 3 months later during follow up. Additionally, we hypothesize that students learning through VR will report greater engagement, satisfaction, and excitement than students learning through video-based and text-based modalities.

Methods: We will have participants undergo a learning session from one of three learning models: VR-based, video-based, and text-based learning. In the learning session, the participants will be taught how to manage a predetermined clinical scenario, in this case, a pulmonary embolism (PE) secondary to deep vein thrombosis (DVT). The efficacy of each modality will be assessed using a standardized exam administered to each group immediately following the learning session. To assess the long-term effects of each modality, we will administer the same exam three months following the learning session as well.

Results: We anticipate that the VR group will score higher than text-based and lecture-based modalities in both the immediate assessment as well as the 3-month follow-up assessment. Furthermore, we anticipate the VR group to report higher satisfaction due to the engaging nature of VR technology.

Conclusions: If VR can prove to be more effective and engaging as well as allow for more effective long-term retention than traditional learning modalities in teaching clinical medicine, then it could provide evidence for a paradigm shift in today's medical education.



Abstract #39

Accounting for Altitude in CVD and Stroke Risk - A Cross-Sectional Study

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Background: Cardiovascular disease (CVD) is the leading cause of preventable death in the U.S. despite the continued development of new therapeutics and improving diagnostic capabilities. It is estimated that there are 795,000 people in the U.S. who have a stroke per year, and of that population, 137,000 die. There are many risk factors that contribute to the development of CVD and stroke, and one of these factors is altitude.

Hypothesis: In this study we pursue a novel approach using a retrospective cross-sectional epidemiological study using aggregate data to evaluate the impact of altitude on stroke risk as a path to proposing a new protective recommendation for high-risk patients.

Methods: We evaluated for association average altitude and aggregate county level data from the CDC related to CVD and stroke risk, the average elevation for each US county was obtained from a previously curated dataset that evaluated lung cancer incidence and elevation. We used the Minority Social Vulnerability Index (SVI) developed by the CDC to address the effect of confounding demographics. Associations were evaluated using Generalized Additive Models (GAMs) in SAS.

Results: We observed that altitude provides a massive protective effect against developing CVD and stroke in White and Black populations, but a negative effect when considering these variables in the Hispanic, American Indian, and Asian Pacific populations. The effects of altitude alone appear to have a significantly larger effect than all the demographic confounders accounted for by the SVI combined.

Conclusion: In summary, these results suggest that altitude alone has an important impact on CVD and stroke prevalence and may serve as a further recommendation physicians can provide as a preventative measure for high-risk patients.



Abstract #40

Improving Survivability among Head Trauma Patients through Pre-Hospital Biomarker Measurements

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Background: Traumatic brain injury (TBI) remains one of the leading causes of death among a wide spectrum of individuals in the population. This is partially because the extent of the traumatic injury may not be fully visible on the initial exam resulting in delayed treatment for life-threatening injury. Ketones, glucose, hemoglobin, creatinine and lactate are point of care (POC) labs and are all potential biochemical markers for severe trauma.

Hypothesis: Correlate prehospital measurements of POC labs to the severity of head injury which would allow medical teams to initiate additional testing and needed interventions sooner, increasing survivability of TBI patients

Methods: South Metro Fire Department will collect POC labs via finger prick using Nova Biomedical's StatStrip device on patients. Trauma severity will be determined using the Injury Severity Score (ISS) (Baker, O'Neill, Haddon, and Long, 1974).

Results: We would expect to find a correlation between increased POC labs and TBI severity.

Conclusion: Overall, it is our goal to help begin the process of developing protocols based on this point of care lab values to bypass the emergency department and go directly to the operating room. This study will be able to add to the literature of in practice predictors for admission of trauma patients to the operating room.



Abstract #41

“Needle Phobia” in Patients with Parkinson’s Disease (PD) Experiencing OFF Episodes Is Uncommon

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Injection is a common medical procedure however fear of needles can result in the avoidance of treatments. Amongst patients with Parkinson’s Disease that take long term oral levodopa, 40% will experience motor fluctuations and dyskinesia within 4-6 years. The percentage increases to 70% after >9 years of levodopa treatment. These OFF episodes occur when the effects of levodopa wane due to pharmacokinetic and pharmacodynamic factors. OFF episodes can be debilitating and severely effect the quality of life of patients. To evaluate willingness of patients with Parkinson’s to self-inject and reduce OFF episodes, a questionnaire was administered to a database of patients and caregivers/next of kin. The questionnaire was built to evaluate patients’ willingness to self-inject with a pen device to reduce OFF episodes. Key findings indicate that 89% of patients experiencing OFF episodes were willing to consider a pen device to begin moving again. Among these patients 45% were taking two or more adjuvant therapies with levodopa. Physicians may be overestimating “needle phobia” in Parkinson’s patients which may prevent them from prescribing subcutaneous apomorphine or future pump therapies to control OFF episodes. To test this hypothesis further, our future steps are to assess physicians’ perception of patients “needle phobia” and how their attitudes toward prescribing these may be altered after representing data which indicates patients are willing to self-inject in order to reduce OFF episodes and improve quality of life.



Abstract #42

The Role of the GABAA receptor δ Subunit in Sex Specific Hypnotic Effects of 3β -OH

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Background: 3β -OH is a neuroactive steroid that is metabolized into 3α -OH, an active GABAergic metabolite with hypnotic properties. In recent studies it has been discovered that 3β -OH has sex dependent hypnotic effects. The purpose of this study is to determine if the GABAA receptor δ subunit is involved in the mechanism of sex specific hypnotic effects of 3β -OH. We hypothesized that circulating estrogens control the GABAA receptor δ subunit.

Methods: We used behavioral loss of righting reflex in wild type mice and genetic knock outs of the GABAA receptor δ Subunit to study sex-specific hypnotic effects of 3β -OH. Mice were placed in habituation chambers for 30 minutes prior to intraperitoneal injection of 3β -OH. Three doses of 3β -OH were injected: 80mg/kg, 100 mg/kg, and 120 mg/kg. Mice were assessed for time to loss of righting reflex and time to gain of righting reflex to assess the sex specific hypnotic effects of 3β -OH.

Results: After injection of 80 mg/kg of 3β -OH all female GABAAR δ knockout mice lost righting reflex, however none of the male GABAAR δ knockout mice lost righting reflex. After injection of 100 mg/kg of 3β -OH male GABAAR δ knockout mice lost righting reflex for a shorter duration than wildtype mice, and female GABAAR δ knockout mice lost righting reflex for a longer duration than wildtype mice. After injection of 120 mg/kg of 3β -OH male GABAAR δ knockout mice had a shorter duration of loss of righting reflex compared to male wildtype mice.

Conclusions: These results suggest levels of circulating androgens may control the GABAA receptor δ subunit and are a contributing factor to differences in hypnosis for males and females after neurosteroid administration.



Abstract #43

Neuropeptide Oxytocin Level Influences Altruism and Adverse Life Events under the Function of Oxytocin Receptor Genotype SNP rs53576

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Background: The neuropeptide hormone oxytocin has widely been looked at by many studies and was found to have both behavioral effects in the human brain, including pro-social and positive social memory and physiological effects in the body, included breastfeeding and childbirth in women. Such oxytocinergic effects are achieved from the oxytocin receptors where variations in OXTR single nucleotide polymorphism (SNP) rs53576 have been linked to moderate prosocial and altruism behavior in individuals depending on situational factors. Situational factors (e.g social exposure to stress) have a large influence on how certain presences of OXTR genotype alter the expression of neuropeptide and thus alter behavioral response towards negative associated experiences.

Hypothesis: Our study proposes that individuals in different biological sex groups who are carriers of the G allele will show the presence of lower levels of neuropeptide in their peripheral body as compared to individuals who are carriers of the A allele OXTR genotype. Furthermore, individuals carrying G allele with high ACE score will score low in the compassionate scale, while the results will show no difference in stress scales compared to individuals with A allele.

Method: Subjects will be recruited at Rocky Vista University where procedures including samples and surveys collection. Saliva samples will be sent to Eve Technologies in Canada for neuropeptide analysis. Genotype Analysis using buccal swab samples will be processed at University of Colorado Denver, Biology Department. Statistical analysis includes first, a one-way ANOVA test will be used to correlate oxytocin levels with OXTR genotypes (one independent variable = OT receptor genotype) with 3 levels of that variable. (GG, AG, AA). Furthermore, a post-hoc test will be used to see which pair of 3 levels are significant from each other. Second, we will use linear regression to correlate oxytocin levels with ACE scores. Third, we will use linear regression to correlate oxytocin levels with altruism survey score.

Results: Anticipated results will show difference in oxytocin level, ACE scores that correlate with genotype

Conclusion: These results will help to shed light on how genotype on how genotype of OXTR can be predictive in determine behavioral traits such as altruism.



Abstract #44

COVID-19 Hospitalization and Mortality Rates, A Comparison between Rural and Metropolitan Populations

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Background: Coronavirus disease (COVID-19) is a highly infectious virus that typically causes mild to moderate respiratory symptoms. Most patients do not require medical treatment and make a full recovery within 1-2 weeks. Some patients do become seriously ill and require hospitalization, underlying medical conditions such as cardiovascular disease, diabetes, and chronic respiratory disease are more susceptible to severe COVID-19 infections. In addition to these factors affecting COVID-19 mortality rates we aim to explore the difference between incidence rates and mortality between Eureka CA, San Francisco, and the U.S.

Hypothesis: Investigate how geographic and economic isolation affects hospitalization and mortality rates of COVID-19 when compared to a large metropolitan area.

Methods: The incidence rates for COVID-19 infection, hospitalization, and mortality were calculated from county and hospital-level infection data and 2020 US Census population data for Humboldt County between 8/2020 and 7/2021. These were compared against CDC infection data from the City of San Francisco and population data the 2020 US Census. The study further broke down infection data into comorbidity and cause-specific death rates.

Results: The daily incidence of hospitalization rate per average population (0.004%), in San Francisco average (0.009%), national average was (0.015%). Cause specific mortality rate in rural area (0.947%), in San Francisco (1.464%), national rate (1.492%)

Conclusion: This study demonstrates how socioeconomic and geographic isolation plays a role in reducing the mortality rates of COVID-19 infections. We hope that the findings of this study will show the importance of encouraging social isolation during COVID-19 outbreaks to reduce infection and mortality rates in communities.



Abstract #45

Anabolic Steroid Use and Cutaneous Manifestations in Body Builders and a Dermatologist's Role

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Acne fulminans (AF) is a rare, severe form of nodulocystic acne that frequently affects young male patients. This condition results in extensive, painful, ulcerative nodules to the face, back, and chest and is associated with systemic symptoms including fever and musculoskeletal pain. AF often results in severe scarring which can affect patients psychologically, causing anxiety and depression. The pathogenesis of acne is multifactorial, involving hyperkeratinization of a hair follicle, increased sebum production, bacterial (*Cutibacterium acnes*) activity, and resulting inflammation. While AF may share this pattern, the exact etiology is unknown. However, it appears to be most strongly affected by genetic predisposition and androgen levels. One often-overlooked cause of acne fulminans is anabolic steroid abuse. While steroid use is common in many sports, it is particularly endemic within the bodybuilding community. In a sport where the goal is to build the best physique possible, the effects of AF can be particularly devastating. Here we discuss acne fulminans and other cutaneous manifestations precipitated by anabolic-androgenic steroids (AAS). We hope that this study can bring light to this issue in the bodybuilding community, while encouraging dermatologists to play a more active role in recognizing and warning of its increased risk amongst bodybuilders.



Abstract #46

Novel Portable Training Model for Skull Trephination by Non-Neurosurgeons

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Background: Emergency physicians must be skillful at performing certain high risk, low volume procedures. One of these procedures is emergent skull trephination for an epidural brain bleed. To our knowledge, the procedure is not taught routinely in emergency medicine residencies and is not part of the Emergency Medicine Defined Key Index Procedure Minimums for board certification by the American College of Graduate Medical Education (ACGME). We are also not aware of any existing simulation model for this procedure that is not a cadaver or animal model. We believe that our model fills this gap.

Hypothesis: Our research aims to prove the efficacy of a simulation training model in teaching and training medical students, residents, and physicians the skill of skull trephination. We have created a didactic module and training model to use for this purpose.

Methods: We enrolled twenty-nine RVU medical students in this study. The subjects were divided into experimental and control groups. The experimental group received didactic training as well as practice with using the trephination drill on our burr hole model. The control group only received the didactic training. Both then completed a simulation scenario in which they were scored on their ability to perform the procedure correctly and in a timely manner. A rubric was used to assign a score for different metrics including procedural steps, location of incision, procedure time, and blood return, with a maximum possible score of 10.

Results: The control group (n = 15) had an average score of 4.6 in the scenario and the experimental group (n = 14) had an average score of 7.07. Two-tailed t-test demonstrated a statistically significant difference found between the scores of the two groups, with $p < 0.05$.

Conclusions: Our results suggest that a cost-effective epidural hematoma model provides additional benefit in training novices in emergent epidural hematoma drainage. More research is needed to determine if this benefit persists in more experienced physicians and advanced practice providers.



Abstract #47

Provision of Equitable Palliative Care for American Indians and Alaskan Natives in the US: A Scoping Review

Evelina Kravchuk - RVU

INTRODUCTION

Although Palliative Care has been demonstrated by numerous randomized controlled studies to improve quality of life for individuals with serious, advanced illnesses and their families and caregivers, it continues to be inaccessible to the American Indian/Alaskan Native (AI/AN) population. While the AI/AN population comprises up to 2% of the U.S. population, they make up only 0.2% of the users of hospice and palliative care.² In this scoping review, the objectives are to i) examine the barriers to provision of palliative care to AI/AN residing in the US and ii) seek to make recommendations for provision of high-quality culturally-relevant palliative care to AI/AN residing in the US in the future.

METHODS

An integrative literature methodology was utilized to search PubMed Central with keywords: American Indian OR Alaskan Native OR Native American AND palliative care. Later searches added terms “pain management, end of life, home-based care, community based care, cultural competence.” The review’s inclusion criteria was all original research papers and non-original meta-analysis published between 2005-2022. Included all that documented barriers to care and that brought forth suggestions for better provision of palliative care for this population in a model applicable to elderly patients, those of all ages with end stage chronic diseases, and those of all ages dying from cancer complications. Fifteen were identified. A simple analytical framework: Search, Appraisal, Synthesis and Analysis (SALSA) was used.

RESULTS AND DISCUSSION

Objective i)

Upon review of the literature it is clear that there are multi level communication, culture, structural, physical, and supportive barriers.^{4,5} Those discussed most frequently are the following:

- Staffing and infrastructure issues.
- Institutional and cultural barriers.
- Interpersonal dynamics.

Objective ii)

The literature shows that widening accessibility seems to hinge on change in two major categories: local capacity and multi-sectoral partnerships.

CONCLUSION

The review demonstrates the needs to adapt current structures for use in and with AI/AN populations by placing focus on capacity building (improvement in an organization’s facility “to produce, perform or deploy”) projects as well as multilevel partnerships. Several examples of programs and provisional recommendations are found.



Abstract #48

The State-Based Financial Reality of Women's Health

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The health services available to women and critical to the practice of women's health has been historically linked to state funding within the United States. This relationship has been underscored by the overturn of *Roe v. Wade*. Private women's health clinics rely on donations and state based funding. Additionally, organizations such as Planned Parenthood which receive federal money are dependent on state dictated allocation of those funds. This leads to vast differences in the availability and outcomes of women's health by state, which also disproportionately affects women of lower socioeconomic status. This research aims to explore the significance and impact of funding in 3 groups: top tier, middle tier, and bottom tier funded states as it relates to their total available budget/financing for women's health services. Although each state has their own unique clinics and state-based rules, regulations, and funding sources, grouping the 50 states into three tiers allows for a more holistic analysis and helps minimize geographic biases. Cancer screenings (breast and cervical), STI testing and treatment, contraception availability and use, as well as prenatal care and abortion access are the key aspects of women's health that will be examined. It is an aim to highlight the vital correlation between available funding and the quantitative impact on women's health. Disparities created by funding differences such as the timing of cancer diagnoses, the public health risk of inadequate STI treatment, and even increases in maternal and fetal death following a lack of proper prenatal care, are all important to recognize. It is also necessary to acknowledge that all individuals in need of women's health services, regardless of gender identity or sexual orientation, are part of the relevant patient population of this study. Women have a right to knowledge about health services that are directly linked to their medical care. It is imperative to know how the state in which one lives affects health care options and thus life and personal health.



Abstract #49

The Sapien Lifestyle and Its Effects on the Markers of Metabolic Disease

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Gary I. Shlifer, DO - Evolve Healthcare

Background

There are limited studies on nutrition and its effects on disease, specifically investigating long-term sustainability of a low-carbohydrate, high fat lifestyle within our healthcare system. Diet plays a vital role in the management of various metabolic diseases. The Sapien diet created by Dr. Gary Shlifer and Brian Sanders consists of minimally processed, nutrient dense whole foods, focusing on protein, embracing fat and minimizing carbohydrates, in addition to having a condensed eating window. This study showcases how diet and lifestyle can help with weight loss/maintenance, disease prevention, and potentially metabolic disease reversal.

Hypothesis

Do patients on the Sapien diet have improved A1cs and BMIs over 6-12 months compared to those on a non-Sapien diet?

Methods:

- A. Setting: Patients at Evolve Healthcare (primary care clinic) in Woodland Hills, CA.
- B. Intervention: The Sapien Diet (whole food based diet, low carb, condensed eating window)
- C. Participants: Either male or female, ages 18-65, starting BMI > 25, starting A1c > 5.7 (prediabetes range), with a minimum of three visits with Dr. Shlifer. Patients taking insulin will be excluded from the study.
- D. Design: A retrospective analysis analyzing patient's BMI, A1c, and lipid panel over the course of 6-12 months.

Results

In accordance with research on the Sapien diet and other studies on how diet and lifestyle affect one's overall health, the Sapien diet should lead to improved BMI and A1c levels over the course of 6-12 months. (Still retrieving and analyzing the data, results are not yet available.)

Conclusions

The Sapien diet is more of a lifestyle, meant to help people thrive rather than survive. This lifestyle focuses on eliminating added sugar, refined grains, and processed foods to lead to improved health and wellness. Nutritional intervention clinical studies can be difficult to assess compliance and have many confounding variables. The number of follow up visits is a proxy for compliance in this study. The confounding variables present in this study include total hours of exercise, total hours of non-fasting window, and presence of comorbidities. The study is still in progress, so no conclusions can be made at this time.



Abstract #50

Barriers to Interpretation for Limited English Proficiency Populations in the Clinic Setting

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PI Darcy Solanyk, MS PA-C (Rocky Vista University College of Osteopathic Medicine)

Background

With over 350 languages spoken in the US (1) and over twenty-five million people in the US designated as having Limited English Proficiency (LEP) (2), language barriers are an inevitability within healthcare. Research demonstrates that language barriers between patients and healthcare staff result in miscommunication, decreased satisfaction, decreased quality of care and safety, and increased length of visits (3). While disparities in the care of LEP and non-English speakers have been investigated, there is limited research on potential interpretation systems to lessen these barriers, and how these systems could interact to create more suitable care.

Hypothesis

The goal of this research is to discuss current findings in interpretation methods along with applications of this research to improve the quality and timeliness of patient service.

Methods

The databases of ClinicalKey and NCBI were utilized for research, as well as the online resource Google Scholar. Government resources including the US Department of Health and Human Services and US Census Bureau were accessed to gain accurate statistics on LEP speakers and policies or services related to those with language barriers in relation to healthcare.

Results

Research indicated that using translation applications on tablets while in clinical settings resulted in 94% of staff and patient participants endorsing the technology as easy to utilize, time saving during visits, and resulting in improved health care delivery and patient safety (8). A 2019 study then identified 2 free applications, CALD Assist and Talk to Me, that experts in translation and cross-cultural communication found adequately supported everyday medical communication (9).

Conclusion

A three-part process is proposed to benefit this vulnerable patient population. Firstly, tablets with free CALD Assist or Talk to Me applications would be utilized by front and back-office staff for communication requiring basic medical terminology. Secondly, professional remote video translation on a tablet would be used for provider visits to allow for the most time consuming and costly component of translation to be utilized when it is most impactful and necessary. Remote phone call translation may also be used. Lastly, follow-up care instructions and appointment reminders in patients' native languages would be made readily available.



Abstract #51

Medical Student Led Community Health Fair: A Community Academic Partnership

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The purpose of the current study was to investigate the services used by community members at medical student-led health fairs, and to determine the best way to increase our impact in fairs to come. In April 2022, the Global Medical Outreach club at Rocky Vista University hosted a community health fair in Parker, CO. The fair attended to 179 patients, while providing services of vital checks, blood draws, vaccinations, and audiology, dermatology and OBGYN screens, which were spearheaded by student and community volunteers. Of the 179 patients that attended the fair, 168 received routine blood work, which included a lipid panel, a thyroid panel, prediabetes screening, and prostate antigen screening in males. In addition, 13 patients received a COVID-19 vaccine. The goal of the health fair was to promote screenings and chronic disease prevention in the community by making patients aware of their current health status.

As a club, we hoped to provide services to local underserved communities that might otherwise not have access to these services. The data and feedback received after the April 2022 fair will help guide improvements in future fairs, including relocating to Aurora, CO, providing osteopathic medical treatment, and expanding vision screening. Implementing these changes will help us meet our goals of expanding our services and targeting a larger, more diverse population and advancing community health through surveys, screenings, and education.



Abstract #52

An Analysis of Factors Impacting Cervical Cancer in Women in Nepal, China, India and the United States of America

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Cervical cancer is the second most common gynecological cancer in the world, affecting women in high and low-income countries worldwide. If cervical cancer is detected early, the 5-year survival rate for localized cervical cancer is 92%¹. Routine screening and vaccination against human papillomavirus (HPV) has been shown to decrease the incidence of precancerous/cancerous lesions. However, not all countries have access to the same preventative resources, and women living in low-income areas are disproportionately affected by cervical cancer. This literature review will analyze the discrepancies in access to healthcare, social barriers, risk factors, methods in screening, and preventative measures in China, Nepal, India, and the United States which are countries with areas of varying socioeconomic status.



Abstract #53

Does SARS-CoV-2 Transmit through Breast Milk?

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Benjamin Brooks, PhD (MSBS and Clinical Education; Rocky Vista University; Ivins, Utah)

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is a highly transmissible virus that is currently perpetuating the declared worldwide COVID-19 pandemic. It emerged from Wuhan, China in December 2019 and quickly spread throughout the entire world. The World Health Organization (WHO) declared it to be a pandemic on March 11, 2020. There have been numerous studies done on COVID-19 and SARS-CoV-2 but the question if vertical transmission of SARS-CoV-2 occurs through breast milk has remained. Given the current infant formula shortage and raising concerns over transmitting the virus to those who may not have a fully developed immune system, it is important for us to further investigate this topic. For this research project, we conducted a literature review of the current research studies on transmission of different viruses through breast milk and how it can potentially be translated to the transmission of SARS-CoV-2. Based on the findings of this research project, vertical transmission through breast milk is not likely to occur, if so, it is a rare occurrence.



Abstract #54

Utilization of Behavioral Health Services Among Online and In-Person Students Prior to and During the COVID-19 Pandemic

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Since the start of the COVID-19 pandemic, numerous stressors have drastically impacted the mental health of many adult students in the United States. Adult students have reported increased anxiety, stress, and isolation due to factors including concerns regarding health, finances, job insecurity, and the transition from in-person to online schooling. As the COVID-19 pandemic continues, students with mental health concerns are in need of behavioral health services, however, it is unclear if students are seeking out behavioral healthcare at a higher rate. This study investigated the utilization of behavioral health services for online and in-person students prior to and since the start of the COVID-19 pandemic. It was hypothesized that students would have increased rates of behavioral health service use since the start of the COVID-19 pandemic when compared to before the pandemic, and online students would utilize services at a higher rate due to the increased isolation often present with online schooling. The survey was delivered via an online Qualtrics link distributed across social media platforms during the months of March 2022-June 2022, where one hundred adult students completed the survey. Data was accessed after completion of survey response collection and responses were analyzed using chi-square analysis and McNemar's test. Contrary to the hypothesis, students were not found to utilize behavioral health services at an increased rate since the start of the COVID-19 pandemic and there was no statistically significant difference in behavioral health service use between online and in-person students. Additionally, students who had less than one hour of social interaction during school hours reported higher behavioral health service use, instead of the hypothesized correlation with the learning platform used. Results from this study can be used to help advocate for additional time for social interaction during school hours and increased behavioral health services for programs with limited interaction among students regardless of learning platform.



Abstract #55

Barriers to Care For Obstructive Sleep Apnea in Rural Areas

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Background

The purpose of this study was to compare the screening, diagnosis, and management of OSA between rural and urban areas according to guidelines of AASM.

Hypothesis

There is no statistical significance between the discussion of symptoms, screening, diagnostics, and or treatment of OSA in Rural vs Urban areas.

Methods

Using custom survey questions with IRB approval (IRB #2022-049), data was collected to determine the percentage of proper screening, diagnostics, and treatment in rural vs urban settings. Survey was validated by sleep specialists. Participants were limited to those with symptoms of OSA in the United States. Participants selected the setting they belonged to when starting the survey. Urban participants served as the “control” group. Questionnaire was distributed via Qualtrics through social media platforms. Participants remained confidential. Relative risk (RR) and odds ratio statistical analyses were utilized.

Results

In total, there were 46 urban and 44 rural participants. Data showed 36.4% of individuals in rural communities had not discussed their symptoms with a healthcare provider as opposed to our urban group that had 15.2%. RR value was 2.3896. Of those who had a discussion of symptoms with their provider, 4 rural participants and 1 urban participant were not screened. RR value was 5.6296. Participants were narrowed to intermediate risk or greater and 2 of the 21 qualifying rural participants and 8 of the 37 patients in urban regions, did not have a sleep study performed. RR value was 0.4891. For the patients diagnosed with OSA, 2 urban participants and 5 rural participants admitted to not treating disorder. RR value was 3.4524.

Conclusions

Data collected confirmed that participants in urban regions were more likely to discuss their symptoms of OSA to provider than rural. I failed to reject my hypothesis in terms of screening, performing sleep studies, and treating OSA in rural vs urban populations. I rejected my null hypothesis in the category of discussing OSA symptoms with provider. A follow up study could be performed to identify why symptoms were not discussed with providers and assess if shortage of providers in rural areas contributes to this.



Abstract #56

A Review of Abdominal Aortic Aneurysm Screening Guidelines in Women with Smoking History

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Background: Rupture of Abdominal Aortic Aneurysms (AAA) has been associated with an overall mortality rate estimated at around 81%. Guidelines to screen for asymptomatic AAA with a one-time ultrasound in high-risk populations have been put forth by organizations around the world in an attempt to identify for intervention before a rupture event. Several risk factors have been linked to AAA development and rupture with the most significant being male sex, older age, smoking history, and family history of AAA. Given the lower prevalence of AAAs in women compared to men and subsequent lack of research on AAAs in women, the recommendations for screening women with smoking history for AAA vary widely. The purpose of this guideline review is to compare various organizations recommendations, investigate their respective underpinnings, and discuss the surfacing research on women smokers with regards to AAA risk and screening.

Methods: AAA screening guideline recommendations from the USPSTF, SVS, and ACC/AHA were reviewed as well as the primary research underpinnings for the guidelines. Additional primary research was gathered through research databases, PubMed and Google Scholar, by searching subjects regarding screening for AAA in women, AAA in women, epidemiology of AAA, risk factors for AAA, surgical outcomes of AAA repair in women, sex differences in AAA, tobacco and AAA.

Results: The evidence outlined in this review reveal that smoking, particularly current smoking, carries a greater risk of AAA for women than for men.

Conclusions: The studies call into question whether recommendations are consistent with current data. Smoking, specifically current smoking, has been shown to bear a greater threat to women than men with regards to AAA risk. Based on the evidence outlined in this review, older women who are current smokers should be included in guidelines for AAA screening.



Abstract #57

Bilateral Patellar Avascular Necrosis Following Total Knee Arthroplasties: A Case Report

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Introduction: Patellofemoral complications have been reported to occur in up to 2% of total knee arthroplasties (TKA). Avascular necrosis (AVN) of the patella is a rare complication following a TKA, with a prevalence of 0.05% to 2%. Ritter et al found that the risk of AVN following TKA is greatly increased when performed in conjunction with lateral retinacular release, due to interruption of the peripatellar vasculature. A prospective study looking at the effects of lateral retinacular release on patellar vascularity showed that 56% of postoperative bone scans demonstrated a “cold patella”. Additional research has underscored the importance of sparing the superolateral geniculate artery during a lateral retinacular release, given that the medial genicular vessels are sacrificed during a TKA.

Methods: The information presented in this case report was obtained through review of clinic notes, radiographic studies, and operative reports. The patient provided consent for her clinical information to be reported in this study.

Results: This paper presents an unusual case of a 79-year-old female who underwent bilateral TKAs in 2014 for longstanding, advanced bilateral knee osteoarthritis (OA). A bilateral retinacular release was also performed at that time. The patient reported persistent anterior knee pain and swelling that began a few months postoperatively. In 2022, the patient presented to the author’s clinic for a second opinion with a new painful prominence at the lateral aspect of the knees, as well as continued anterior knee pain and swelling. Her physical exam demonstrated significant bilateral joint effusion, limited range of motion, and an antalgic gait. X-rays and a computed tomography scan were obtained which revealed near-complete resorption of bilateral patellas with subluxation of the patellar components. A bilateral TKA revision surgery was performed to remove the bilateral patellar hardware.

Conclusion: This case illustrates a patient who suffered bilateral patellar AVN following a TKA. Although the prevalence of AVN following a TKA is quite low, there appears to be a greater risk of complication when a lateral retinacular release is performed concomitantly. Orthopedic surgeons may consider more close follow-up with patients who have undergone both of these procedures.



Abstract #58

Analysis of Diversity and Academic Backgrounds Among Emergency Medicine Residency Leadership

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Background: This cross-sectional study aims to evaluate demographic features, academic backgrounds, scholarly achievements, and practice setting, to highlight trends among EM allopathic and osteopathic leadership in the United States.

Hypothesis:

Gender and type of medical degree have a significant impact on the scholarly achievement, clinical experience, and practice setting of EM PDs.

Methods: EM residencies were identified using the ERMA Match directory, which includes PD name, medical degree, and type of institution. Educational background was obtained via institutional biographies, online curriculum vitae, and professional social media accounts. Clinical experience was approximated by calculating the number of years since medical school completion. Gender was determined by inspection of first name, followed by a search of institutional biographies. Scopus was queried to identify scholarly activity such as number of publications and citations, and H-index. Legacy AOA residency programs are defined as previously AOA-accredited programs that transitioned to ACGME-accreditation. Legacy ACGME-accredited programs are defined as programs that had been accredited by the ACGME prior to the merger that began in 2015.

Results: A majority of PDs were MDs and male. MDs displayed significantly more scholarly achievement than DOs with regard to publications and H-Index. Males also displayed significantly more scholarly achievement than females with regard to publications, citations, and H-Index. There was no significant difference in institution type among males and females, but a significant difference in institution type was seen between MDs and DOs, as allopathic physicians are more likely to serve as PDs at university and county-based programs, whereas osteopathic physicians are more likely to serve in community-based programs. Seven medical schools and eight residency programs produced the greatest amount of currently practicing PDs. A statistical difference was also observed when comparing the proportion of MD leadership at legacy AOA programs, to DO leadership at legacy ACGME programs.

Conclusion: This analysis of EM PDs revealed that gender and type of medical degree both had a significant impact on scholarly achievement, clinical experience, and practice setting. Continued efforts should be made.



Abstract #59

A Case Report: The Uncommon Syphilitic Alopecia

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Many diseases lead to overlapping symptoms, but only one is often referred to as “the great masquerader” and that is syphilis. It is a sexually transmitted disease (STD) that is caused by *Treponema pallidum*, a gram-negative spirochete. Syphilis is known to clinically progress in four stages: primary, secondary, latent, and tertiary. The focus of this case study is secondary syphilis. This stage usually arises two months following a primary infection and presents with systemic symptoms and a disseminated mucocutaneous macular rash which involves the palms and soles. An uncommon presentation of secondary syphilis is alopecia and is only seen in approximately 4-11% of cases. Syphilitic alopecia is described as “discrete patches of non-scarring alopecia”. This case will address the need to be vigilant for medical “zebras” in seemingly mundane clinical settings.



Abstract #60

Distinguishing Gender Identity from Biological Sex in Dermatologic Healthcare: Methods, Harms, and Paths Forward

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Gender identity and biological sex are important and distinct variables in dermatology research. However, these are often conflated or poorly demarcated, which threatens the validity of study results. Our analysis aims to illuminate the need for a robust consensus regarding assessments of gender identity and biological sex in dermatology research that does justice to the complexity and significance of this distinction. We began by analyzing the current methodology in use to make these assessments. Although the literature emphasized the importance of transparency, reproducibility, and the need for delineating the differences between sex and gender, the criteria and methods used to assess those differences varied widely between sources. We then examined gender identity and biological sex's effects on people's skincare, disease prevalence, and disease manifestations. We found discrepancies in the rates of various skin diseases between males and females and considerable differences in skin care practices. Next, we discussed the discrepancy in healthcare literature representation between male and female patients. While there is growing recognition and response to female underrepresentation in literature, there is pervasive underrepresentation of transgender and gender non-binary patients. Lastly, we discussed how providers communicate about gender identity. Arming providers with better communication skills regarding sex and gender can help prevent the conflation of sex and gender while maximizing respect during patient encounters. The healthcare research community needs more thorough guidance regarding gender and sex assessments. This frequently overlooked distinction is not inconsequential but compromises respect for patients' identities and the validity of study results. Given the marked differences between male and female skin, this issue is particularly relevant to dermatology research. Our findings indicate the need for further work on this issue.



Abstract #61

A Case Report: The Atypical Klebsiella Meningitis

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On a global scale, the most common pathogens behind the development of acute bacterial meningitis include *S. pneumoniae* and *N. meningitidis*, even with the development of vaccines. There remains a staggering mortality rate associated with this condition, even with the administration of targeted antibiotics, in addition to a myriad of neurologic complications should the patient survive. Less common causes of acute bacterial meningitis include: *H. influenza* type b, *L. monocytogenes*, *S. aureus*, and gram-negative bacilli such as *K. pneumoniae*. This report will reflect on a case of *K. pneumoniae* meningitis and its sequelae. *Klebsiella pneumoniae* is a gram-negative bacteria within the Enterbacteriaceae family. Colonization with *K. pneumoniae* is through person-to-person contact. While humans are the primary reservoir for this pathogen, research has indicated increased carrier rates among those with Asian ethnicity, recent history of antibiotic use, indwelling catheter use, and alcoholism. *K. pneumoniae* is known to be the third leading cause of nosocomial infections. Clinical manifestations of *K. pneumoniae* include pulmonary infection, bacteremia, genitourinary tract infections, intra-abdominal infections, endophthalmitis, and meningitis. This case report will discuss a specific manifestation termed *K. pneumoniae* primary liver abscess (KLA), a monomicrobial consequence of metastatic infection. There is a high prevalence of KLA among patients with Asian ethnicity, which is consistent with our case report, giving rise to questions regarding how host genetic factors play a role in the development of disease. We present this case of atypical meningitis due to KLA to enlighten fellow physicians and to raise awareness of this rare condition not typically seen in the US.



Abstract #62

Free Sunscreen Dispensers: A Readily Available Asset for the Primary Prevention of Skin Cancer

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Sunscreen is a well-known primary prevention method for skin cancer and photoaging effects. Since the start of the COVID 19 pandemic, purchase and use of portable sunscreen dispensers has seen a drastic decline, signaling a potential risk increase in skin cancer. This paper aims to educate physicians, institutions, and individuals of the various types of dispensers currently on the market and their associated pros and cons. Online searches were conducted February 2022, via Google and Amazon, using the search term “portable sunscreen dispensers”. Results yielded eight unique sunscreen dispensers available for purchase. Dispensers were evaluated on factors which affected perceived ease of use, including price, portability, dispenser volume, and battery usage. Results indicated wide price range in the purchase of dispensers and their associated maintenance costs. Of the eight dispensers, wall mounted dispensers tended to have a lower associated purchase and maintenance cost. Dispensers of higher prices, had potentially superior features influencing ease of use including portability and touch free capabilities. Pedal operated stands accounted for half of the dispensers allowing for increased portability and placement of such dispensers in high traffic areas. Similarly, half of all dispensers had touch free capabilities limiting pathogen transmission, but saw potential drawbacks being battery operated. Resulting conclusions indicate that despite supply issues secondary of COVID-19, the market still has a wide variety of dispensers to fit any and all consumer demands.



Abstract #63

Anabolic Steroid use and Cutaneous Manifestations in BodyBuilders and a Dermatologists Role

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Acne fulminans (AF) is a rare, severe form of nodulocystic acne that almost always affects young male patients. This condition results in extensive, painful, ulcerative nodules to the face, back, and chest and is associated with systemic symptoms including fever and musculoskeletal pain. Also, AF often results in severe scarring which can affect patients psychologically, causing anxiety and depression. The pathogenesis of acne is multifactorial, involving hyperkeratinization of a hair follicle, increased sebum production, bacterial (*Cutibacterium acnes*) activity, and resulting inflammation. While AF may share this pattern, the exact etiology is unknown. However, it appears to be most strongly affected by genetic predisposition and androgen levels. One often-overlooked cause of acne fulminans is anabolic steroid abuse. While steroid use is common in many sports, one community that appears to be affected more so than others is the bodybuilding community. In a sport where the goal is to build the best physique possible, the effects of AF can be particularly devastating. Here we discuss acne fulminans and other cutaneous manifestations precipitated by anabolic, androgenic steroids. We hope that this study can bring light to this issue in the bodybuilding community, while encouraging dermatologists to play a more active role in recognizing and warning of its increased risk amongst bodybuilders.



Abstract #64

Skin of Color Representation in the American College of Mohs Surgery Educational Cases on Social Media

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Mohs surgery is a precise and effective tissue-sparing approach to the surgical treatment of skin cancer, one of the most prevalent conditions seen in veterans. The American College of Mohs Surgery (ACMS) has established guidelines for Mohs appropriate use, but access and care coordination remain challenges for veterans.¹ Additionally, the proportion of non-White veterans is projected to increase to almost 40% by 2045,² highlighting concerns regarding care for Skin of Color (SoC) patients where skin cancers are often underdiagnosed, due to part to inadequate training and exposure to the visual appearance of conditions on different skin tones. Social media has become an increasingly popular method of delivering and disseminating educational information in dermatology. A highly-followed ACMS Instagram page posts weekly “Flap Friday” content for practitioners, each featuring a Mohs case with before-and-after patient photos and clinical pearls. To assess the representation of SoC images in this series, two independent reviewers categorized and tabulated Mohs patients’ constitutive skin tones (Light, Fair, Medium, or Dark) following previously published methods.³ No SoC patients were featured in the most recent 10 “Flap Fridays” as of August 2022 (60% Light, 40% Fair), and the vast majority of the remaining 294 cases featured were also non-SoC. These results corroborate current trends in dermatologic literature⁴ and curricular resources⁵, where only 15-17% of material included SoC. Academic pages, including social media, should be encouraged to increase SoC exposure and alleviate gaps in SoC representation to improve care for an increasingly diverse United States population.



Abstract #65

Reducing Intraoperative Radiation Exposure During Periacetabular Osteotomy: The Use of Flat Panel Detector Fluoroscopy

Rachael Martino; Patrick Carry; Omar Samara; Sterling Lee; Courtney Selberg

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Background: The Periacetabular Osteotomy (PAO) is a technically demanding procedure that requires precise intraoperative evaluation of pelvic anatomy for reorientation of the acetabulum. Fluoroscopic images pose a radiation risk to operating room staff, scrubbed personnel, and the patient. The purpose of this study was to determine the difference in radiation dosage and intraoperative acetabular correction assessment using a Standard Fluoroscope with an Image Intensifier (SFII) compared to the novel Flat Panel Detector (FPD) C-Arm.

Hypothesis: The FPD C-Arm will decrease total radiation exposure and intraoperative acetabular correction compared to the SFII fluoroscope during PAO.

Methods: A retrospective review of 57 patients who underwent PAO at a single institution was performed. The total radiation exposure dose (mGy) was recorded for each case from the SFII fluoroscope (n=29; 1/1/2019-12/31/2019) and the FPD C-Arm (n=28; 1/1/2020-8/21/2020). Lateral center edge angle (LCEA) was measured intraoperatively and at the six-week postoperative visit on an AP pelvis supine radiograph. Average radiation dose and intraoperative and six-week postoperative LCEA measurements were compared between SFII and FPD groups.

Results: A total of 57 patients (95% female) with a mean age of 17.55 years (SFII) and 17.71 years (FPD) were included. The SFII fluoroscope averaged total radiation exposure to be 410.1 mGy, while the FPD C-Arm averaged 94.05 mGy. We saw a decrease of 316.05 mGy (77.07%) between groups ($p<0.000$). The average difference between intraoperative and 6-week postoperative LCEA measurement was 0.24° for the SFII cohort and 0.29° for the FPD cohort.

Conclusion: Use of fluoroscopy with FPD technology decreased the total radiation dose exposure intraoperatively and did not produce differences in intraoperative assessment of LCEA compared to postoperative imaging. Both cohorts were corrected to LCEA within appropriate limits seen on 6-week postoperative imaging and based on intraoperative assessment, the FPD fluoroscope appears to produce similar quality images as a standard fluoroscope. Decreasing radiation exposure to young patients is imperative to reduce the risk of future comorbidities. Further study is necessary to develop an ideal protocol to reduce radiation exposure to young patients, while still providing adequate image quality and surgical correction.



Abstract #66

Perceptions of Family Planning and Contraception by Maasai Women

Ashley Jordan McGee, Macarena Basanes, Mackenzie Ryan, Isain Zapata, Camille Bentley - RVU

Access to family planning and contraceptive services continues to be an unmet need in Kenya – and nomadic populations, like the Maasai, face increased barriers to family planning and contraceptive care. In January 2022, 148 surveys were collected in Kajiado County, Kenya. All women of reproductive age 14-49 across 14 different clinic sites were asked to complete the survey. Age, Marriage Status, and Pregnancy history variables were evaluated for association with other factors assessed using contingency tables for categorical variables and linear regressions for continuous variables. We found that participants aged 40-49 were more likely to state that STI prevention is a proponent of Family Planning than their younger counterparts. Respondents who have never been pregnant were more likely to site infertility as a perceived side effect of contraceptive use than counterparts who have previously been pregnant. Of those who are not using contraception, the most common reasons for not using contraception were partner dissent and perceived side effects, the most common cited being infertility, excessive bleeding, and lack of monthly period. Our findings point to a difference in perspectives of who should use family planning related to age of the person interviewed, their marital status, and whether they have been pregnant. Many participants perceive side effects proven to not be supported by modern medicine. We are hopeful in establishing a continuous program between RVU, HFH, and Kajiado County Health Officials in establishing a future Family Planning campaign and are hopeful at the Maasai's reception in this, as we found that 51% of women surveyed are using contraception at the time the study was conducted and 74% of women surveyed wished to learn more about Family Planning. Additionally, we recognize the need for future research to dive deeper into these perceptions of family planning, as this survey only provides a starting point for our understanding. We also recognize limitations to our study such as translational barriers and necessary settings for elucidating sensitive information from informants that could have been improved.



Abstract #68

Gown and Glove Survey Results: Preparation for Third Year Rotations

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The Association of Women Surgeons Club conducted a hands-on training in gowning and gloving in conjunction with a surgical simulation as part of an event for pre-clinical medical students on the Colorado RVU campus. The research investigated whether or not students felt subjective improvement after a gowning and gloving training and whether or not they felt the surgical simulation added to the training effectiveness. The research investigation consisted of a pre and post training survey, evaluating student's confidence in gowning and gloving procedures, hand washing protocols, and understanding of OR etiquette/regulations. Due to the small sample size and therefore low powered data, further research is needed to evaluate effective gown and glove training modalities.



Abstract #69

Pulmonary Embolism Diagnostic Criteria: A Data Analysis Comparing Two Clinical Decision Rules

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Background

A pulmonary embolus (PE) is a common acute cardiovascular disease in the US, and accounts for over 100,000 deaths per year. Despite the frequency and severity, there is not one universally adopted diagnostic protocol to diagnose a PE in the acute setting. The purpose of this study was to perform a data analysis comparing two Clinical Decision Rules (CDRs) that are used in diagnosis of pulmonary embolism: The Wells and Revised Geneva scores.

Methods

PubMed and Clinical Key databases were reviewed utilizing a key term search to find pertinent primary studies comparing the two CDRs. Studies that met criteria were included in a data analysis where sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated. Four studies were included in the analysis.

Results

In total, there were 1,537 patients included between the four studies reviewed. The Revised Geneva score had an increased sensitivity in three of four studies, and the Wells score had a higher PPV and specificity in three of four studies.

Conclusions

Neither CDR has perfect sensitivity or specificity, meaning there is still work to be done to improve the protocol for diagnosing pulmonary embolism. This study analyses the benefits and limitations of using each CDR in clinical practice, and raises the question of whether predictive factors in a CDR could be weighed differently to more accurately stratify the risk of a patient having a PE in the acute setting.



Abstract #70

Effects of CACNA1G Knock Down in the Central Medial Nucleus of the Thalamus in Mice on Contextual Fear Conditioning following Neonatal Exposure to Sevoflurane

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Inhaled anesthetics have been shown to cause neuroapoptosis in the neonatal rodent brain by various mechanisms such as production of free radicals and mitochondrial damage. These neurotoxic effects have been shown to induce neurocognitive and social impairments later in life as seen in alterations of many behavioral paradigms including freezing response time to foot shock as assessed by the Contextual Fear Conditioning (CFC) test. Recent data have implicated the role neuronal T-type voltage-gated calcium channels (T-channels) in CFC. Furthermore, we have well documented the role of CaV3.1 (CACNA1G) isoform of T-channels in effects of general anesthetics in regulation of neuronal excitability in the central medial (CM) nucleus of the thalamus. Based on these findings we hypothesized that a single neonatal exposure of mice at postnatal day 7 (PND7) to sevoflurane (SEVO) may dysregulate the CaV3.1 channel in the CM and these changes help contribute to the behavioral deficits seen later in CFC test. Hence, we aimed to perform molecular knock down (KD) of the CaV3.1 channel in the CM using shRNA approach in SEVO exposed mice to assess the function of these channels in modulating contextual learning tasks. So, we exposed mice to 3% SEVO for 2h then 2.4% SEVO for 4h or sham exposure (regular air supplemented with 30% O₂) on PND7. We then performed stereotaxic injections between PND 57- 102 and mice were injected with CACNA1G shRNA or scramble RNA. Following a 2-3 week waiting period, we performed a 3-day CFC protocol on each mouse to assess freezing response. After behavioral testing, animals were sacrificed, and brains were transcardially perfused with 4% paraformaldehyde (PFA) to confirm exact locations of stereotaxic injections. Based on our preliminary data, it appears that mice exposed to SEVO and received scramble RNA injections exhibited altered contextual fear behavior as demonstrated with a trend towards increased freezing time when compared to naïve animals. This trend was diminished in animals exposed to SEVO that received injections of CACNA1G shRNA. We conclude that CaV3.1 channels in CM thalamic nucleus may play role in the lasting alterations of contextual fear behavior induced by neonatal exposure to SEVO.



Abstract #71

The Relationship between Microbiota and the Most Commonly Prescribed Medications in the United States: Future Considerations for Personalized Medicine: A Review

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The microbiota that inhabit the human body have received increasing attention in recent decades. Growing connections have been made between these microbial communities and their confirmed and potential implications in human health and homeostasis. Despite these advancements in understanding, there is still much that is yet to be understood. An area of specific interest is the role these microbiota play in pharmaceutical interventions and conversely how these pharmaceutical interventions affect the overall microbiome of the patient utilizing them. This review serves the purpose of compiling the results of recent research that has tested the effect microbiota have on pharmaceutical interventions and the effect medications have on the human microbiome. Specifically, this review will be focused on medication classes derived from the top twenty-five most prescribed medications in the United States. The drug classes to be examined are: antidepressants, antihypertensives, anxiolytics, antidiabetics, proton pump inhibitors, statins, and thyroid hormone replacement. Results from the studies examined show that microbiota can significantly alter the efficacy of a medication via bacterial metabolism either increasing or decreasing the bioavailability. Research has also shown that medications can alter the composition of the microbiome of the patient, which may contribute to the therapeutic effect or lead to a dysbiosis that is not entirely understood. The growing interest in microbiota-drug interactions may shed light on the variability in patient responses to pharmaceutical therapy and resistance to treatment. This review highlights what is known about these recent developments in drug-microbiota interactions and gaps where more research is needed. Future research into more of these interactions will allow for a potentially more targeted and individualized approach to treatment that may allow for more efficacious treatment of patients.



Abstract #72

Skin Tone and Racial Disparities in Dermatology Educational Resources

Madison Nash, PA-S3

A persisting disparity existing within medical education lies in how dermatologic conditions are underrepresented photographically on non-white skin. Specifically, most medical texts fail to show common rashes and depict skin conditions on non-white skin.^{4,5,10} Even at a basic level, common skin descriptors such as erythema or purpura, can be difficult to visualize in patients with more pigmented skin for an untrained eye.⁴ This research study aims to contextualize racial disparities in medical texts, specific to dermatology, via a literature review to show how this can lead to delayed diagnosis or incorrect diagnosis of common skin conditions for ethnic patients. Various cross-sectional studies and articles from the Journal of American Academy of Dermatology were used to contextualize this problem in order to show how some common skin conditions appear different in presentation on different skin tones and how dermatology texts underrepresent photographs of skin of color in educational resources. Review of these studies concluded that images of medium to dark skin tones were underrepresented in all seven evaluated texts, and that Dermatology (Bologna) contained the most representation for medium to dark skin tones at 19% of the total images.⁴ This study also concluded that the range and type of dermatologic diseases represented were limited. Commonly used texts also fail to highlight the differences in presentation for common skin disorders on pigmented skin such as acne vulgaris and squamous cell carcinoma.^{4,9} Additionally, this study aimed to find available resources that represent dermatologic conditions on various skin tones and promote awareness for skin of color dermatology. When there is a lack of representation in photographs, students develop an implicit bias that certain diseases are less common for pigmented skin. This then provides a route for which bias ultimately affects medical treatment and diagnosis. If various skin tones are underrepresented when showing these dermatologic manifestations there is a greater risk for misdiagnosis or delayed diagnosis for these patients.



Abstract #73

Retrospective Analysis on the Influence of Mental Health on Maternal Mortality Rates

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Despite being the leading country in healthcare expenditure, the United States remains one of the worst ranking for maternal mortality in the field of Obstetrics and Gynecology among developed countries. The World Health Organization defines maternal mortality as the annual number of female deaths from any cause related to or aggravated by pregnancy or within 42 days of termination of pregnancy. According to the American Health Rankings, Colorado is ranked 8th lowest in maternal mortality. However, the leading cause of maternal mortality in Colorado is suicide, making mental health during pregnancy an important topic of study.

We hypothesize that by examining the survey data collected by the Pregnancy Risk Assessment Monitory System (PRAMS), we will gain insight into the mental health statuses of pregnant and postpartum women and observe possible indications of how mental health conditions are contributing to maternal mortality.

We will utilize the PRAMS analytic research file from the Centers for Disease Control and Prevention (CDC) to address our hypothesis. We will evaluate the survey response data for mental health status and diagnoses of the participating women and compare it to the rate of death by suicide. We will analyze if there are any associations.

The Colorado Department of Public Health and Environment published a summary of maternal mortality data from 2014-2016. The top five causes of maternal deaths during this period, in order of most frequent causes, were suicide, drug overdose, injury, homicide, and cardiac conditions. We anticipate that our data analysis of more recent years, since 2016, will reveal that suicide is still a persistent cause of maternal mortality in Colorado. By examining the mental health and maternal experiences of pregnant and post-partum women, we hope to discover an underlying common pattern contributing to increased maternal mortality by suicide.

Despite increased efforts of intervention to decrease maternal mortality rates, there has been an insignificant attempt beyond basic mental health screening exams to address the mental health-related causes of death. This study is crucial in identifying the influence mental health has on the maternal mortality rate and in suggesting advanced initiatives to reduce maternal suicide in Colorado.



Abstract #74

Do Healthcare Providers in Colorado Meet the Recommended Physical Activity Guidelines as Recommended by the American Medical Association and Set by the Physical Activity Guidelines Advisory Committee

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Current AMA guidelines for physical activity are 30 minutes of moderate-intensity aerobic physical activity five days per week or 20 minutes of vigorous-intensity aerobic physical activity three days a week. However, CDC surveys indicate that physical activity levels nationwide are below the recommendation and a significant percentage of the population is inactive. While most providers are aware of the benefits of physical activity, current research indicates that providers tend to engage in insufficient levels of physical activity and may additionally participate in other unhealthy lifestyle behaviors. Currently, there is no study on the physical activity levels of Colorado healthcare providers. Investigating if providers in Colorado meet the AMA physical activity requirements and identifying a theme of influencing factors could contribute towards improving workplace wellness initiatives.

An anonymous response survey was created with the intent to assess if Colorado healthcare providers met the current physical activity guidelines and questions from the Israel Journal of Health Policy Research and the CDC were adapted for use. The survey was distributed via social media and public platforms and additionally employed snowball sampling. At the end of the collection period, all data was compiled for an overarching theme.

Processed collected data demonstrated that 95% of responding healthcare providers are participating to some extent in physical activity. However, 55% of responding active providers still do not meet the AMA guidelines with the most commonly reported barrier to meeting the current guidelines being the 'lack of sufficient time outside of home and work life.' The study also indicated that the responding providers who met the AMA guidelines believed that the most common incentives for doing so were access to facilities/activities and having sufficient time.

The conclusion of this pilot study appears to be that many providers do not have sufficient time outside of home and work life to participate in physical activity and this barrier plays a seemingly significant role in whether providers meet physical activity guidelines. Though further research is needed to establish a firm correlation, this study provides valuable insight as improving provider physical activity not only benefits providers, but the patients served as well.



Abstract #75

Case Report: Anca-Positive Minocycline Induced Lupus in a Young Female Adult

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Background: Minocycline has been established by other studies as a cause of lupus-like symptoms in patients treated for acne (1). We report the case of a 22-year-old female treated with minocycline for 8 months who presented with lupus erythematosus-like symptoms that resolved after discontinuation of the drug. We highlight the unique clinical and serological differences that distinguish minocycline-induced lupus (MIL) from systemic lupus erythematosus (SLE) and other forms of drug-induced lupus (DIL).

Case Report: 22-year-old female presented to rheumatology in May 2021 for severe joint pain, fever, and chills for 2 months. Physical exam was without joint synovitis, tenderness, skin findings, or oral ulcers. Bloodwork was as follows: positive antinuclear Antibody (ANA), elevated C-Reactive Protein (CRP), positive P-ANCA, positive Anti-dsDNA antibodies, and negative Anti-histone antibodies. A month later (April 2021) the patient developed an erythematous rash and was diagnosed with SLE. Treatment with hydroxychloroquine was commenced. In July 2021, the patient reported taking minocycline for acne and was advised to stop the drug to see if symptoms resolved. In January 2022, the patient reported symptoms including joint pain and rash resolved after discontinuation of minocycline. P-ANCA antibodies became negative. Anti-dsDNA antibodies were positive but decreased. In July 2022, P-ANCA and Anti-dsDNA antibodies were negative. The patient decided to continue hydroxychloroquine after discussing risks and benefits.

Results: After discontinuation of minocycline and long-term follow-up, the patient showed a reversal in clinical and serological lupus manifestations with continued treatment. Anti-dsDNA antibodies are rare in DIL and more specific for SLE; however, MIL generates other autoantibodies including P-ANCA (2). Anti-histone antibodies are less frequent and are found to be positive in less than 50% of patients with DIL caused by minocycline (2). Therefore, the presence of P-ANCA and resolution after discontinuation of minocycline suggests MIL is likely.

Conclusion: Being able to identify the clinical and serological differences between MIL and SLE is important to limit unnecessary testing and treatment due to misdiagnosis. Clinicians should take a comprehensive drug history and be aware that MIL can resemble SLE. They should also stop ongoing treatment of minocycline in patients that present with lupus erythematosus symptoms.



Abstract #76

Knowledge of Palliative Care among Young Adults with and without Chronic Medical Conditions

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Background: Palliative care treatment improves patient-centered outcomes such as pain, depression, and patient-family satisfaction. However, the misconception about palliative care impedes the medical professional's ability to provide patient-centered care, a key aspect to our healthcare system. Even though there is a high level of familiarity with the term palliative care among young adults, there is also an overwhelming lack of knowledge about palliative care among the same population. The Palliative Care Knowledge Scale (PaCKS) was determined to be an accurate psychometrically tested questionnaire that consists of 13 true or false questions. To better understand the current perception of palliative care among young adults, this study aims to 1) estimate the current understanding of palliative care among young adults age 18-40, 2) identify sociodemographic disparities in the knowledge of palliative care, and 3) determine if having a family member who has been previously treated by palliative care impacts the understanding of palliative care.

Hypothesis: We hypothesized that young adults who have been previously diagnosed with a chronic medical condition will have a better understanding of palliative care, and therefore have a higher PaCKS score than young adults who have not been previously diagnosed with a chronic medical condition.

Methods: This descriptive analysis utilized an anonymous survey to limit potential biases. The population of interest is individuals age 18 – 40 years old was identified through the social media platforms Facebook and Instagram and an anonymous survey was created using Qualtrics platform.

Results: The average PaCKS score of those with a chronic medical condition was greater than the average PaCKS score of those without a chronic medical condition, accepting the null hypothesis. However, there was a correlation between those with experience of family members treated with palliative care and the understanding of palliative care.

Conclusions: These data demonstrate a lack of significant difference between the understanding of palliative care among young adults with chronic medical conditions compared to young adults without chronic medical conditions. We found a significant difference between the understanding



Abstract #78

Salivary Hormones Trend Synchronously in Response to Repeated Stress Exposures

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The effects of stress and trauma on hormone levels have been examined to develop biomarkers and objectively appreciate physiology during stress. Prolonged stress has been shown to dramatically affect hormone homeostasis. Intensive Surgical Skills Course (ISSC) held at STOPS in San Diego, California is held every year to create an environment for medical and law enforcement personnel to experience hyper-realistic mass casualty simulation. The effects of prolonged stressful experiences on cortisol, which is known to fluctuate during times of stress, has been examined at length, however the effects on other stress-related hormones have not. 37 students consented to participate in training and provide salivary samples upon their arrival, every morning at 5 AM, and at a point of high stress immediately following a mass casualty scenario for which they had received no prior training. Each participant then had a salivary sample collected an hour after the high stress test. Six hormones and 43 cytokines were measured from these samples and quantified. The average hormone levels of all the participants from their first morning level was taken and compared using ANOVA testing. A p-value < 0.05 was considered significant. Single factor ANOVA testing was completed comparing values of Tuesday morning through Friday morning. Apart from cortisol, all other hormones showed a statistically significant difference from mu at 0.0073, 0.0004, 0.0011, 0.0003, and a 0.0077 for estradiol, progesterone, triiodothyronine, tetraiodothyronine, and testosterone respectively. While morning values of cortisol were consistent across Tuesday through Friday, these other hormones showed significant correlated changes day to day during the testing of first morning saliva. All five hormones showed a synonymous peak between Wednesday afternoon and Thursday evening during the week, whereupon resolution on Friday decreased hormone levels back towards baseline. Our results suggest that salivary levels of hormones simultaneously track together following repeated stress exposures.



Abstract #79

Ways to Approach the Growing Language Barrier in the United States

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With immigration rates in the United States on the rise, there has also been an increase in the limited English proficiency population (LEP). Many of the LEP population are immigrating from Central America, Asia, and Africa, with a higher proportion of them found in California, Texas, and New York. Studies have shown that there is an increase in detectable physical harm and adverse outcomes when a person with LEP receives medical care in the United States compared to a person who is English proficient. The lack of access to adequate translation services and the use of ad hoc interpreters play a large role in this. These adverse outcomes can be seen as readmissions, infections, falls, pressure injuries, delays in treatment, and poor medication adherence. Though this is an unfortunate statistic, many are working on innovative approaches to diminish the language barrier in healthcare. Several approaches were found in articles analyzed from PubMed and Google Scholar. Search terms that were utilized include “language barriers in healthcare” and “language barrier solutions”. The approaches found include incorporating an “Interpret2Improve” course for healthcare students, utilizing a translation smartphone application such as MediBabble, and implementing a Medical Student Interpreter Training Program (MSITP) for student volunteers. Although these approaches will not eliminate the language barrier, they will hopefully increase the chance that an LEP patient will receive optimal and satisfactory care.



Abstract #80

Mild COVID-19: A Silent Threat

Khurrum Qureshi OMS-I, M.S., RVUCOM; Nicoleta Rus M.D.; Rocky Vista Health Center

Pulmonary embolism (PE) is a form of venous thromboembolism (VTE) which causes an obstruction of the pulmonary vasculature. Massive PE can be a fatal, accounting for over 100,000 death/year in the US. Incidence of PEs is increased in COVID-19 infections, due to a hypercoagulable state resulting from endothelial injury, stasis and increase in prothrombic factors.

We report a case of a 48-year-old male with past medical history of mild form of COVID-19 infection approx. 6 months back. He was brought to the ED after cardiac arrest resuscitated in the ambulance. 3 days prior to the cardiac arrest he presented in the ED for non-specific upper respiratory tract symptoms, for which he received symptomatic treatment. During that visit all the workup was negative except for sinus tachycardia. The cause of patient's cardiac arrest was found to be massive bilateral PE leading to right ventricular strain, shock, and HFrEF (20%). Our patient received thrombolytic, ECMO, thrombectomy, anticoagulation, and required complex treatment for several complication during hospitalization. Was eventually discharged home recovered.

COVID-19 pandemic has been one of the worst in human history, causing millions of deaths. Symptoms of COVID -19 infection vary from mild upper respiratory disease to respiratory failure or severe VTEs. Multiple studies including a large national study in Sweden reported COVID-19 being an independent risk factor for VTEs, risk extending up to 180 days after COVID-19 infection, especially in unvaccinated population as seen in our patient. New variants of SARS-Cov 2 pose a challenge to control the spread of COVID-19 infection. As more studies support COVID-19 infection association with hypercoagulability status, varied nonspecific symptomology of PE remains a diagnostic and treatment dilemma.

Physicians should have low threshold for investigating PEs in patients with unexplained sinus tachycardia or non-specific respiratory distress, especially in an unvaccinated post-COVID-19 patient, including historical mild forms of infection. Many studies have arguably advocated "treatment to prevent thrombotic events" in post COVID-19 infection, however, vaccination remains the corner stone to reduce morbidity and mortality associated with serious thrombotic events like massive PEs in patients exposed to COVID-19.



Abstract #82

Worsening Shortness of Breath After a Mild Case of COVID

Khurrum Qureshi, M.S., Terry Siriphatnaboon Krause, M.D., Kathryn Vidlock, M.D.

History: A 34 year old female presents to the Emergency Department with worsening shortness of breath and tachycardia for 3 days. Her symptoms are worse with ambulation. She feels dizzy and lightheadedness. The patient had COVID-19 about two weeks ago and received monoclonal antibodies. The patient has a history of "drenching" night sweats and unintentional weight loss. She denies fever and cough. The patient is eating and drinking normally with no abdominal pain, nausea, or rash. No changes in bowel movements.

The patient's past medical history consists of ADHD, Anxiety, Neuropathy, and Insomnia. The patient takes Adderall, amitriptyline (ELAVIL), fluocinonide (LIDEX). The patient's family history consists of an aunt who has autoimmune disease and a maternal grandfather who has Non-Hodgkin's Lymphoma. She works as a medical assistant in a family medicine clinic.

Exam shows:

Constitutional: General: She is not in acute distress.

HEENT: Head: Normocephalic and atraumatic.

Cardiovascular: Normal rate and regular rhythm. No murmurs.

Pulmonary: Normal effort. No respiratory distress. No wheezing, rhonchi or rales.

Abdominal: Soft, tender, non-distended.

Skin: Warm and dry. No rashes.

Remainder of exam normal.

Differential:

Pulmonary Embolism

Congestive Heart Failure

Anemia

Metabolic Acidosis

Intrathoracic Mass

Course: Patient underwent a CTA which displayed a new anterior mediastinal mass measuring 4.6 x 2.6 x 3.2 cm which was not shown on a previous CT scan 11 months prior. She was referred to a thoracic surgeon for mediastinoscopy, which couldn't be performed due to location. A PET scan showed mildly FDG-avid soft tissue density in the anterior mediastinum. Four months later, the patient had a CT scan which showed a modest decrease in size measuring 2.1 x 2.5 cm.

Discussion: Thymic hyperplasia is a response that has been displayed in autoimmune diseases such as Myasthenia Gravis. Rebound hyperplasia occurs less often with viral illness. There have been a limited number of cases seen with COVID-19. This patient will require repeated imaging and follow up.

Final Diagnosis: Thymic Hyperplasia response in a patient with COVID 19



Abstract #83

Review of Aspirin in Non-Obstructive Coronary Artery Disease Diagnosed via CCTA Imaging

Jeffrey Ready, Physician Assistant Student, Rocky Vista University

Background:

In recent years, the recommendation of 81mg Aspirin for cardiovascular event and death prophylaxis has become controversial. CCTA imaging has improved the risk stratification of CAD, however there are no guidelines for the use of 81mg Aspirin in non-obstructive CAD diagnosed via CCTA.

Hypothesis:

The use of once daily 81mg aspirin compared to the non-aspirin group will show a reduction in CAD events and death, following the diagnosis of non-obstructive CAD via CCTA.

Methods:

A systematic review of the current data compared the use of aspirin to non-aspirin users using hazard ratios and odds ratios, to determine the role of once daily 81mg Aspirin in non-obstructive CAD diagnosed via CCTA.

Results:

The combined sample was 130,914 subjects across four studies. Hwang et al., the smallest study, found an overall benefit of aspirin in all-cause mortality in high-risk patients only. Bartolucci et al., showed that aspirin decreases the risk of non-fatal MI and CV-events, but showed no statistically significant evidence for improvement in all-cause mortality, and failed to use CCTA imaging in their study. Chow et al., and Indraratna et al., also showed no statistically significant reduction in all-cause mortality via the CONFIRM trial data. Importantly, the CONFIRM trial did not include any subgroup analysis.

Conclusions:

The current USPSTF guideline for aspirin use should be used in the management of non-obstructive CAD diagnosed via CCTA, until more detailed studies are published. A discussion about once daily 81mg aspirin in a high-risk patient is appropriate.



Abstract #84

Potential Benefit Effects of Low Dose Naltrexone Use in Patients with Breast Cancer

Jessica Reynolds Nguyen (Rocky Vista University)

Naltrexone was first synthesized in 1963, initially developed to treat opioid addiction and was approved by the FDA in 1984. Less known is its purported role in the treatment of neoplasm. While it is still a novel treatment for breast cancer, recent studies have shown that it has immune boosting qualities, is a DNA modulator, aids in autoimmune disease, takes part in pathways mediated by cancer cells, decreases cancer metastasis, and aids in inflammation. I hypothesize that there is no difference in outcome with adjuvant low dose Naltrexone (LDN) therapy for breast cancer. A case review was performed on a 60-year-old postmenopausal, Caucasian female with right breast cancer (DCIS, pTisN0M0, stage 0) in August of 2020 and left sided breast cancer (DCIS, pT1bpNXM0, stage 1) in September of 2020. She started on Anastrozole but discontinued after three months due to unacceptable side effects. She transitioned to a functional medicine specialist whose plan consisted of medications such as metformin, melatonin and LDN and diet and lifestyle modifications. Search criteria for literature review consisted of the words “low dose Naltrexone”, “breast cancer”, “therapy”, “treatment”, and “cancer”. Peer reviewed websites such as BMJ Case Reports, BMC, ClinicalTrials, Cochrane, DOAJ, JAMA, NEJM, Pubmed, ScienceDirect, and Taylor & Francis were used. While there is evidence to demonstrate the beneficial effects of LDN, it is hard to draw conclusions regarding the case study as her treatment plan was not solely LDN. The evidence does relate to the pathophysiology and other aspects of cancer, but is not unique to breast cancer. Although there are hundreds of material discussing the benefits of LDN in cancer, there were less than 10 for breast cancer specifically in my search. The benefits provided for pain, autoimmune and inflammatory related conditions are evident, however available evidence to support the use of LDN for breast cancer treatment is lacking and more definitive research is needed.



Abstract #85

The Postoperative Problem: Community Specific access to Care and Implications for Post Surgical Outcomes

Jemari Roberts, PA-S3, Rocky Vista University

Post-surgical outcomes are closely associated with proximity to a high-volume medical center. Compared to their urban counterparts, rural patient outcomes are often less desirable and include a significantly elevated mortality risk. The hypothesis as to why this correlation exists centers around the idea that the cumulative burden of time, distance, and other social pressures results in decreased access to necessary medical care at high-volume medical centers. Even if patients receive the initial care at a high-volume center, returning to that same center or a comparable facility proves more difficult based on proximity. This analysis utilizes population data and medical literature to assess the relationship between proximity to a high-volume medical center and postoperative outcomes. Testing of the hypothesis included analysis of data from available medical review articles and systemic reviews. Reviewing distance traveled and operative outcomes allowed for a broad assessment of the issue. The data show that there is a definite correlation between proximity to a large medical center and improved post-procedure outcomes. However, there is no true consensus and there are several confounding data points including socioeconomic status, ethnicity, and procedure type. Despite the lack of true alignment of the best path forward, the data at hand reinforce the benefit of expanding and improving the current rural medical systems. As it stands now, there are measurable benefits in patient outcomes for those living more proximally to medical centers so preventing the outcome gap from widening is a worthy aim.



Abstract #86

Determination of Number of COM Applications Mentioning Tracks and Importance of Track Availability in Decision to Attend RVU

Vickie Roettger, CO RVU; Camille Bentley CO RVU; Andrew Nigh SU RVU

Tracks such as those offered by RVUCOM, are less common at osteopathic vs allopathic medical schools. In the supplemental applications prior to this current admissions cycle, applicants were asked to include reasons for why they wish to attend RVU and many mentioned tracks specifically. This project was initiated to measure how often tracks were mentioned in the supplemental applications. In addition, we measured the importance of track availability in choosing to attend RVU. This was a pilot study based on observations from interviewing candidates. Exempt IRB status was obtained. Deidentified essay answers from all interviewed applicants during the 2019-2020 and 2021-2022 admissions cycles on both campuses were scored for mentioning specific tracks or tracks in general. Current track students from classes of 2023, 2024, and 2025 were consented and surveyed to measure importance of track availability in choosing to attend RVU and the likelihood of attendance if participation in tracks was mandatory. Data from interviewed applicants showed a disparity in percentage of tracks mentioned between CO (42.3%) vs SU (29.1%) for 2019-2020 and CO (29.9%) vs SU (10.0%) for 2020-2021 cycle (pandemic/zoom interviews). Global medicine, rural/wilderness, and urban underserved tracks were mentioned most in CO applications while global medicine and physician scientist tracks were mentioned most in SU applications. 60% of current track students indicated high or very high importance of track availability in their decision to attend RVU. 36% of current track students indicated they would be not, less, or somewhat likely to attend RVU if tracks were mandatory for all RVU students. Priority of track availability when choosing to apply to RVU appears to differ between campuses based on the number of mentions of track in the application. Track availability was important to current track students in choosing to attend RVU but less likely to factor into their decision to attend if track participation was mandatory. This information is important going forward as the tracks program continues to evolve on all three campuses.



Abstract #87

Combating Period Poverty in Kenya

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Period poverty involves lack of access to adequate education about menstruation and hygienic menstrual products and facilities. This has serious detrimental effects on the health of those it impacts including financial burden, lack of education, social stigma, and risk of infection. In January of 2022 while on medical outreach with RVUCOM and the Hands for Health Foundation, we sought to help with efforts to alleviate period poverty among underserved women and girls in Kenya. Our project was aimed at providing reusable feminine hygiene kits and education about menstruation and associated topics with the goal to decrease the negative outcomes associated with period poverty.

Our project consisted of a fundraiser for the purchase of Makini reusable feminine hygiene kits and an educational poster focused on common misconceptions surrounding menstruation. The poster also included information on how patients can keep themselves healthy during menses. We collaborated with our Kenyan contact, Christine Njihia, for information about the population, cultural practices related to menstruation and women's health, and distribution of the products and education. We raised a total of \$4,587 and distributed 623 kits. The women and girls receiving the donations were also provided education on how to use and clean the products, as well as education about women's health and wellbeing. Our educational poster was given to Kilimanjaro Mission Hospital to be displayed for patient viewing.

Our goal in providing these products and education to young Kenyan women and girls was to help combat period poverty and open the discussion about the normalcy of menstruation. A byproduct of fundraising in the USA was bringing awareness to our local communities about period poverty, where it exists, and how people are affected by it. This encouraged us to continue spreading awareness to other global healthcare providers about the importance of education around menstruation and feminine hygiene. The very act of having a conversation about menses with our patients helps reduce the stigma and normalizes menstruation and, maybe even more importantly, empowers women about their health.



Abstract #88

A Pilot Program Evaluation on a Backcountry Search and Rescue Stress Injury Awareness Course

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Introduction

Identifying burnout and dealing with stress has been an increasing topic of interest among first responders due to its ability to directly impact health and work productivity. Backcountry search and rescue (BSAR) volunteers experience taxing work demands with routine exposures to stressors. There are limited interventions for preventing and rehabilitating mental health stress injuries among first responders.

Objective

The aim of this project was to evaluate the effectiveness of a wellness and stress awareness pilot program on reducing stress and burnout levels among BSAR volunteers.

Methods

This is a program evaluation with secondary data analysis that is collected as part of Wellness and Stress Awareness Pilot course between July 2021 – December 2021. The survey was 65 questions to assess understanding of stress injuries, the level of stress on the stress continuum. Participants filled out surveys that were sent out via email before and after course completion to assess awareness and record current levels of stress.

Results

BSAR volunteers in this pilot group said they had increased capacity to cope with stress after participating in the program, improving all target learning objectives (all $p < .001$). As an overall rating of the course, 86% of participants said that the online stress injury prevention curriculum had been either “very useful” or “extremely useful.” The percentage of BSAR workers who rated their current level of burnout as either high or very high dropped from 27% to 20% after participation in the course.

Conclusion

Wellness and stress awareness programs may be useful to raise awareness about chronic stress and reduce the level of burnout among BSAR volunteers. These programs are needed to better identify and prevent burnout and stress injuries among the BSAR community.



Abstract #89

Automated Video and Audio Seizure Detection: A Scoping Review

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Background: Timely detection of seizures is crucial for intervention and may alleviate complications and injury from seizures, including death. Wearable sensors have shown promising results for automated seizure detection, but this method is limited by patient tolerance and is not practical for use in newborns. Additional non-contact video- and audio-based technologies have become available, but a detailed literature review of automated video and audio-based seizure detection publications is lacking.

Hypothesis: We hypothesize that literature results will provide information to further refine the approach and accuracy of video/audio-based seizure detection.

Methods: An initial PubMed search was aimed to identify relevant keywords. Keywords were combined using Boolean logic with appropriate controlled vocabulary mined from known relevant articles. This strategy was translated into other databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Embase, Web of Science, ClinicalTrials.gov, Google Scholar, and MedNars. Searches were run from 2006 to June 27th, 2022. All results were deduplicated and imported into the Covidence software. Titles and abstracts were screened by two independent reviewers for assessment against the inclusion criteria (primary research on automated audio and/or video seizure detection, patients with a diagnosis of epilepsy, and articles written in English). The full text of selected citations was assessed again against the inclusion criteria. Data will be extracted from papers by two or more independent reviewers using Covidence, which will include specific details about the participants, concept, context, study methods, and key findings.

Results: A total of 4,487 deduplicated abstracts were uploaded into Covidence. Eighty-two abstracts were then selected for full-text review. Of those full-text articles, a portion will be selected for data extraction. We anticipate that the methods used for prior studies will include optical flow, convolutional neural networks, long short-term memory, computer vision, spatio-temporal interest points, and dual tree complex wavelet transform. We also anticipate that the greatest specificity and sensitivity will be in motor seizures.

Conclusions: We anticipate obtaining additional evidence to suggest that video- and audio-based automatic seizure detection is feasible, and we will report on the methodologies used with their performance metrics.



Abstract #90

Management of a 3rd Degree Heart Block in 33 Week Pregnant Patient in a Rural Critical Access Hospital

Kaylynn Sines-Losak: RVU CO

Nearly all medical conditions are more difficult to manage in a pregnant person. This challenge is rapidly compounded when the patient presents to a critical access facility with no specialty departments aside from Labor and Delivery, staffed by two Family Medicine physicians. A 3rd degree heart block is rare, it is even more rare to present during pregnancy with the exact prevalence being unknown¹. There is no direct association with pregnancy though it is hypothesized it may be precipitated by atrial stretch during pregnancy¹. Most often development is associated with a history of previous cardiac surgeries, myocardial infarction, congenital heart disease, cardiomyopathy, or drug intoxication. This patient had no medical history, an unremarkable CMP, and initially presented with syncope while laying in bed. This seems straight forward, the patient likely was laying on her back or left side and vena caval compression led to syncope. However, she was aware of this potential and assured us she was laying on her right side. The syncope was repeated multiple times during the morning, but not while ambulating to the vehicle to come to the hospital. During history and physical the patient lost consciousness twice and was fully oriented upon awakening. With cardiac exam a several second pause in cardiac activity was auscultated. This prompted an urgent EKG which revealed a 4.4 second period with 7 P waves and no QRS complexes, this stretch culminated in a wide QRS escape beat suggestive of a block below the bundle of HIS, a finding indicating the need for urgent pacemaker placement¹. This case explores the management, not just of a potentially life-threatening complete heart block, but also explores it under the added complications of a current pregnancy and management in a low resource facility.



Abstract #91

Investigating the Link Between Sleep Quality and Resilience in First Responders

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Many studies in humans show that low resilience outcomes such as PTSD (Post Traumatic Stress Disorder), anxiety and MDD (Major depressive disorder) have an immunological component. One factor that is tightly linked to the immune system is sleep. We aim to test our hypothesis that sleep can alter immune cytokine fluctuation during the stress response, which in turn can predict resilience. We will measure cytokine levels of first responders engaged in stress training, LEC-5 (Life Events Checklist) to assess previous life trauma, HRG (Hardiness Resilience Gauge) to determine resilience status and a demographics survey. Participants will wear a Fit Bit Versa 2 watch throughout the academy to track sleep metrics. Salivary cytokine levels and fluctuations throughout the stress response will be determined for stress test 1 (at the beginning of the academy) and stress test 2 (at the end of the academy). Correlation analysis will be conducted on levels and fluctuations of cortisol, along with cytokines EGF, PDGFAA, IL18, GRO α , TGF α , IL1Ra, VEGF, IL6, IL10 and IL15, to determine relationships between biomarkers, resilience scores and sleep quality. These results will be used to 1) validate an immune cytokine fluctuation profile that is predictive for resilience and 2) investigate the role of sleep quality in determining cytokine reactivity relating to resilience.



Abstract #92

Patient Reported and Clinical Outcomes in Total Ankle Arthroplasty: The CU Total Ankle Registry

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Background: Total ankle arthroplasty (TAA) is a common procedure to treat end stage ankle osteoarthritis. Despite recent increase in popularity, there is minimal literature assessing clinical and patient reported outcomes (PROs) in TAA procedures. These measures are an important tool for physicians to better assess patient performance in daily activities.

Hypothesis: Patients in the CU total ankle registry who have undergone TAA will show significant improvement in PROs over time while maintaining reduced clinical complications.

Methods: We developed a prospective outcomes registry for patients undergoing TAA at our institution. Patient demographics, relevant case information, PROs and complications are collected. Collected PROs include PROMIS Physical Function (PF), Pain Interference (PI), Depression, Global Physical Health (GPH), Global Mental Health (GMH), and Foot and Ankle SANE. Records are categorized as a primary TAA, or revision involving either a polyethylene only exchange or complete hardware removal and replacement. Differences between groups were determined non-parametrically using Mann-Whitney U tests.

Results: A total of 236 TAA patients entered into the registry were included for analysis. 200 patients received a primary TAA, and 36 received a partial or full revision. Average length of stay was 1.6 ± 1 days. All physical PRO measures, such as PF and PI, showed significant improvements from baseline at 6 and 12 months post-op ($p < 0.0001$). There were no significant changes in mental health PROs, such as Depression or GMH. There were 6 wound infections (2.5%) resulting in one re-admission. There were 4 unplanned re-operations (1.7%). There were no DVTs and no pulmonary complications. There were no early implant failures.

Conclusion: Total ankle arthroplasty is an effective procedure for end stage ankle arthritis. Long term outcomes and implant longevity will be tracked using the CU Total Ankle Registry. Total ankle arthroplasty is a safe procedure that improves quality of life in patients suffering from ankle osteoarthritis. Further follow-up and patient enrollment in the CU Total Ankle Registry will help us to identify risk factors for complications and define implant lifespan.



Abstract #93

Reversible Cerebral Vasoconstriction Syndrome and its “Thunderclap Headache”

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Reversible cerebral vasoconstriction syndrome (RCVS) is a rare condition characterized by a severe headache coupled with a narrowing of cerebral vasculature. Due to its infrequency, diagnosis and treatment of RCVS can be challenging. It is often confused with other conditions such as subarachnoid hemorrhage, cerebral aneurysm, or primary thunderclap headaches.

A 55-year-old female presented to the emergency room due to a “thunderclap headache” that came on suddenly after she took a warm shower. Mode of onset was rapid, and pain was 10/10 which she described as throbbing which involved the whole cranium. Her associated symptoms included nausea leading to 8-9 bouts of emesis overnight, throbbing eye pain, dizziness, and diaphoresis.

She had no past medical history of migraines, transient ischemic attack, or cerebral vascular accident and patient denied peripheral numbness, tingling or loss of sensation. Risk factors pertinent to this patient included history of drug use (+barbiturate), alcohol use disorder, current smoker, and past medical history of head trauma, hypertension, myocardial infarction, and coronary artery disease (CAD) status post percutaneous coronary intervention. CT head showed no signs of bleeding or mass. CT angiogram head/neck was concerning for multifocal vasospasm on middle cerebral arteries and anterior cerebral arteries. MRI was negative for acute intracranial pathology. EEG was normal without signs of focal slowing or epileptiform discharges.

Neurointerventionist reviewed CT angiogram and confirmed multiple vasospasms without cerebral aneurysm. Patient was treated as an inpatient. Subsequent brain MRI was unremarkable for cerebral parenchymal changes related to vasospasm. Verapamil 40 mg BID was started overnight, and patient’s symptoms were resolved by the morning.

This case illustrates the importance of broadening a differential when it comes to sudden severe headaches. While “thunderclap headaches” are often thought of as pathopneumonic for subarachnoid hemorrhage, RCVS is a lesser known and underdiagnosed syndrome that should be considered when a patient presents like this. It is important to recognize RCVS early to prevent progression to stroke.



Abstract #94

Barriers to Primary Care and Non-Urgent Emergency Department Visits

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Background

Overcrowded Emergency Departments (ED) lead to delays in emergent medical care nationwide. [4, 9] Delays in care in urgent and emergent medical scenarios exponentially increase the risk of harm, and potentially death for these patients. Lack of access to Primary Care Physicians (PCP) for preventative care and acute, non-urgent, medical services is one aspect that is believed to be attributing to overcrowding of EDs (9). This literature review will evaluate barriers to primary care and the relationship between lack of patient access to primary care and non-urgent ED visits.

Hypothesis

Lack of availability of primary care services drives non-necessary utilization of ED services.

Methods

This literature review included 9 articles with varying methodology such as retrospective, observational, or cross-sectional surveys of patients and physicians. [1,2,3,4,5,6]. Additionally, one study used retrospective data collection from EMRs to gather information and one literature review [8, 9]. Non-urgent will be defined as a problem that is not life-threatening, not requiring immediate medical care, and treatment could be safely delayed 24 hours.

Results

Common themes identified in the referenced articles include: lack of availability to PCPs, limited office hours, full clinic schedules, and an inability to contact their PCP for acute medical advice leading to non-urgent ED visits. The most commonly identified barrier to access was an inability to acquire an appointment for an acute medical need (ex. full clinic schedules). [1, 3, 4, 5, 6, 7] And, the second most common was restricted office hours of primary care clinics. [2, 3, 4, 6]

Conclusions

The information gathered across the literature referenced in this article, largely support the hypothesis. Patients' inability to access Primary Care for acute services is attributable to restricted clinic hours and days. Additionally attributable is the clinic's inability to accommodate acute medical issues with same day or next day appointments due to their full schedules. Benefits of limiting non-urgent use of EDs include but are not limited to decreasing patient wait time,



Abstract #96

Evaluating a Hospital-Based Service and Care Plans for Children with Medical Complexities

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BACKGROUND: Children with medical complexity (CMC) have chronic conditions affecting multiple systems. CMC comprise only 0.4% of the pediatric population yet account for a third of child health care costs. The Medically Complex Child (MCC) Service is a hospital-based service for Seattle Children's CMC.

HYPOTHESIS: The MCC Service has gaps in care that can be addressed by expanding its services.

METHODS: We administered a survey to hospital providers that asked them to rate their level of agreement to various statements about the service. Providers were also asked open-ended questions about the service's strengths and weaknesses. We analyzed the frequency of answers for each statement. For responses to the open-ended questions, we identified themes through a content analysis.

We also redesigned the current MCC care plan which includes a summary of a patient and their medical conditions. We used findings from prior research to create our initial care plan template. As part of human-centered design, we had feedback sessions with multiple providers that led to iterative revisions to the care plan.

RESULTS: The strengths of the MCC service include its continuity of care, patient knowledge, and team presence. However, the service can be improved by reducing redundancy, increasing team proactiveness, and redesigning the care plan. In our care plan template, providers expressed agreement that having the list of a patient's active issues in a table format was more organized. Multiple providers suggested a "last updated" date at the top corner of the document. Providers thought the addition of family information and care goals allowed the care plan to be more family-centered. They suggested adding dates for goals to track them over time and moving these sections earlier in the care plan.

CONCLUSIONS: The MCC Service is a valued service but can be improved and expanded. Findings from our study will be informative in our future study to pilot a virtually delivered Complex Care Program. The care plan template designed in this study will also be a component of our pilot.



Abstract #97

An Exploration of Hiking Preparation and Injuries Acquired while High Altitude Hiking on Colorado's 14,000 ft Peaks

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Every year, an increasing number of hikers and climbers experience injuries and death on Colorado's highest peaks. The purpose of this study is to analyze the preparedness of people hiking 14,000ft peaks in Colorado and the rate and variety of injuries acquired while hiking. Our primary hypothesis is that hikers who carried more first aid items and have hiked more 14,000ft peaks acquired less injuries than those who carried less first aid items and had less experience on these peaks. To investigate this, a survey was administered to an online hiking group. As the popularity of the sport increases, research on the association between experience, preparedness, and injuries becomes imperative so that people are more informed. This research will contribute to public awareness of common injuries as well as experience levels when injuries were acquired and the types of first aid items that hikers commonly utilize and if utilization is associated with less injuries.



Abstract #98

Surveying Pet Owners to Compare Attitudes Toward Human vs. Pet Vaccination

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Increased reluctance towards immunizations in the past several years despite overwhelming evidence on vaccine effectiveness and safety has made vaccine hesitancy in humans one of the top threats to global health. In recent years, this vaccine hesitancy has bled over into the animal world, with fewer pet owners complying with recommendations to vaccinate their companion animals. Previous research has examined the motivations behind vaccine hesitancy in humans or in animals, but no study to date has evaluated the attitudes of pet owners to both human and pet vaccines. Through a survey and subsequent quantitative analysis, this study aims to determine whether pet owner attitudes towards human vaccines versus pet vaccines are consistent or discrepant and investigate the causes and motivations affecting these attitudes. Questions will evaluate the role of socioeconomic status, political and religious beliefs, healthcare accessibility, and perceived vaccine efficacy and safety. These roles will be evaluated across vaccines for self, dependent children, and companion animals. Insight on the motivations and potential barriers underlying vaccination decisions and any discrepancies in attitudes towards human versus pet vaccines can provide context that can be used to guide interventions to increase vaccine acceptance in both humans and animals.



Abstract #99

An Innovative Approach to Coronary Microvascular Disease in a Patient with an Anomalous Left Main Coronary Artery

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This case study describes an interesting and unusual finding of an anomalous left main coronary artery in a patient presenting with myocardial ischemia and no evidence of atherosclerotic disease. The patient initially presented to the cardiac clinic with recurrent angina at rest and an abnormal EKG. After initial graded exercise testing demonstrated ST segment depression, she underwent cardiac catheterization which demonstrated an anomalous left main coronary artery arising from the right aortic cusp with a prepulmonic course but no evidence of significant epicardial coronary artery disease (CAD). Intravascular imaging confirmed no ostial left main narrowing. The patient was recommended to follow up for microvascular testing which further showed severe microvascular endothelial dysfunction evidenced by the absence of an increase in blood flow with acetylcholine. The patient has successfully been enrolled in the COSIMA trial for treatment of refractory microvascular disease with successful placement of the Neovasc Coronary Sinus Reducer. This is a cutting-edge cardiac stent placed in the coronary sinus for treatment of microvascular coronary disease. The device is currently in Phase II trials.



Abstract #100

Immunological Findings Associated with Post-Acute Sequelae of COVID-19

Kelsey White, Rocky Vista University

Post-Acute Sequelae of COVID-19 (PASC) has been a topic of much discussion and research as the SARS-CoV-2 pandemic has progressed. Little is known about what differentiates the disease course in patients with long-term complications from that of those considered fully recovered. Though the actual mechanisms of PASC are likely multifactorial, one hypothesis is that ongoing immune dysregulation may be responsible for at least some of the symptoms experienced with PASC, including fatigue, myalgias, cognitive impairments, headaches, cardiovascular effects, and mood alterations, among others. This review of recent research on the topic of immune cytokines and immune cell population alterations in the context of past SARS-CoV-2 infection is intended to identify areas of agreement within this body of research to guide future study. Though research is still limited in this area, a consensus is forming that the primary cytokines found at altered levels with PASC include IL-1b, IL-6, and TNF α with others implicated in combination with them. Alterations to interferon levels, particularly type I, have also been seen in association with PASC but with varied results. Immune cell populations have been found to be significantly different between participants with and without a history of SARS-CoV-2 infection, however, the differences between recovered participants and those with PASC are more difficult to elucidate. One plausible explanation for the variability of results in these areas is the chronological proximity of sampling and COVID-19 vaccination. Future research should focus on differentiating between PASC in individuals with autoimmunity, persistent viral populations, and simple immune system dysregulation. Very large sample sizes and meta-analyses will likely be vital in this regard. As research into PASC and the pathogenesis of SARS-CoV-2 infection progresses, regular synthesis of the available information will be important to enact timely improvements to treatment.



Abstract #101

Can Healthcare Technology Improve Health Equity for Reproductive Health? A Systematic Review of the Literature

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BACKGROUND: The presence of technology in our lives is undeniable and healthcare is no exception. As healthcare interventions become more intertwined with and reliant on technology, it is important to ask how the digitizing of healthcare affects historically-underserved groups and the disparities in outcomes they face.

OBJECTIVE: This study aims to understand the current landscape of health tech solutions for people with breasts or uteruses and their impact on health equity for populations experiencing health disparities in sexual and reproductive health.

METHODS: PubMed was used to review the literature and PRISMA guidelines were followed to complete the review.

RESULTS: Of the 1475 publications screened, six publications based on four studies were found to be eligible. Of the four interventions described in these publications, three out of four were found to be effective in improving a health outcome for a population experiencing a health disparity.

CONCLUSIONS: While this review indicates that the literature is sparse in this topic area, the extant evidence is promising for health tech solutions to increase health equity. This study found that interventions that respond and adapt to user input may be more effective than static informational interventions, but more research is needed to confirm this. Future improvements include the development of standardized methods for measuring the equitable creation of health tech interventions and studies that measure equity directly by comparing outcomes between historically underserved groups and a control equitably served group for both the intervention group and the comparison intervention.



Abstract #102

A Structured Review of Colorectal Cancer Prevention Dietary Guidelines

Authors

Background

Colorectal cancer (CRC) is the third most common cancer worldwide with an estimated 1.9 million new cases per year.

Purpose

To give providers the most accurate, up-to-date information and resources on nutrition measures for patients at higher risk of CRC.

Hypothesis

It was hypothesized that new data would support current colorectal cancer prevention guidelines.

Methods

CRC prevention guidelines from American Cancer Society (ACS), International Agency for Research against Cancer- European Code Against Cancer (IARC/ECAC), and Canadian Cancer Society (CCS) were reviewed. The primary literature cited in each of the above guidelines were then evaluated. The methods of each guideline were reviewed to determine the update processes, year of last update, and any additional recommendations utilized. A PubMed search was then performed utilizing the key terms: “colorectal cancer prevention”, “colorectal cancer nutrition”, “cancer prevention,” and “colorectal cancer risks”. Articles published since 2017 categorized as “Review” or “Systematic Review” were then assessed against the above organizations’ guidelines to determine whether they supported the current recommendations.

Results

ACS, IARC/ECAC, and CCS recommend eating a diet high in fiber-rich foods and low in red meat, processed meat, processed foods, and alcohol for CRC prevention. These recommendations are consistent with current research and other organizations’ guidance. Variations in the reviewed guidelines include the additional proposal by CCS to limit meat-cooking methods that rely on high temperatures and the lack of a recommendation regarding calcium consumption by IARC/ECAC. Based on the reviewed data, patient populations who are at higher risk for CRC should consider the possible risks of consumption of foods containing HCAs and PAHs and the risks vs benefits of a calcium-rich diet.

Conclusion

Emerging evidence supports the dietary recommendations made by ACS, IARC/ECAC, and CCS. Given the rapidly evolving nature of cancer research, these guidelines require continued review and modification. Limitations of this data include the limitations of epidemiological and randomized control trial study designs, diet and alcohol intake estimation, and variable outcomes of intervention trials. Future research may benefit from utilization of case control studies, which can be less costly and more advantageous when studying dynamic populations in which follow-up is difficult.



Abstract #103

How Exercise Effects the Well Being and Academic Performance of Post-Graduate Health Professions Students

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It is established that female students who participate in exercise have higher levels of happiness compared to females who do not [1-3], and there is evidence suggesting a positive association between physical activity and high academic performance [2,4]. Presently, there is limited information as to whether this holds true for postgraduate health professions students in the United States.

The aim of this study is to determine if exercise is associated with higher levels of well-being and academic performance in postgraduate health professions students at a single institution in the United States.

Students at Rocky Vista University College of Osteopathic Medicine were encouraged to complete a self-administered survey. 120 students, 65 (54%) female and 55 (46%) male, provided their student identification number, basic demographics, completed the Flourishing Scale questionnaire [5,6], and responded with the frequency, duration, and type of physical activity they participate in. The RVUCOM Registrar de-identified the information and provided the quartile of the student's academic standing. Data was evaluated using Generalized Linear Models (GLMs) where wellbeing perception response (dependent variable) was evaluated for association against class rank categories or class rank categories along with the covariates (independent variables) simultaneously. All analyses were performed using SAS/STAT v.9.4.

This study shows a small, yet significant, association between exercise and well-being in female students, but no association in their male counterparts. However, there was no association between participation in exercise and high academic performance. Duration and type of exercise did not have a significant impact on academic performance or the overall well-being of respondents. However, female students had significantly higher-class rank compared to males ($p < 0.05$).

Limitations to this study include a small sample size of 120 respondents across all years of the College of Medicine and Physician Assistant Program. Additionally, the study was conducted at a single institution in Colorado with 87% of respondents participating in regular physical activity. It is possible that a disproportionate number of respondents participate in regular exercise compared to the general population [7], making the sample not representative of the postgraduate health profession students across the United States.



Abstract #104

Nanotechnology in the Diagnosis and Treatment of Osteomyelitis

Demi Zapata, Hunter Wittholt

Infection remains one of the largest threats to global health. Among those infections that are especially troublesome, osteomyelitis, or inflammation of the bone, typically due to infection, is a particularly difficult condition to diagnose and treat. This difficulty stems not only from the biological complexities of opportunistic infections designed to avoid the onslaught of both the host immune system as well as exogenous antibiotics, but also from changes in the host vasculature and the heterogeneity of infectious presentations. While several groups have attempted to classify and stage osteomyelitis, controversy remains, often delaying diagnosis and treatment. Despite a host of preclinical treatment advances being incubated in academic and company research and development labs worldwide, clinical treatment strategies remain relatively stagnant, including surgical debridement and lengthy courses of intravenous antibiotics, both of which may compromise the overall health of the bone and the patient. This manuscript reviews the current methods for diagnosing and treating osteomyelitis and then contemplates the role that nanotechnology might play in the advancement of osteomyelitis treatment.

Keywords: osteomyelitis; bone infection; nanotechnology; nanoparticles; nanobiopolymers



Abstract #105

Comorbidities, Sociodemographic Factors and Determinants of Health on COVID-19 Fatalities in the United State

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Previous studies have evaluated comorbidities and sociodemographic factors individually or by type but not comprehensively. This study aims to analyze the influence of a wide variety of factors in a single study to better understand the big picture of their effects on case-fatalities. This cross-sectional study used county-level comorbidities, social determinants of health such as income and race, measures of preventive healthcare, age, education level, average household size, population density, and political voting patterns were all evaluated on a national and regional basis. Analysis was performed through Generalized Additive Models and adjusted by the COVID-19 Community Vulnerability Index (CCVI). Effect estimates of COVID-19 fatality rates for risk factors such as comorbidities, sociodemographic factors and determinant of health. Factors associated with reducing COVID-19 fatality rates were mostly sociodemographic factors such as age, education and income, and preventive health measures. Obesity, minimal leisurely activity, binge drinking, and higher rates of individuals taking high blood pressure medication were associated with increased case fatality rate in a county. Political leaning influenced case case-fatality rates. Regional trends showed contrasting effects where larger household size was protective in the Midwest, yet harmful in Northeast. Notably, higher rates of respiratory comorbidities such as asthma and chronic obstructive pulmonary disease (COPD) diagnosis were associated with reduced case-fatality rates in the Northeast. Increased rates of chronic kidney disease (CKD) within counties were often the strongest predictor of increased case-fatality rates for several regions. Our findings highlight the importance of considering the full context when evaluating contributing factors to case-fatality rates. The spectrum of factors identified in this study must be analyzed in the context of one another and not in isolation



Abstract #106

COVID-19 Infection and Simultaneous Worsening of Pre-Existing Neurologic Conditions: A Case Report Series

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Viral infection commonly causes exacerbation of chronic conditions. However, this is not yet well reported in patients with a SARS-CoV2-infection and a history of a chronic neurologic disorder. At our institute, we had a patient presenting with more definitive upper respiratory symptoms and no history of vaccination, while the other patient was a breakthrough case with minimal pulmonary symptoms. However, both cases illustrated aggravated symptoms in otherwise stable neurologic disorders. We recommend that all patients with exacerbated neurological conditions should be tested for COVID even if they are asymptomatic. Our patients responded well to high dose steroids.



Abstract #107

Acne Clinical Management Guideline Review

Matthew Rich

Acne is the most common skin condition in the USA, affecting some 50 million Americans annually⁹ and is frequently treated by both specialists and primary care providers. Given that treatment of acne is carried out by a wide variety of clinicians and frequently involves the use of topical and systemic antibiotics, the development of antibiotic resistance is of concern and should be considered³. The goal of this research is to elucidate relevant guidelines on the treatment of Acne. Acne management guidelines were reviewed from the USA¹, Canada⁶, and UK⁸. The primary literature on which these guidelines were based was reviewed. The treatment of Acne often requires a multi-drug regimen which may include topicals in combination with systemic therapies. The goals of treatment should be discussed, and must be considered when tailoring an appropriate management plan given that sequelae from acne can include severe scarring and dyspigmentation². A stepwise approach is generally recommended given the potential for severe adverse effects with some agents and the potential for antibiotic resistance^{3, 5, 11}. 3/3 major guidelines that were reviewed recommended against topical or systemic antibiotic monotherapy and all stressed that when oral antibiotics are selected, tetracyclines should be first line^{1, 6, 8}.



Abstract #108

Macintosh versus Miller Blade in Intubation of Pediatric Airways: A Review

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Background: Pediatric anatomy and physiology increase endotracheal intubation difficulty and decrease first attempt success. However, additional intubation attempts increase the risk of complications such as desaturation and airway injury. Several intubation methods have been developed over the years to address common complications. Macintosh and Miller blades are two commonly used methods for laryngoscopy in pediatrics, although there continues to be considerable debate over which blade is better in various situations and leaves physicians to become biased toward the method in which they were initially trained.

Hypothesis: The aim of this review was to determine if, and when, there is a clinically significant difference in the use of Macintosh or Miller blades in the intubation of pediatric patients.

Methods: We conducted a literature search utilizing PubMed and Google Scholar. Primary literature was screened for data comparing total time to intubation, glottic view, first attempt success rate, total number of attempts, ease of intubation, use of additional maneuvers, and complications.

Results: Preliminary results show that the Macintosh and Miller blades were comparable in intubations under non-emergent conditions when airway difficulty is not anticipated. Under emergent conditions with a difficult airway, the Miller blade improved intubating conditions compared to the Macintosh blade.

Conclusions: Physician preference for Macintosh or Miller blades may guide choice in routine intubation conditions. However, difficult airway management may necessitate switching of blades to improve glottic view. Training and competency in both methods is critical in the management of pediatric airways.



Abstract #109

Anesthetic Management in a Patient with a Stanford Type A Aortic Dissection

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An aortic dissection results from a separation of vessel layers due to disruption in the intima. Peak incidence occurs between ages 60-80 or 30-50 in patients with connective tissue diseases. The Stanford classification system is utilized to classify the severity of an aortic dissection. A Stanford Type A dissection involves the ascending aorta and generally requires surgical intervention, given the higher risk for complications and rupture. The length of surgery averages eight hours, increasing the risk of anesthesia complications. Prolonged anesthesia in a patient with a complicated past medical history increases the risk of hemodynamic instability and perioperative complications.

This report presents the case of a 48-year-old male with a Stanford Type A dissection, measuring 7.5 cm at its maximum diameter, requiring a polyester graft implantation. Intraoperative complications involving LAD artery ischemia necessitated CABG with saphenous vein autograft. The patient had established diagnoses of hypertension, hyperlipidemia, COPD, OSA, and prior severe aortic regurgitation that was corrected via surgery. Social history included alcohol consumption and a 40-pack-year smoking history. Family history of connective tissue disorders or cardiac disease was unremarkable.

The patient's poorly managed chronic respiratory disease, obesity, cardiac disease, and Mallampati class III with a grade III view upon intubation all increased the potential for airway management complications, designating him as an ASA 3. Intraoperative hemodynamic maintenance proved challenging given the patient's highly variable blood pressure and heart rate despite repeated interventions with vasodilators, vasopressors, and fluids. Mass transfusion was required, which is an independent risk factor for developing multi-organ failure and increases the risk of postoperative complications such as hypothermia, electrolyte abnormalities, metabolic acidosis, air embolism, and others.

Postoperative management included reducing postoperative nausea and vomiting (PONV). Complications of extensive PONV include prolonged hospital stay, increased aspiration pneumonia risk, and Mallory Weiss syndrome due to repetitive retching. The patient was at increased risk of PONV complications due to prior history of PONV and factors such as the use of a volatile general anesthetic, prolonged anesthesia, perioperative opiate, and age less than 50 years old. Management of PONV included oral gastric decompression, antiemetics, and avoidance of opioid analgesics.



Abstract #110

Gaining a better Understanding of Hell's Itch

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Bailey Cook, OMS III, RVUCOM-CO; Benjamin Brooks, PhD, RVUCOM-SU*

Hell's Itch (HI) is a condition characterized by severe itch and pain experienced days after a sunburn, often triggered by showering, that typically gets worse with most topical sunburn treatments. The condition is widely unknown to the medical community with only three peer-reviewed articles published to date, yet a Google search of this condition yields hundreds of thousands of results. Our lack of understanding of HI leaves most afflicted individuals without medical treatment, causing them to resort to social media for guidance, leaving anecdotal data from these sites as the basis for our current understanding. Valid and reliable data is an essential next step in strengthening our understanding of HI. To gather this data, we designed a survey to assess individuals' experiences with HI and posted it on social media pages specific to the condition. With the survey results, we aim to provide the valid and reliable data needed and to further strengthen our understanding, propose the underlying pathophysiology, and educate healthcare professions on HI so afflicted individuals can have access to effective treatments needed to relieve their suffering.



Abstract #113

Disparities in Leadership Training in Osteopathic Medical Education

Hunter Bell - RVU; Min Kyung Chung - RVU; Christian Earl - RVU; Ryan Enslow - RVU; Colton Merrill - RVU; Clyde Jensen, PhD - RVU

Leadership skills among physicians are increasingly important for health care quality, organizational performance, and patient outcome. However, a standardized leadership curriculum does not currently exist in medical education. This educational analysis examined the quantity and quality of leadership-specific courses currently offered by osteopathic (DO) medical schools in the United States. This was accomplished by determining a list of key terms (23 terms) related to leadership qualities, and then carefully reviewing and appraising each course description in school course catalogs and student handbooks according to those standards. Courses were categorized into 4 groups, depending on the phrasing of the title, course description, and inclusion of key related terms; 1. Dedicated, 2. Integrated, 3. Element, and 4. Not associated with leadership. Dedicated group criteria included “leadership” in the title of the course. Integrated group criteria required that the word “leadership” be mentioned in the course’s description. Element group criteria required that the course utilized one of the key terms associated with leadership in the title or course description. Lastly, the courses not associated with any leadership group criteria above were categorized as a group of exclusion. Of the 42 osteopathic medical schools in the United States, 39 had adequate public course information available and 2,973 courses were examined. Nine courses met the criteria for Dedicated. Sixteen courses met the criteria for Integrated. Three hundred and thirty-seven courses met the criteria for Element. Two thousand six hundred and eleven courses met the criteria for not associated with leadership. Of the 39-schools evaluated seven schools met the criteria for dedicated (7/39), twelve schools met the criteria for integrated (12/39), thirty-nine schools met the criteria for Element (39/39), and five schools met all three categories (5/39). Results indicate that gaps currently exist in standardization of leadership courses among DO schools and brings into question whether future implementation of such courses by the Commission on Osteopathic College accreditation (COCA) is warranted. Future research should examine the effects of osteopathic medical student leadership training and outcomes among graduates.



Abstract #114

Methylnaltrexone Used in the Treatment of Acute Colonic Pseudo-Obstruction: A Case Study

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Acute colonic pseudo obstruction is a rare finding of acute massive colonic dilation. There is no mechanical obstruction or other apparent reason for the dilation found. It is best treated with early diagnosis and intervention with conservative therapy to prevent bowel perforation.

We present a case of a patient with acute colonic pseudo obstruction (Ogilvie's Syndrome) in a 69 year-old female with multiple comorbidities, presented to the ER due to significant hip pain after a fall at home. Patient decompensated while in the hospital due to comorbidities and was admitted to the ICU. In the ICU she would withdraw from pain during abdominal examination. Subsequent clinical examination and diagnostic workup confirmed a massive colonic dilation without a mechanical obstruction.



Abstract #115

Overcoming Healthcare Barriers: Identification of Health Determinants in the Unhoused Population

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1. Rocky Vista University

Housing insecurity is a challenging, multifaceted social issue that can be encompassed by a myriad of definitions. Switchpoint Community Resource Center (SCRC) was established to address housing insecurity in Washington County, Utah. SCRC collaborates with numerous community partners to aid individuals experiencing homelessness by providing access to stable housing, food, and other supportive services so that they may be able to get back on their feet. However, SCRC's residents lack access to healthcare services and health education, resulting in significant disease exacerbations and excessive utilization of emergency transportation services to meet the needs of this community. This paper discusses Phase I of a two-phase project aimed at gaining a more comprehensive understanding of the barriers to healthcare access the homeless population of Washington County, UT faces. Phase I was separated into three steps. First, key community informants were identified based on analysis of infrastructures that were highly utilized by the homeless population. Second, qualitative interviews with these key informants were conducted utilizing a premade list of questions that was created to seek out the barriers to consistent healthcare access and to get a better understanding of the health needs for the SCRC population. Interviews were analyzed, and an action plan was created that would result in a coordinated effort between Rocky Vista College of Osteopathic Medicine, SCRC, and community partners to target the barriers to care that were identified by this study. The identified trends among the responses from this study showed that there is inadequate transportation to and from medical appointments, a necessity for routine medical screenings for residents experiencing chronic and/or acute conditions, and a disconnect between the SCRC and medical providers within the community. This project provides a foundation for the development of intervention programs and an opportunity for collaboration amongst various community partners to further minimize the healthcare barriers for individuals experiencing homelessness in Washington County, Utah, ultimately advocating for disease prevention and advancing community health at large.



Abstract #116

Utilizing Digital Predictive Biomarkers to Identify Veteran Suicide Risk

Jackson G. Holmgren, Adelene Morrow, Ali K. Coffee, Paige M. Nahod, Samantha H. Santora, Brian Schwartz, PhD, MLIS, Regan A. Stiegmann, DO, MPH, FACLM, DipABLM (Maj, USAF, MC, FS), Cole A. Zanetti^{4,6}, DO, MPH

Veteran suicide is one of the most complex and pressing health issues in the United States. According to the 2020 National Veteran Suicide Prevention Annual Report, since 2018 an average of 17.2 Veterans died by suicide each day. Veteran suicide risk screening is currently limited to suicide hotlines, patient reporting, patient visits, and family or friend reporting. As a result of these limitations, innovative approaches in suicide screening are increasingly garnering attention. An essential feature of these innovative methods includes better incorporation of risk factors that might indicate a higher risk for tracking suicidal ideation based on personal behavior. Digital technologies create a means through which measuring these risk factors more reliably, with higher fidelity, and more frequently throughout daily life is possible, with the capacity to identify potentially telling behavior patterns. In this review, digital predictive biomarkers are discussed as they pertain to suicide risk, such as sleep vital signs, sleep disturbance, sleep quality, and speech pattern recognition. Various digital predictive biomarkers are reviewed and evaluated as well as their potential utility in predicting and diagnosing Veteran suicidal ideation in real-time. In the future, these digital biomarkers could be combined to generate further suicide screening for diagnosis and severity assessments, allowing healthcare providers and healthcare teams to intervene more optimally.



Abstract #117

Effective Post-Cesarean Pain Management to Reduce Opioid Abuse/Addiction

*Jaden Cooley, OMS-II, RVU; Jeff Rigby, OMS-I, RVU; Dallen Broadbent, OMS-III, TCOM
Benjamin Brooks, PhD, RVU; David Forstein, DO, RVU*

Background:

The incidence of opioid-related death in women has increased five-fold over the past decade. For many women, their initial opioid exposure will occur in the setting of routine medical care. Approximately 1 in 3 deliveries in the U.S. is by Cesarean and opioids are commonly prescribed for post-surgical pain management. Possible alternatives to pain management via opioids is the use of TAP block, QL block and intrathecal morphine which may be as effective in managing patients' pain without the adverse side effects and risks of opioids.

Hypothesis:

Effective post-procedure pain management will reduce overall pain scores and opioid use, leading to decreased opioid abuse/addiction.

Methods:

We identified women in a database of commercial insurance beneficiaries who underwent Cesarean delivery and who were opioid-naïve in the year prior to delivery. To identify persistent users of opioids, we used trajectory models, which group together patients with similar patterns of medication filling during follow-up, based on patterns of opioid dispensing in the year following Cesarean delivery. We then constructed a multivariable logistic regression model to identify independent risk factors for membership in the persistent user group.

Results:

285 of 80,127 (0.36%, 95% CI [0.32,0.40], opioid-naïve women became persistent opioid users (identified using trajectory models based on monthly patterns of opioid dispensing) following Cesarean delivery. Demographics and baseline comorbidity predicted such use with moderate discrimination (c statistic = 0.73). Significant predictors included a history of cocaine abuse risk 7.41%; adjusted OR 6.11, 95% CI [1.03,36.31], other illicit substance abuse 2.36%; adjusted OR 2.78, 95% CI [1.12, 6.91], tobacco use 1.45%; adjusted OR 3.04, 95% CI [2.03, 4.55], back pain 0.69%; adjusted OR 1.74, 95% CI [1.33, 2.29]), and migraines 0.91%; adjusted OR 2.14, 95% CI [1.58, 2.90], antidepressant use 1.34%; adjusted OR 3.19, 95% CI [2.41, 4.23], in the year prior to Cesarean delivery.

Conclusions:

Approximately 1 in 300 opioid-naïve women become persistent prescription opioid users following Cesarean delivery. Alternatives to opioid prescription following cesarean delivery, namely TAP block, QL block and intrathecal morphine may be as effective at managing pain without the risk of abuse/addiction.



Abstract #118

Multi-ligamentous Knee Injury in a Female Skier including a Lateral Meniscal Root Avulsion-Case Report

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Case: A 45-year-old female presented to the emergency department after a twisting ski accident without binding release. MRI showed complete rupture of the ACL, PCL, proximal MCL, and femoral sided MPFL. The lateral meniscal root was torn and the posterior horn flipped superiorly into the popliteal hiatus. Using a two-stage surgical approach, we first addressed the lateral meniscus avulsion and extra articular ligaments including MCL and MPFL. We then allowed eight weeks for return of range of motion and returned for ACL and PCL reconstruction. The patient tolerated the staged approach well and aims to return to sport.

Conclusions: We present a case report of a multiligamentous knee injury with a lateral meniscal root avulsion displacement into the popliteal hiatus in a 45-year-old female after a skiing accident. This injury required a two-stage operative approach. Where risk for meniscal plastic deformation and long term disability is high, decision making and careful surgical planning are central to a successful outcome.



Abstract #119

CRISPR-Cas9 Mediated Elimination of Fermentative *S. Cerevisiae*

*Chandler Nicholas - Weber State University; Kasey Doney - Weber State University;
Cameron Shapiro - Weber State University; Brian Rushforth - Weber State University
Faculty Mentors: Kendal Beazer, MHA - Weber State University;
Matthew Nicholaou, DrPH - Weber State University*

Auto-Brewery Syndrome (ABS) is a rare disorder in which gut microbiota ferment ingested carbohydrates, leading to ethanol production. ABS can cause intoxication and has been associated with pathologies such as Chron's disease and non-alcoholic fatty liver disease. Current methods of treatment include carbohydrate-restricted diet, probiotics, and antifungals; however, these have failed to demonstrate universal success. This research investigated the efficacy of CRISPR-Cas9 gene-editing as a treatment by designing an efficient guide RNA and Cas9 system to cleave vital genes of the ethanol-producing *Saccharomyces cerevisiae*. Plasmids targeting genes phosphoribosylaminoimidazole carboxylase (ADE2) and tRNA guanylyltransferase (THG-1) were incorporated into *S. cerevisiae* cells using electroporation. Cells were then plated and colony forming units (CFUs) were counted for each condition. A significant reduction in CFUs was seen in plasmid-transformed cells when compared to controls (ADE2 B and THG-1 $t(2)=-6.623$, $p=0.0220$ and ADE2 A $t(2)=-6.593$, $p=0.0222$). This indicates that the CRISPR-Cas9 model resulted in fatal damage to *S. cerevisiae* cells, demonstrating the potential for CRISPR's use in treating ABS patients.



Abstract #120

Medication Concordance of Low-Income, Hispanic Patients in the United States

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Faculty/Preceptor: Thomas Bigham, DO; Primary Care Medicine, RVU, Ivins, UT*

Medication non-adherence in the United States is expensive and contributes to poorer health outcomes, especially among Hispanic patients. Non-adherence is multifactorial and complex; socio-economic, patient-specific, condition-specific, and health system-specific risk factors all contribute to poor adherence rates. The contribution of patient medication concordance to adherence (i.e., a patient's perception of their understanding compared to their actual knowledge), especially among low-income, Hispanic patients, is less researched and is something that can be addressed with patients at each visit.

Based on previous research, we hypothesize that low-income, Hispanic patients at a free clinic will show low medication concordance rates, putting them at risk for medication non-adherence and adverse events. This research is ongoing.

Patients at a free clinic, post-physician encounter, are asked to participate in a research questionnaire to investigate their medication concordance. The questionnaire is offered in both Spanish and English by investigators who are bilingual and can verbally assist participants as needed.

Preliminary data show discordance among participants, especially regarding knowledge of medication side effects.

The research findings will contribute to the growing body of literature on low income, Hispanic medication adherence as well as provide feedback to the volunteer clinic on how to improve patient education on medications.



Abstract #121

Quantitative Biomarkers to Assess Upper Trapezius Muscles in Chronic Neck Pain

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Background: The aim of this study is to identify and develop multiparametric quantitative ultrasound imaging biomarkers and EMG for assessing upper trapezius muscles with and without chronic neck pain (CNP) and their response to treatment. Preliminary results have shown that biomarkers including muscle B-mode ultrasound echo-intensity, shear wave velocity, and longitudinal strain ratios associated with muscle tissue structure, mechanics, and function significantly differ between muscles in low back pain and neuromuscular disorders and normal muscles. This publication is a brief introduction of AOA-funded study.

Hypothesis: To determine the diagnostic performances of EMG, echo-intensity as a muscle structural biomarker, shear wave velocity and longitudinal strain ratio as muscle mechanics/function biomarkers, and color Doppler microvascular index as a muscle blood flow biomarker; and subsequently to determine the prognostic performance of the EMG and QUI biomarkers developed in predicting clinical response to OMT treatment.

Methods: Healthy subjects will be recruited to test these quantitative biomarkers on upper trapezius muscle in the neck region to establish normal control values. To determine the clinical utility of these novel biomarkers, subjects with chronic neck pain will receive clinical osteopathic assessments over the neck region using conventional osteopathic examination with qualitative disease scoring by clinicians and subjective pain scales by subjects. The biomarkers and qualitative osteopathic assessments of corresponding tissues with and without CNP will be analyzed using advanced ultrasound processing methods and statistical analyses.

This trial will determine if improvement in abnormal biomarker values leads to improvement in subject's pain and osteopathic assessments. Subjects with neck pain will be examined at intervals with biomarker measurements and osteopathic assessments. Image processing and statistical analysis will be used to determine the performance of the biomarkers in predicting response to treatment. (IRB #2022-095; ClinicalTrials.gov-ID: NCT05497622)

Expected Results: The trial approach is supported by preliminary studies, which demonstrate that EMG and ultrasound biomarkers change following OMT, returning toward more normal muscle tissue mechanics.



Abstract #122

An Osteopathic Approach to Head Impact Mitigation in Collegiate Lacrosse Players

Samantha Haubeil, RVUCOM-SU; Madison Garlock, RVUCOM-SU; Amanda Troy, PhD, RVUCOM-SU

Repetitive head impacts in contact sports have been a leading concern due to their link to long-term brain disease and dysfunction. Many impact mitigation strategies have been postulated, but very few have used the osteopathic understanding of fascial planes to explore other body region strengths as a protective element in head stabilization. It is understood that if there is a disturbance or weakening of fascia in one region, this diminishes the entire fascial layer's strength and durability. In sports, core building exercises have been implemented in many programs to increase athlete performance. However, limited research has examined the core strength of athletes and compared it to their head injuries, especially in lacrosse. Therefore, the purpose of this study is to assess core strength among college lacrosse players and compare it to their concussion data. We believe the stronger the core of the athlete, the lower the likelihood of getting a head injury during the season. Using the Sahrmann Core Stability Test (SCST) as a measurement tool, this study aims to determine whether there is a correlation between a player's core strength and concussion incidence during their season. Players will undergo the SCST before the season begins and take a survey to determine their current and previous health status. After their season, their injury reports and play time will be analyzed and compared to initial core strength using Pearson correlations. It is expected to find players that sustained one or more head injuries in a season scored significantly lower on the SCST. If the data coincides with the hypothesis, it further emphasizes the need to implement core building training in athletic programs; not only for performance, but for protection.



Abstract #123

A Case Report of Late-Onset Hereditary Angioedema in a Patient with Non-Hodgkin's Lymphoma, Common Variable Immunodeficiency, and Antiphospholipid Antibody Syndrome

Jordan Higgs; RVU-SU

Introduction

Hereditary angioedema (HAE) with C1q deficiency is a rare hereditary condition characterized by repeated attacks of angioedema. This condition most frequently affects the skin or mucosal tissues of the upper respiratory and gastrointestinal tracts. HAE can be associated with lymphoproliferative disorders such as splenic marginal zone non-Hodgkin's lymphoma and should be considered in the differential for patients with recurrent attacks of angioedema or abdominal pain that is unresponsive to treatment. HAE is underdiagnosed and continued research and education on diagnosis and management of the disease are warranted.

Case Presentation

A 71-year-old woman presented to the ED with a complaint of abdominal pain. Her symptoms included cramping, constipation, diarrhea, nausea, and severe vomiting. The patient's previous medical history consists of splenic marginal zone non-Hodgkin's lymphoma, treated successfully with chemotherapy; common variable immunodeficiency with ongoing IVIG treatment; positive anticardiolipin antibody testing with daily 81 mg of aspirin and no current thrombotic events. Subsequent diagnostic testing results indicated a diagnosis of late-onset C1q hereditary deficiency angioedema was made.

Discussion

HAE due to acquired C1-INH deficiency is difficult to identify and is most commonly diagnosed after many years of recurring attacks. Currently, HAE treatment relies on short- and long-term prevention and treatment for acute attacks. The goal of HAE therapy is to reduce the frequency and severity of angioedema and improve patient quality of life. Due to the variable clinical presentation and severity of the disease, if untreated, it is essential to recognize and initiate appropriate treatment for HAE.



Abstract #124

Post-Cesarean Pain Management to Reduce Opioid Abuse/Addiction

Jaden Cooley, OMS II, RVU; Jeff Rigby, OMS I, RVU; Benjamin Brooks PhD, RVU; Dallen Broadbent, OMS III, TCOM

Background:

The incidence of opioid-related death in women has increased five-fold over the past decade. For many women, their initial opioid exposure will occur in the setting of routine medical care. Approximately 1 in 3 deliveries in the U.S. is by Cesarean and opioids are commonly prescribed afterwards. Possible alternatives to pain management via opioids is the use of TAP block, QL block and intrathecal morphine which may be as effective in managing patients' pain without the adverse side effects and risks of opioids.

Hypothesis:

Effective post-procedure pain management will reduce overall pain scores and opioid use, leading to decreased opioid abuse/addiction.

Methods:

We identified women in a database of commercial insurance beneficiaries who underwent Cesarean delivery and who were opioid-naïve in the year prior to delivery. To identify persistent users of opioids, we used trajectory models, which group together patients with similar patterns of medication filling during follow-up, based on patterns of opioid dispensing in the year following Cesarean delivery. We then constructed a multivariable logistic regression model to identify independent risk factors for membership in the persistent user group.

Results:

Among opioid-naïve women, 285 of 80,127 (0.36%, 95% confidence interval 0.32 to 0.40), became persistent opioid users (identified using trajectory models based on monthly patterns of opioid dispensing) following Cesarean delivery. Demographics and baseline comorbidity predicted such use with moderate discrimination. Significant predictors included a history of cocaine abuse and other illicit substance abuse, tobacco use, back pain, migraines, antidepressant use, and benzodiazepine use in the year prior to Cesarean delivery. This evidence shows that opioids are a potential risk for these patients following cesarean delivery. A nerve block may be an effective solution for pain management in post-cesarean opioid-naïve women.

Conclusions

A very small proportion of opioid-naïve women (approximately 1 in 300) become persistent prescription opioid users following Cesarean delivery. Alternatives to opioid prescription following cesarean delivery, namely TAP block, QL block and intrathecal morphine may be as effective at managing pain without the risk of abuse/addiction. Reducing the risk of abuse/addiction will ease the minds of prospective and postpartum mothers, while still receiving effective pain management.



Abstract #127

Unique Leg Muscle Discovered and Defined in a Cadaveric Specimen

Jeremy Jones OMS II- RVUCOM UT; Amanda Troy PhD- RVUCOM UT

An anomalous muscle was discovered in the right leg of a 64-year-old male cadaveric specimen during routine dissection. The muscle was found deep to the lateral head of the gastrocnemius muscle and superficial to the soleus muscle. The muscle had a definitive fascial covering and unique attachments along the tibia, fibula and iliotibial tract. A distinctive blood supply was identified during dissection. Exclusive innervation is suspected, but was not preserved during the dissection. Function of the muscle may include supporting flexion of the knee and iliotibial tract stability and posterior movement of the fibular head. No previous documentation of this muscle could be found. A continuous search of similar structures among other cadaveric specimen and possible commonalities between these discoveries may help to further investigation into function or conditions related to the anomalous muscle.



Abstract #128

BRCA Gene Mutations and Testicular Cancer

*Lindsay M. Kadell MS, Noah T. Glende, Heidi Arreola MS, Benjamin Brooks PhD
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Background: Tumor suppressor genes produce tumor suppressor proteins that regulate the cell cycle. Tumor suppressor gene mutations have been linked to increase likelihood of developing certain types of cancers, including the Breast Cancer genes (BRCA1 and BRCA2). Individuals with the BRCA gene mutations have a higher incidence of breast, ovarian, prostate, pancreatic, stomach and colorectal cancer. Testicular cancer is most common in men between the ages of 20 and 34. The testes and ovaries have the same embryonic origin, primordial germ cells.

Hypothesis: Males with BRCA1 or BRCA2 gene mutations will have a higher prevalence of testicular cancer compared to males without the gene mutation.

Methods: All records were screened for information to screen for testicular cancer risk in males with the BRCA gene mutation and males without the BRCA gene mutation.

Results: The initial search process yielded 30 records and 20 were excluded in the screening process and 2 studies were eligible for qualitative analysis. Risch et al. found the statistically higher risks of testicular cancer associated with the BRCA1 mutation and there was not enough information to determine the relative risk testicular cancer associated with the BRCA2 mutation. Dorssers et al. 2019 found A BRCA-like mutational signature was observed without evidence for direct involvement of BRCA1 and BRCA2 genes in testicular germ cell cancer.

Conclusions: Prior research is insufficient to link testicular cancer and the BRCA gene mutations. The review was inspired by a case of a 28-year-old male with a BRCA 1 gene mutation who presented with testicular cancer. Future studies should include a retrospective chart review of males with the BRCA1 or BRCA 2 gene mutations and identify if they have a higher prevalence of testicular cancer than those without the gene mutation.



Abstract #129

Osteopathic Practice and Principles 3-D Educational Videos

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Somatic dysfunction (SD) has historically been a somewhat difficult concept to understand because of the need to be able to conceptualize the mechanics in 3 dimensions. This study hopes to discover if 3-D videos make SD easier to envision. The goal of this project is to enhance students' learning, understanding, and development of confidence in diagnosing somatic dysfunction and success in answering written exam questions while in their first year of osteopathic medical school. Qualtrics surveys will be used to determine the validity of the videos for thoracic, cervical and sacral diagnoses. We expect to find that the video group is more likely to correctly answer the exam-like questions than the non-video (control) group because videos are helpful in visualizing, naming, and understanding somatic dysfunction of respective body regions. The ultimate hope is to provide a new tool to enhance the osteopathic medical education system.



Abstract #130

Case Study: Can Digital Wearable Device Detect and Monitor Coronary Artery Disease in a Male Triathlete?

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This study seeks to examine the efficacy of a Garmin watch in monitoring post-treatment outcomes for a triathlete with coronary artery disease (CAD). I hypothesized that measurable changes in cardiac variables such as resting heart rate, average heart rate, and VO2 max recorded by the wearable would indicate improved cardiac function after treatment was initiated. The study follows a subject who presented with a CT-angiogram revealing a 50-60% plaque obstruction in the left anterior descending coronary artery. The subject's utilization of a Garmin Watch Wearable device, pre- and post-diagnosis, provided 5 years' worth of data tracking measures of cardiac health, including average heart rate, resting heart rate, and VO2 max. Data analysis showed a significant decrease in average heart rate and resting heart rate after treatment for CAD was initiated ($p < 0.01$), as well as an increase in VO2 max ($p=0.057$). While analysis of data from the wearable did not support the use of the device for the identification of CAD, these findings do support the ability of a Garmin Watch to track variables that can provide information for endurance athletes to monitor their cardiac health while they continue to train, and help inform physicians that manage their treatment plans.



Abstract #131

The Impact of Global Health Outreach Experiences on Medical Student Burnout

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Background

Increasing burnout rates and empathy decline during medical education is a prevalent and critical problem. Current rates of medical student burnout are estimated at over 45%. Global Health Outreach Experiences (GHOEs) have demonstrated successful burnout protection amongst working healthcare professionals. However, research has yet to be conducted on the effect that GHOEs have on medical student burnout prior to entering the workforce.

Hypothesis

Medical students who participate in a week-long GHOE will have a reduction in burnout (H1) and increased empathy (H2) compared to students who have a standard week-long break from school.

Methods

A survey utilizing the Copenhagen Burnout Inventory-Student Survey (CBI-SS) and Toronto Empathy Questionnaire (TEQ) was distributed to 1st and 2nd year osteopathic medical students at Rocky Vista University College of Osteopathic Medicine (RVUCOM) participating in a one-week, spring break GHOE and randomly selected, non-participating students. Surveys were given 1 week prior, 1 week after, and 10 weeks after the trip/spring break. Twenty-one GHOE medical students and 70 non-GHOE medical students were analyzed as a control. Four questions focused on Personal Burnout (PB), 3 questions on Studies Related Burnout (SRB), and 2 on Colleagues Related Burnout (CRB).

Results

There was a statistically significant reduction in burnout at 1-week and 10-week post spring break surveys among GHOE participants compared to the control, confirming H1. GHOE participants had decreased PB (-5.7%), SRB (-7.4%), and CRB (-12.1%), while the control group demonstrated increased PB (5.6%), SRB (2.6%), and CRB (2.9%). GHOEs did not have a statistically significant impact on empathy levels, rejecting H2.

Conclusion

The results demonstrate that GHOEs may be an effective tool for institutions to combat burnout rates in their student populations. Because the effects of burnout worsen as practicing physicians, a further review of the impact medical school experiences have on long-term burnout outcomes is merited.



Abstract #132

Does the Study of Radiology Early in Medical School Contribute to Higher Scores in Anatomy-Based Courses?

Lucas Marin-Salcedo, OMS II RVUCOM; Brian Gloyeske, OMS II RVUCOM; Julia Javate, OMS II RVUCOM; Alexander Fishburn, OMS II RVUCOM; Amanda Troy, PhD RVUCOM

Structure and function are reciprocally related; therefore, a complete understanding of anatomy is a requisite for the understanding of function. Current pedagogy for the instruction of anatomy during the first year of medical school attempts to marry a two-dimensional memorization of facts with the three-dimensional understanding of cadaver dissection. However, clinically, most physicians view the human body through the lens of radiology. The study of radiographic images is not often implemented among the curriculum of first-year medical students. Given the need for an introduction to radiographic images and the general understanding of radiology for first-year medical students, this study aimed to produce and evaluate optional radiology-based practice questions that relate to the material being covered in anatomy-based courses.

The goal was to determine if radiology-based anatomy review questions will improve medical students' examination scores and their attitudes towards anatomy-based block classes at Rocky Vista University College of Osteopathic Medicine (RVUCOM). Multiple modalities of radiological imaging were used for the quizzes, and questions spanned multiple organ systems.

Question topics covered subjects including embryology and histology and related to clinical correlations from lectures. Quizzes included five multiple-choice, board-style, clinical vignette questions with embedded radiographic images. The questions ranged from first-order to fourth-order and were designed to elicit clinical critical thinking skills not usually requisite for OMS-I lecture classes. Quantitative student t-tests were performed as well as qualitative Likert-style survey questions, from which statistics were obtained.

Quantitative data indicated that there was no significance between the experimental group and control group, however, qualitative data indicated that the quizzes were difficult yet helpful to improve anatomy understanding and retention.

In conclusion, there was some perceived benefit to implementing radiographic practice questions into the curriculum. However, more teaching methods are required to bridge the gap between the physical study of anatomy and extrapolating that understanding to a radiographic image from a clinical case. Further studies are currently being implemented which include the addition of didactic radiology tutorials to give OMS-I students a more complete understanding of normal imaging before attempting practice questions.



Abstract #134

Osteoarthritis and Aquaporin Dysregulation, the Unrecognized Link with Idiopathic Intracranial Hypertension and Glaucoma

Max Raynor DO, University of Southern California; Isain Zapata PhD, Rocky Vista University; Amanda E. Brooks PhD, Rocky Vista University

Osteoarthritis (OA) is described as chronic pain, numbness, tingling, and burning in major joints caused by wearing away of the articular cartilage. OA is the leading cause of disability in the world. There is growing evidence that the upregulation of aquaporins at joint cartilage contributes to the loss of cartilage homeostasis and pathogenesis of OA. Idiopathic intracranial hypertension (IIH) and glaucoma are two other diseases that have been linked to aquaporin upregulation. Acetazolamide has been shown to decrease expression of and block aquaporins. Due to the use of acetazolamide as a treatment for IIH and glaucoma, we hypothesized that the incidence of OA would be lower in patients who had been diagnosed with IIH and glaucoma. The National Inpatient Sample data from 2013 was used in this study. Diagnosis codes for OA (ICD-9-CM codes starting with 715.XX), IIH (ICD-9-CM code 348.2), and glaucoma (ICD-9CM codes 365.1 and 365.2) were used to identify patient populations. Descriptive statistics were calculated for the full dataset and for the selected patient cohort. Pairwise direct associations were evaluated using contingency tables. Association of all effects were performed using generalized linear models where a binary response distribution was selected for the dependent variable. For all applicable instances, odd ratio estimates were provided with a 95% confidence interval. Results showed that the frequency of being diagnosed with osteoarthritis and IIH simultaneously is lower than expected ($P=5.41E-26$). Oppositely, there appears to be a higher frequency than expected of being diagnosed with osteoarthritis and glaucoma simultaneously ($P=2.89E-199$). Curiously, an association between Glaucoma and IIH could not be detected ($P=0.9320$). Incidence association of these diseases provides clues for the possible use of acetazolamide to target the aquaporin upregulation in osteoarthritis. Acetazolamide is used as a primary treatment in IIH while it is only used in glaucoma secondarily. Treating the aquaporin dysregulation with acetazolamide may explain why the incidence of OA in IIH is lower than expected while in glaucoma it is higher. If proven effective in preventing or halting the pathogenesis of OA, acetazolamide, as a potential early therapeutic could decrease the financial burden of disease significantly.



Abstract #135

Dermatologic Applications of Cenegermin

Cassidy Musick (Christopherson); Madison Garlock; McKenzie White; Co-faculty: Dr. Jack Brozna

Cutaneous wounds of the largest organ of the body, the skin, are limited to epidermal regeneration and anesthetic recovery and often left with loss of sensation in the healed area. While the smallest organ in the body, the eye, has shown evidence of nervous tissue regeneration in the case of neurotrophic keratitis with the application of U.S. Food and Drug Administration (FDA) approved cenegermin (Oxervate®). Few studies have focused on developing strategies to improve nerve regeneration in the context of cutaneous wound healing. We hypothesize that the FDA approved recombinant human nerve growth factor (rhNGF), Oxervate, will be effective at promoting healing of chronic non-healing wounds that are often seen in patients with cutaneous wounds. This review will focus on the proposed connection between cutaneous wound healing compared to corneal wound healing, nervous tissue loss in both, and how cenegermin has potential to restore nerves in cutaneous wounds as it does in neurotrophic keratitis.



Abstract #136

Ultrasound-Guided Carpal Tunnel Release: A Comparison to Open Carpal Tunnel Release

*Kaiser Nieman- Rocky Vista University; Erin Robbins- Rocky Vista University;
Benjamin Brooks- Rocky Vista University*

Carpal tunnel syndrome (CTS) is the most common peripheral neuropathy in the United States, affecting an estimated 1-3% of the general population, and is the causes of significant loss of productivity and morbidity. Carpal tunnel release surgeries are the most common hand and wrist procedures in the US, with an estimated economic impact of over \$2 billion per year. Traditional open carpal tunnel release (OCTR) has been the standard treatment for CTS for years; however, minimally-invasive ultra-sound guided procedures (USGCTR), such as SONEX, have recently emerged and are gaining popularity over traditional open release given their shortened recovery period and patient aversion to the more invasive open release. Both procedures carry inherent risks and long-term benefits, but the long-term efficacy of USGCTR compared to those of OCTR has been largely understudied. An in-depth analysis of available literature on USGCTR and OCTR was performed and a comparison of recovery period, adverse events and long-term sequelae was made to determine the utility of USGCTR over OCTR. USGCTR has the advantage of direct visualization of at-risk structures, it is therefore predicted that USGCTR will emerge as a favorable alternative to OCTR in the coming years.



Abstract #137

Manual Labor and Chronic Pain and the Risk of Opioid Addiction

Abigail Fish

The purpose of this literature review is to analyze different factors that may suggest a correlation between communities with an increased number of individuals working manual labor jobs and chronic pain. Higher incidences of chronic pain in turn may lead to an increased rate of opioid addiction, possibly suggesting that communities with more individuals working manual labor jobs have a higher risk of opioid addiction. Other factors being analyzed in this review include regular exercise, food security, healthcare access, housing security, education, mental health diagnosis and average income.



Abstract #138

Utilizing Syringe Exchange Services as the Primary Intervention for Conduction Hepatitis C Micro Elimination Studies: A Systematic Review

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Micro elimination (ME) is an approach to disease elimination within a discrete population that incorporates population specific measures to increase efficacy and efficiency of public health measures. Syringe Exchange Services (SES) is a harm reduction approach to decrease HCV transmission among people who inject drugs (PWID). Limited data is available regarding the utilization of harm reduction methods, such as SES as the primary method of implementing HCV micro elimination. This study aims to systematically review current research regarding implementing SES as a primary method for conducting an HCV micro elimination project. Databases searched included PubMed, Qinisght, EBSCO, Cochrane databases of Systematic Reviews, and Google Scholar. Search terms were narrowed to: "HCV micro-elimination" AND "people who inject drugs", "HCV micro-elimination" AND "syringe exchange", "HCV micro-elimination" AND "people who inject drugs", "Hepatitis C micro-elimination" AND "syringe exchange", "Hepatitis micro-elimination" AND "people who inject drugs." 3 stages of searches were conducted, including: title search, key terms within abstracts, and full text review. After the text review, four out of the 26 articles were selected for inclusion. The studies reviewed emphasized that current methods combating the elimination of HCV are not sufficient. Some suggested methods to include in a ME project are implementing SES, decreasing barrier to care, and continuation of treatment to those facing imprisonment after release. The studies strongly suggested that SES may be a key piece in reaching micro elimination among PWID, reducing HCV incidence by 80% and transmission by 20% in some populations. This is due to fully functioning SES being a low-barrier system for testing, treatment, referral, social and counseling services. This systematic review highlights SES as a crucial piece to achieving elimination among PWID. However, in order to maximally reduce HCV incidence and prevalence, more research must be completed to determine what models of SES are most effective.



Abstract #139

Colonoscopy CPT Code Trends in Medicare Patients: 2000 - 2020

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Background: Colon cancer screenings are an essential component of health for the Medicare population. Trends can be analyzed using CPT codes. Trends in colonoscopy codes are an indication of cancer screenings for the Medicare population. Trends in the use of brushing in comparison to biopsy and mass removal during colonoscopy call for investigation into underlying causes such as physician preference, test sensitivity, or frequency of complications.

Hypothesis: There are observable patterns in colonoscopies techniques that can be observed through analysis of CPT code reports from Medicare patients.

Methods: CMS data provided Medicare patient information. CPT code claims and reimbursements were analyzed for the time period of 2000 to 2020. Claims per 10,000 Medicare beneficiaries and reimbursement per claim adjusted for inflation were calculated.

Results: From 2000-2020, for claims per 10,000 Medicare beneficiaries, CPT code 45378 decreases from 235.41 per 10k, to 58.64 per 10k, or 75.09%. CPT code 43580 increases from 123.18 per 10k to 188.34 per 10k, or 53%. CPT code 43585 increases from 153.63 per 10k to 179.31 per 10k, or 17%. Compensation decreases for each CPT code; Code 45378 decreased from \$238.27 to \$183.54, or 23%. Code 45380 decreased from \$254.24 to \$195.08, or 23%. Code 45385 decreased from \$346.75 to \$287.16, or 17%.

Conclusion: CPT code usage demonstrates a trend towards collecting biopsies and removing masses and away from obtaining samples via brushing for patients on Medicare. A call for further research is warranted to investigate the underlying causes of these trends to properly address the needs for patients on Medicare.



Abstract #140

Reducing Risk of Respiratory Illness Associated with Traditional Cookstoves in Rural Communities of India - An Initial Assessment

Samuel Patha - Brigham Young University, Rocky Vista University

Unvented biomass cookstoves present a recognized respiratory health risk in developing countries. The purpose of this study was to characterize fine particle indoor air pollution (IAP) concentrations in dwellings using traditional cookstoves in a rural community in India. It also aimed to understand if a culturally acceptable clean cookstove intervention was needed to reduce the risk of respiratory illnesses from exposure to combustion products from traditional cookstoves. We took PM_{2.5} concentrations and $\leq 0.5 \mu\text{m}$ particle counts inside a sample of dwellings during the use of traditional cookstoves. The data were analyzed to indicate the magnitude of IAP. In households with traditional cookstoves, average PM_{2.5} concentrations were 172.8 $\mu\text{g}/\text{m}^3$, and the particle counts $\leq 0.5 \mu\text{m}$ averaged 346,150. The PM_{2.5} concentrations from the traditional cookstoves were shown as unhealthy per the PM_{2.5} air quality index (AQI) of the U.S. Environmental Protection Agency. Partnering with local community members, an improved prototype metal cookstove was designed to be fuel-efficient and vent the smoke out of the dwellings. We found PM_{2.5} concentrations and $\leq 0.5 \mu\text{m}$ particle counts for the new stove averaged 21.5 $\mu\text{g}/\text{m}^3$ and 60,812, respectively. The PM_{2.5} concentrations from the new stove are at an acceptable level per the AQI.



Abstract #141

Exploratory Analysis of Droperidol for Excitable Delirium in Emergency Medical Services: A Systematic Review and Retrospective Analysis

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Rocky Vista University

In 2019, while suffering with excitable delirium, Elijah McClain endured cardiac arrest due to a Ketamine overdose in the prehospital setting¹. There has been a history of Ketamine overuse due to ambiguity surrounding its use for “excitable delirium”². Excitable delirium has been defined as “excessive motor activity associated with a feeling of inner tension;” commonly treated with Ketamine⁵. However, Ketamine administered in the prehospital setting is shown to be associated with higher rates of intubation and worsening schizophrenic symptoms in acutely psychotic patients¹⁰.

An alternative to Ketamine for sedating patients with excitable delirium is Droperidol. Extensively used in the 1960s, Droperidol treated headaches, agitation and pain¹². In 2001, the United States Food and Drug Administration required a blackbox warning due to reported adverse events including QT prolongation and potentially fatal arrhythmias¹². Peer reviewed literature has since shown those events to be associated with high dose Droperidol and rarely associated with low to moderate dosage¹².

In 2019, the blackbox label was removed and it became widely available in the United States. In comparison to Midazolam (another common sedative), Droperidol has a lower adverse event rate (about 7% v 23%),¹³ and associated with lower need for rescue sedation and a shorter emergency department stay¹⁴. However, possible adverse events include extrapyramidal symptoms, which are usually resolved with diphenhydramine¹⁴. A shortcoming in current literature is a systematic review of randomized trials with Droperidol sedation for excitable delirium in the prehospital setting¹⁵. A systematic review and meta-analysis coupled to our retrospective study could strengthen the legitimacy of our study to previous literature on this topic.

Based on our review, there is no research that directly compares Ketamine and Droperidol administration, so we cannot conclude that Droperidol alone is a safe or better alternative than Ketamine as primary treatment for excited delirium. Our contribution to the research would be to investigate the safety and efficacy of Droperidol administration in prehospital settings, as compared to Ketamine, in the context of sedation of individuals presenting with excited delirium. Our end goal is to provide insight and data to modify EMS protocols pertaining to sedative drug administration.



Abstract #142

Yoga as an Educational Aid for Osteopathic Medical Students Studying Musculoskeletal Anatomy

Meave Phipps; Josephine Hinkley; Mia Panlilio; Kyle Johnson; Alexander Seegrist; Amanda Brooks, PhD

Previous studies have suggested a link between yoga practice and increased anatomy exam performance, increased confidence in anatomy knowledge, and decreased stress in allopathic medical students. However, no such study has been conducted with osteopathic medical students. As students of osteopathic medicine spend considerable time studying anatomy to practice Osteopathic Manipulative Medicine, this increased curriculum exposure to musculoskeletal (MSK) anatomy, combined with the adjunct activity of yoga, could result in significantly increased MSK anatomy practical scores. A small study was conducted with osteopathic medical student volunteers assigned to either a yoga intervention group or a survey-only control group. The yoga intervention group participated in three yoga classes during their MSK block, one before each anatomy practical exam. All study participants were asked to complete pre- & post-MSK surveys, which evaluated their stress levels using the Perceived Stress Scale (PSS-10), and average anatomy practical scores were compared. The yoga intervention group scored significantly higher ($p = 0.044$) than the control group on the lower extremity anatomy exam and when comparing the average of all exams ($p = 0.024$). PSS-10 scores showed a modest decrease in the yoga intervention group but were not statistically significant. Further research is warranted, but our study suggests that incorporating a yoga component into the anatomy curriculum could improve student exam scores and potentially lead to reduced stress levels among osteopathic medical students.



Abstract #143

A Comparison of The Bouquet Speculum and Traditional 2-Bladed Speculum

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Background:

A speculum exam is an essential part of all women's health screening exams. The ability to visualize the cervix during such exams is critical and can be difficult depending on various factors such as weight. The 5-petaled Bouquet Vaginal Speculum (BVS) design is intended to dilate the vaginal canal in order to prevent lateral vaginal wall collapse in multiparous and obese women, which often causes obstruction of the cervix.

Hypothesis:

We believe the new 5 bladed speculum will be more comfortable for patients, increase visibility of the cervix, and increase the ease of use by the physician compared to the traditional speculum.

Methods:

This is a randomized single-blinded clinical study that compares the typical 2-bladed plastic disposable vaginal speculum to the novel 5-petal Bouquet speculum on level of patient comfort, visibility of the cervix, and time length of the examination. Patient inclusion criteria includes: indication for a Pap test, history of previous Pap Screening, and two or more children vaginally delivered. Patient exclusion criteria includes: signs of vaginitis or cervicitis and current pregnancy. If the patient meets the criteria and consent is given, the BVS is used and afterwards both the patient and provider are given a set of questionnaires.

Results (anticipated):

We anticipate that the BVS will take less time to use, provide better visibility of the cervix in multiparous and obese women, and fewer maneuvers will be required to find the cervix. We currently have only a dozen patients and the data is inconclusive at this point. We need more power by recruiting more patients.

Conclusion:

Our prediction is that the design and results of the trial will increase the use of this speculum examination in order to maximize comfort for patients and enhance efficiency for providers. Some things to consider would be the speculum was designed for obese multiparous women. The number of notches in the speculum makes it difficult to evaluate nulliparous thinner patients. Since these patients are not excluded from the trial it may skew the results. The device could be redesigned with this in mind or we could make a more narrow selection criteria.



Abstract #144

Development of B7-H3, Midkine Vectors to Investigate Immune Regulation in Tumor Microenvironments

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Richard Warner- Montana State University Billings

Background: In cancer, there is a failure of the immune system to recognize and kill cancer cells. Recently there has been great interest in developing immune therapies to reinitiate this anti-tumor response. Proteins in the B7 family stimulate or inhibit immunoregulatory signaling. In this family, B7-H3 has recently been confirmed to show immune inhibitory functions in mouse models of carcinomas and has potential for immunotherapy targeting and anti-tumor immune reactivation. To identify B7-H3 associated proteins, immunoprecipitations were previously performed and midkine (MDK) was determined to be a prime candidate for interaction.

Hypothesis: B7-H3 is an inhibitory molecule of MDK produced by tumor microenvironments in order to decrease lymphocyte proliferation and infiltration.

Methods: Our goal in this project is to develop a protein complementation assay (PCA) to confirm the direct interaction of these proteins. To do this we can fuse complementary fragments of a reporter protein, Gaussia luciferase enzyme, to the proteins of interest, B7-H3 and MDK. We designed PCA to include B7-H3 and MDK complementary vectors, and we made primers to clone our genes into corresponding restriction sites of PCA vectors in the correct reading frame. Currently, we are carrying out the molecular cloning of both genes.

Results: Figure 1 depicts the successful production and isolation of midkine genes. Figure 2 depicts the successful production and isolation of B7-H3 genes. Lastly, Figure 3 demonstrates successful restriction enzyme digest of the future vectors to be used for gene insertion.

Conclusion: With each gene now purified and stored, the next steps include introducing these genes via restriction enzymes into the designed PCA vectors. These vectors can then be injected into E. coli cells where they can begin transcription and production of the desired proteins. MDK and B7-H3 proteins can be further isolated and purified from the samples for analysis of their structure and functional attributes. The proteins can then be applied to mammalian cells to test for any functional differences that may arise for clinical application into humans.



Abstract #145

Research Output among Dermatology Residency Candidates Pre- and Post-COVID-19 Pandemic Era

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Background: Recent research has indicated an increase in the number of research experiences and publications reported by successfully matched dermatology applicants.

Hypothesis: The number of research experiences and publications required for residency applicants to match to dermatology will continue to increase steadily over time.

Methods: Regression analysis of NRMP charting outcome data between 2007 and 2022.

Results: In 2022, the average number of publications and research experiences by matched dermatology candidates were 20.9 and 7.2. In 2035, the projected average number of publications and research experiences are expected to rise to 32.9 and 9.4, respectively.

Conclusions: By the year 2035, the required numbers of both research experiences and publications is expected to increase significantly for dermatology residency candidates.



Abstract #146

Socioeconomic Implications of Price Differences between Tinted and Non-Tinted Sunscreens

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Background: Recent research indicates an increase in available tinted sunscreen options marketed to consumers.

Hypothesis: Tinted sunscreen may cause increased economic burden to consumers when compared to non-tinted counterparts.

Methods: Record price per ounce of tinted versus non-tinted sunscreen counterparts from five popular skincare retailers (Ulta, Amazon, Target, Walmart, and Dermstore).

Results: Of the 156 products analyzed, tinted sunscreen was marketed at an increased price per ounce on average when compared to non-tinted products among all five retailers. Tinted sunscreen products were found to cost an average of 23% more when compared to non-tinted. Median cost of tinted sunscreen was \$17.64/ounce while median for non-tinted sunscreens was \$16.28/ounce.

Conclusions: Dermatologists must properly educate themselves about cost discrepancies and product options in order to attenuate financial burden for patients with skin of color.



Abstract #148

Early-Life Stressors and Their Prolonged Negative Effects on Adolescents

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All: Rocky Vista University College of Osteopathic Medicine - SU

Stress is defined as a process arising from real or perceived environmental demands that can be viewed as threatening or nonthreatening, depending on the availability of adaptive coping resources to an individual. Allostasis is the process that maintains homeostasis through mediators such as adrenaline, cortisol, and other chemical messengers. These stress mediators also contribute to allostatic overload. Allostatic overload is the harmful weathering on the brain and body that results from negative chronic stress. Although these allostatic processes are essential for survival, recurrent neurobiological responses to stress increase the chances of physical and mental health problems. This higher risk association may be crucial during times of fast brain development, such as in adolescents.

Chronic stress has a variety of negative effects on an individual's long-term health and well-being. Prolonged stress in adolescents is not just detrimental to the development of the brain but also increases the risk of future psychological illnesses and is indicative of future health disparities, as will be discussed later. Stress can manifest lifelong chemical and physiological changes through multiple mechanisms, including epigenetics.

Prolonged exposure to stressors, specifically during adolescence, is also strongly correlated to psychiatric disorders. Feedback systems such as the hypothalamic-pituitary-adrenal axis (HPA-axis) have antagonistic effects on other systems in our body. The HPA-axis release of cortisol also influences central neurotransmitters and other molecular signaling systems, such as dopamine and serotonin. Further expressions of stress include altered neurogenesis, neuroplasticity, and oxidative neuron-damaging that contribute to a plethora of negative long-term effects on an individual's well-being and mental health.

Early life stress exposure has numerous consequences on HPA-axis function in adulthood. This suggests that early stress management techniques in life may have a profound positive effect on health later on in adulthood.



Abstract #149

Diagnostic Ultra-sound in Juvenile Scleroderma

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Background:

Juvenile scleroderma (JS) is a rare chronic rheumatic condition associated with excessive production of collagen. Due to low incidence, JS has limited diagnostic and therapeutic options. In the last decade, interest in ultrasound (US) imaging as a clinical tool for diagnosis, monitoring treatment and activity of disease in JS has emerged.

Methods:

A literature review analysis was performed on data and clinical findings surrounding juvenile scleroderma and US using PubMed and Elsevier ranging from 2016 to 2022.

Results:

There is a lack of US imaging data solely focusing on juvenile scleroderma population which clinically differs from adult populations.

Conclusions:

Treatment modalities and monitoring techniques remain limited in JS. Currently, there are no standard procedures for US imaging as an established diagnostic tool. And mRSS in conjunction with ultrasonography, more specifically SWE and HFU, could potentially improve the methods of which JS can be detected earlier and for continued monitoring of disease progression.



Abstract #150

Pneumatosis Intestinalis Induced by Alpha-Glucosidase Inhibitors in Diabetic Patients

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Alpha-glucosidase inhibitor (α GIs)-induced pneumatosis intestinalis (PI) has been narrated in case reports, but never systematically investigated. This study aimed to investigate the concurrency of PI and α GIs. A literature search was performed in PubMed, Google Scholar, WorldCat, and the Directory of Open Access Journal (DOAJ), by using the keywords “pneumatosis intestinalis”, “alpha-glucosidase inhibitors”, and “diabetes”. In total, 29 cases of α GIs-induced PI in 28 articles were included. There were 11 men, 17 women, and one undefined sex, with a median age of 67. The most used α GI was voglibose (44.8%), followed by acarbose (41.4%) and miglitol (6.8%). Nine (31%) patients reported concomitant use of prednisone with or without immunosuppressants. The main symptoms were abdominal pain (54.5%) and distention (50%). The ascending colon (51.7%) and the ileum (34.5%) were most affected. Nineteen (65.5%) patients had comorbidities. Patients with comorbidities had higher rates of air in body cavities, portal vein, extraintestinal tissues, and the wall of the small intestine. Only one patient was found to have non-occlusive mesenteric ischemia. Twenty-five patients were treated with conservative therapy alone, and two patients received surgical intervention. All patients recovered. In conclusion, comorbidities, prednisone, and immunosuppressants aggregate α GIs-induced PI. Conservative therapy is recommended when treating α GIs-induced PI.



Abstract #151

Prevalence and Progression of Ametropias in Medical Students

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Background: Uncorrected refractive errors (Myopia, Hyperopia and Astigmatism) are one of the main causes of poor vision, attributing to 43% of vision deficiencies. Myopia is the most common visual disorder in the world and can progress up until the age of 20-25, when many people are in university. The etiological factors that cause myopia are still unclear and deserve to be studied.

Hypothesis: Our aim was to identify the prevalence of ametropias and self-perception of ophthalmic health in medical students at the Centro Universitário Saúde ABC/FMABC. **Methods:** This is a cross-sectional study with data collected at Centro Universitário Saúde ABC/FMABC from medical students. A total of 232 students participated in the survey, from the 1st to the 4th year of study. Data was obtained through a questionnaire, which evaluates ophthalmologic health, ametropia, and self-perception.

Results: It was observed that 74.57% of the students had some type of ametropia, myopia being the most recurrent (59.05%). The study shows significant data of an increase in the grade of students from 1st to 4th grade throughout college. It was observed that the average daily study time of the students was 9.68 hours and abuse in the use of electronic devices.

Conclusion: This study presented a high prevalence of ametropias among medical students at the Centro Universitário ABC/FMABC, in addition to a high prevalence of multifactorial myopia and an increased need to update their diopters (degrees) during the course of university.



Abstract #152

Effects of Oral Probiotics on the Skin Microbiome of Healthy Individuals

*SD Jason L. Steele; SD Christian S. Earl; SD Aryunzaya Jones; SD Alexander K. Matthias
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Background:

The human microbiome is a collection of site-specific microbiomes (e.g., the gut, skin, lungs, nasal, oral, etc.). While this complexity is now recognized, fundamental questions about the nature and influence of site-specific human microbiomes on other disparate site microbiomes remain unknown. Previous studies have demonstrated that an immune-mediated connection exists between the gut and skin (gut-skin axis). This suggested connection has led to a host of studies exploring the use of probiotics in a therapeutic capacity to reduce the symptoms of a variety of dermatological conditions. Unfortunately, while the literature demonstrates the utility of probiotics in GI and skin microbiome disturbances, little work (Szántó et al.) has been done specifically observing the effect of probiotics on the skin microbiome of healthy individuals.

Hypothesis:

We hypothesized that a 30-day course of an oral probiotic would alter the skin microbiome in healthy individuals.

Methods:

Healthy participants were recruited based on inclusion and exclusion criteria. Each had their forearm and forehead swabbed to create a baseline microbiome sample. They then took a commercial oral probiotic containing *Saccharomyces boulardii* for 30 days while maintaining current hygiene practices. They then returned for collection of a second set of skin microbiome samples. Microbiome sample analysis using 16S rRNA sequencing was then conducted and statistical data analysis was performed.

Results:

As a group, a two-way PERMANOVA test showed no difference between the baseline and post-treatment samples ($p=.9927$, Euclidean Similarity Index). No distinct trends were observed when the results were analyzed by species, with some individuals showing an increase and others a decrease irrespective of baseline population.

Conclusions:

Based on the results of our study, we are unable to determine if the 30-day course of probiotics caused a change beyond normal month-to-month variability. Future iterations of the study will need to establish an extended baseline to determine each participant's short-term variability prior to taking oral probiotics. Additionally, increased numbers of participants will be required.



Abstract #153

Cordyceps Improve Insulin Resistance and Hepatic Steatosis via Inhibition of Intrinsic Ceramide Biosynthesis

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Ectopic ceramide aggregation in insulin-sensitive tissues plays an important role in impaired insulin sensitivity and development of obesity. Previous studies in mice have shown that a pharmacological inhibition of key enzymes in the ceramide synthesis pathway results in improved insulin sensitivity and related metabolic indices. Serine palmitoyl transferase (SPT) is one of the essential enzymes in this pathway that is potently inhibited by myriocin. Myriocin was originally extracted from the fungus *Isaria sinclairii* and has been established to be present in large amounts in closely related fungal species such as the Cordyceps. Currently myriocin is not approved for human use but has been routinely consumed as part of traditional Chinese medication from extracts of Cordyceps. We hypothesized that because myriocin is extracted from Cordyceps, it may be a key bioactive ingredient and that reductions in ceramide biosynthesis might account for the beneficial effects of Cordyceps on energy metabolism and uses in treatment of diseases such as diabetes. We screened commercially available extracts consumed by humans and tested the degree to which they improved energy and glucose homeostasis in obese mice. We demonstrated that these extracts contained variable amounts of myriocin and that the treatment of the Cordyceps extracts to mice resulted in a reduction of ceramide accumulation, increased energy expenditure, improvement in glucose homeostasis, resolved hepatic steatosis, and prevented diet-induced obesity. These findings indicate that myriocin containing Cordyceps extract inhibit ceramide biosynthesis and attenuate metabolic impairments related to obesity. In addition, they identify Cordyceps as a potential supplement to treat obesity and other metabolic disorders.



Abstract #155

One for the Ages: Advanced Glycation End Products Cross-Link Collagen Fibers in the Dermis Changing the Extra-Cellular Matrix Architecture Leading to Impediment of 3D Macrophage Migration and Prolonged Healing in Diabetic Foot Wounds

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According to the CDC, a total of 37.3 million (11.3%) people within the United States have been diagnosed with diabetes mellitus (DM).¹ In 2018, 154,000 individuals diagnosed with DM had to undergo a lower-extremity amputation due to a complications of their disease.¹ A common complication leading to lower-extremity amputation in these patients is development of a non-healing diabetic foot ulcer. In the case of an ischemic limb leading to ulceration, 12 months after re-establishment of blood flow to the lower limbs leads to 85% limb salvage; however, this doesn't guarantee complete healing of the initial wound or stop the development of a new wound.² Given this, it is important to continue researching the molecular mechanisms of the pathology of diabetic foot ulcers to potentially find a therapeutic target to supplement golden standard treatments. In this review, advanced glycation end products' (AGEs) influence on 3D macrophage migration through tissues will be investigated. We hypothesize that AGEs cross-link collagen fibers within the dermis of the skin leading to stiffened and non-compliant dermal architecture. This new architecture of the dermis, therefore, impedes 3D migration of macrophages through the dermis during wound healing. To adapt to this change, macrophages transition to mesenchymal 3D migration; however, AGEs persist within tissue leading to a detrimental feedback loop of increased metalloproteinases (MMPs) and a prolonged pro-inflammatory state. Through this literature review, the goal is to understand this potential mechanism more and explore possible drug targets to aid in wound healing within this patient population.



Abstract #156

Case Report of Incidentally Discovered Metastatic Renal Cancer in a Fighter Pilot

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Introduction: Renal Cell Carcinoma (RCC) is an insidious cancer that is often discovered via incidental imaging in the late stages of the disease because most patients are asymptomatic, and the cancer has a high metastatic rate. It is a relatively uncommon malignancy with some 7.1 cases per 100,000 persons in the United States. This case describes such a classic presentation but found in a highly selective and monitored population with an Air Force fifth-generation fight pilot diagnosed with RCC by way of x-ray for complaints of lower back pain.

Case Report: This patient is a 41-year-old white male active duty fifth-generation fighter pilot. He has a history of chronic hip and back pains. Patient reported acute on chronic pains in 2018 and x-rays were obtained. Lumbar x-ray showed stippled calcifications overlying the left renal shadow with otherwise normal bowel and bones. A follow up CT scan showed a mass with internal calcifications of the left kidney. Patient was referred to nephrology where nephrectomy was performed, and biopsy confirmed RCC. Approximately two years later, a surveillance MRI showed metastatic disease to the lung and patient started immunotherapy. Patient continues to follow up with oncology as of this report and has relatively stable symptoms.

Discussion: RCC has a variety of first line treatment options depending on tumor mutations and metastasis. For patients with good to intermediate prognosis these consist of sunitinib. Sunitinib is a tyrosine kinase inhibitor, an anti-angiogenic VEGF target that inhibits the growth of tumors due to vascular growth inhibition.

Air Force pilots have a 69% lesser chance of being diagnosed with renal cancer than the general population. The fiscal loss of a fifth-generation fighter pilot is significant with training costs alone is \$10.9 million to basic level. Our pilot was experienced in which likely incurred costs to train of estimated \$30 million. This case highlights the need to continue close monitoring of this patient population. Despite the loss of the remaining years of flying, the patient's life was likely saved from runaway metastatic cancer which allowed him to provide additional years of innumerable service to the Air Force.



Abstract #157

Pre-Cesarean Screening to Reduce Opioid Use In Patients High-Risk for Depression

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Introduction:

Patients that deliver via cesarean-section compared to spontaneous vaginal delivery are six times more likely to develop postpartum depression. Opioids are commonly prescribed for post-operative pain management and are known to potentiate symptoms of depression.

Materials/Methods/Results:

We performed a literature review looking at opioid use potentiating symptoms of depression and further investigated screening tools for identifying symptoms of major depression. Screening and monitoring for postpartum depression can be done via a PHQ 2 exam. A PHQ 2 with a score higher than 2 indicates major depression in 86% of participants and should be confirmed with a PHQ 9 exam. Literature review results support the premise that opioid use should be avoided to prevent exacerbation of postpartum depression.

Conclusion/Discussion:

We propose the use of pre-procedural screening and monitoring tools to identify patients at high risk for developing depression. Opioid use should be avoided in these patients to decrease the risk of exacerbating depressive symptoms. Once high-risk patients have been identified, the use of alternative pain management other than opioids should be considered. Further research is needed to confirm/reject that these alternative post-cesarean pain management methods may reduce the risk of exacerbating postpartum depression.



Abstract #158

Psychological Distress and Urological Symptom Prevalence in the Pediatric Population

Logan B Wesemann; Kelly Dinh

Children and adolescents with lower urinary tract symptoms (LUTS) tend to have more emotional and behavioral problems, exhibiting higher levels of anxiety and difficulty concentrating compared to those without this condition. Furthermore, higher incidence of urinary symptoms have been documented relating to sexual abuse in children. The increased susceptibility of children to urinary symptoms is related to various factors including but not limited to: psychological, social, and behavioral factors. With the rise of antibiotic resistance, there is an increasing need for preventing and treating the underlying cause of urinary symptoms. Various alternative therapies exist to treat the physical urinary symptoms, but often fail to decrease the frequency of complications, recurrence, and use of antibiotics. The question at hand is if the frequency of urological complications and recurrence could be related to environmental and psychological stressors. If so, an emphasized addition of an osteopathic/whole-body approach to the current treatments of urinary health in children would be warranted. Taking into consideration children's mental health in urological visits could address the underlying cause of recurrence and complications, thus decreasing antibiotic use and resistance. This literature review began with a broad focus on the connection between recurrent UTI's and ethnic background but narrowed as it became more clear the rising interest in the pediatric population and psychological distress. Using this information, we wanted to connect psychological distress with physical illness, specifically urinary bladder symptoms in the pediatric population. Consideration of current trends and data in various research demonstrates a connection between psychological distress and physical ailment, including research relating psychological distress to urological symptoms and disorders in the pediatric population. Multiple studies point to the impact of psychological and environmental stressors on the frequency and exacerbation of urinary tract symptoms. Clinicians may limit therapeutic response if only physical symptoms are taken into consideration in these patient visits. This review is a first step toward providing a more complete view of the pediatric patient and associated urological symptoms.



Abstract #159

Defining the MCID, PASS, and SCB for Patients Undergoing Hip Arthroscopy with Periacetabular Osteotomy at Minimum 1-Year Follow-Up

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Background: Hip arthroscopy (HA) with concomitant periacetabular osteotomy (PAO), HA+PAO, has been shown to have favorable outcomes for treatment of hip pathology in the setting of acetabular dysplasia. Mid to long-term studies have shown statistically significant improvement in pain and function following HA+PAO. Metrics to assess clinical significance including minimally clinically important difference (MCID), patient acceptable symptomatic state (PASS), and substantial clinical benefit (SCB) remain sparsely defined for HA+PAO. The purpose of this study is to define the MCID, PASS, and SCB values using PROMIS and iHOT-12 in patients undergoing HA+PAO with minimum 1-year follow up.

Hypothesis: We hypothesize that patients will show significant improvement meeting these measures after HA+PAO.

Methods: Inclusion criteria were all patients with radiographic and clinical data and the diagnosis of hip dysplasia or instability undergoing HA+PAO with minimum 1-year PROMs. Outcome measures including the iHOT-12 and PROMIS computer adaptive tests (CAT): Physical Function (PF), Pain Interference (PI), and Global Physical Health (GPH) were collected. MCID was evaluated utilizing a distribution-based method based on $\frac{1}{2}$ standard deviation of the preoperative means. PASS was calculated based on responses to the anchor question "How satisfied are you with your hip procedure?" SCB was calculated via ROC curve analysis.

Results: The study included 106 patients (94% female) with a mean age of 23.5 ± 6.6 years. 1-year mean MCID was calculated to be 40.9, 40.7, 60.2, and 43.5 for iHOT-12, PROMIS-PF, PROMIS-PI, and PROMIS-GPH respectively ($P < 0.01$). The percent achieving MCID at 6 months and 1-year were as follows respectively: iHOT-12 (74.19, 87.05); PROMIS-PF (71.59, 85.71); PROMIS-PI (69.3, 81.81); PROMIS-GPH (68.5, 73). At 1-year follow-up, ROC analysis found the iHOT-12, PROMIS PF and GPH Scales were able to identify those 100% satisfied from those 90% or less satisfied. PASS scores for 100% were 79.9, 49.3, 51.8, and 52.5 for iHOT-12, PROMIS-PF, PROMIS-PI, and PROMIS-GPH respectively.

Conclusions: Our study defines MCID, PASS and predictive scores of achieving 100% satisfaction. The iHOT-12 and PROMIS PF were more accurate in identifying those 90 and 100% satisfied at 1-year follow-up from HA+PAO than the PROMIS GPH. There was no difference between the iHOT-12 and PROMIS-PF.



Abstract #160

Antibacterial Activity of Fungal Endophytes: A Systematic Review

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Despite efforts to limit antibiotic use in the 21st century, multidrug-resistant bacteria remain a significant cause of morbidity and mortality in the United States and the world. The Centers for Disease Control and Prevention estimates 2.8 million infections, and 35,000 deaths occur every year due to multidrug-resistant bacteria. Novel antibiotic discovery remains one of the world's best measures to combat drug-resistant infections. Fungal endophytes found within their symbiont plants remain an understudied yet promising and abundant source of novel antibiotics. A systematic review of fungal endophytes and their secondary metabolites was conducted. A total of 63 studies since 2017 described antibacterial activity against gram-positive and gram-negative bacteria including Methicillin-Resistant *S. aureus*, *P. aeruginosa*, and *M. tuberculosis*. Many of these studies isolated novel secondary metabolites that are possible new drug isolates. Based on these results, further research into the microbiome of plants remains a promising new frontier in the fight against multidrug-resistant bacterial infections.



Abstract #161

Cage Enrichments Negatively Impact the Reproductive Brain in Male Mice

Hugh Zhang

The vertebrate reproductive brain comprises neurons that secrete gonadotropin-releasing hormone (GnRH) as well as their afferents/efferents. Increasing evidence suggests that the reproductive brain, like the cognitive brain, can respond to various forms of enrichment cues to alter its functions. Since enrichment cues provide sensory cues that may be processed differently by different neurocircuits, we hypothesize that the same enrichment may have highly divergent effects on different brain functions. The objective of this study was to examine if cage enrichments known to benefit the cognitive brain were also beneficial to the reproductive brain and downstream gonadal function in male mice. To test this, male mice were treated at the time of weaning on postnatal day (PN) 20 with either (1) no cage enrichments or (2) combined cage enrichments of nestlets, egg cartons, and igloos. Animals were sacrificed on PN35 and PN50 and assessed for reproductive hormone levels and gene expression as well as testicular histology. Cage enrichments did not significantly affect the expression of GnRH and KiSS1, an upstream stimulator of GnRH neurons, on PN35, but significantly decreased the expression of both genes on PN50. The expression of fibroblast growth factor 2, a factor known to enhance neural plasticity, in the preoptic area was also significantly decreased by enrichments. However, hypothalamic GnRH and pituitary luteinizing hormone (LH) stores were not significantly altered. Serum LH content as well as testicular morphology and spermatogenic function were also not altered by cage enrichments. These results suggest that environmental enrichments may not consistently have positive effects on all brain functions. Further, the negative impact of cage enrichments on the reproductive brain was manifested only in older animals with longer enrichment exposure, suggesting this is a slow process that may need more time to secondarily inhibit pituitary and testicular functions. Overall, the same enrichment cues may exert neurocircuit-specific effects, leading to highly variable outcomes depending on the brain region examined.



Abstract #162

Pain Improvement Post Percutaneous Tenotomy with Tenex Tool for Calcific Tendinitis

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Background: Calcific tendinitis is a common cause of shoulder pain. Current treatment options include steroid injection, shockwave therapy, physical therapy, and ultrasound-guided lavage. Tenex is a novel tool used for percutaneous tenotomy that may be utilized to improve range of motion and functionality as well as decrease pain in patients with calcific tendinitis via ultrasound-guidance. Tenex uses ultrasound technology to break down calcium crystals while aspirating the debris simultaneously.

Hypothesis: Percutaneous tenotomy of the shoulder using the Tenex tool with ultrasound guidance will improve range of motion and functionality for patients and decrease reported pain.

Methods: Patients diagnosed with calcific tendinitis of the shoulder were treated using ultrasound-guided percutaneous tenotomy with Tenex. For pain assessment, a pain score survey was created based on the UCLA shoulder pain score. The responses will be collected via Survey Monkey. Statistical significance for pain improvement will be determined.

Results: Pending survey responses. **Conclusions:** We anticipate demonstrating the efficacy of the Tenex tool for ultrasound-guided percutaneous tenotomy in shoulder calcific tendinitis, thus supporting its use by orthopedic surgeons for minimally invasive treatment of this condition.



Abstract #163

Genetic Disorders and Aortic Dissection: The Man with an Air Compressor in His Chest

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Introduction: Type A aortic dissection is a rare but lethal medical emergency with an incidence of 3-4 per 100,000. The 30-day mortality rate is 47.4% in those who survive to hospital admission. The International Registry of Acute Aortic Dissection states Marfan syndrome is identified in 4.5% of Type A dissections. Marfan Syndrome is an autosomal dominant disease characterized by a tall slender body habitus with associated ocular and cardiovascular involvement. Mutation in the fibrillin-1 (FBN1) gene is a key finding with aortic dissection being the most concerning complication. **Case Presentation:** We present a case of a 52-year-old white male who presented to the emergency department with a chief complaint of pressure in his chest. Presenting vitals: temperature of 36.7C, heart rate 50, respiratory rate 14, O2 saturation of 99% on RA, and brachial blood pressures of 116/42 mmHg on the left and 78/50 mmHg on the right. Initial appearance: anxious, but no acute distress. EKG, CBC, CMP, and troponin S were obtained, all within normal limits. CT chest/abdomen/pelvis angiogram with IV contrast revealed an extensive Type A aortic dissection involving the base of the aortic root extending through the thoracic and abdominal aorta into both common iliac arteries to the level of the iliac artery bifurcation bilaterally. The dissection extends into the right innominate and left common carotid arteries, celiac axis, SMA, left renal artery, and base of the IMA. **Diagnosis** of Type A aortic thoracoabdominal dissection was made and emergency surgery performed. The patient was later diagnosed with Atypical Marfan Syndrome. **Discussion:** In this case, the diagnosis of Atypical Marfan Syndrome was made after presentation to the ED. Findings prior to dissection include bifid uvula and celiac artery aneurysm. It's unclear if aneurysms of medium-sized arteries occur more frequently with Marfan Syndrome; however, there are reports of patients diagnosed with Marfan Syndrome with aneurysms of the celiac artery. Findings elucidated from the literature and this case highlight gaps in knowledge of the presentation of Marfan Syndrome. Gaining a better understanding of atypical presentations can lead to prevention of emergent situations as what happened in this case.



Abstract #164

Hydration Status and Cognitive Performance Among Medical Students

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Hypothesis: Hypohydration will have an adverse effect on cognitive performance in medical school students. **Hypothesis:** Hypohydration will have an adverse effect on cognitive performance in medical school students **Background** Medical students and practicing physicians are constantly challenged to think critically through regularly tested patient interactions and licensing exams. Success in healthcare relies heavily on cognitive capability. The effects of hydration status on cognitive performance of healthcare providers have not been thoroughly investigated like sleep and stress. Studies indicate minor changes in hydration can affect memory and attention in certain populations. With high demand for cognitive capability in medical students and physicians, minor changes in hydration status could potentially have significant effects on cognition and patient outcomes. Maintaining proper hydration is a simple yet overlooked measure that may improve medical student and physician performance. **Methods** Seventy-two (72) medical students enrolled at Rocky Vista University were randomized in an experimental study to assess effects of hydration status on cognition. Students fasted from foods and liquids for 9 hours and were randomly separated into hydrated and non-hydrated groups of 36 each prior to administration of cognitive tests. The hydration group was provided with 500 ml of water before testing began, while the non-hydrated group continued their fast. Students were tested in three cognitive assessments: short-term memory, working memory, and focused attention. **Results** Performance of the hydrated and non-hydrated groups on the Conceptual Span, Eriksen Arrow and Sternberg Tasks were evaluated through the Generalized Linear Models with Task scores and timings set as dependent variables and the groups and other factors (hours of sleep, class year...etc.) set as independent variables. Hydration status had no significant effect on cognitive performance in any of the tests administered, although significance difference was found in the focused attention Eriksen Arrow task with class years. **Conclusion** This study found no significant differences in cognitive performance between the hydrated and non-hydrated groups. Future studies could address limitations of this study as well as effects of age, BMI, diet, and mood cognition. The need for high level cognitive performance in physician training and in patient care is critically important. Further research aimed at identifying opportunities to improve student and physician performance are warranted.



Abstract #165

Effects of Oral Probiotics on the Skin Microbiome of Healthy Individuals

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Background: The human microbiome is a collection of site-specific microbiomes (e.g., the gut, skin, lungs, nasal, oral, etc.). While this complexity is now recognized, fundamental questions about the nature and influence of site-specific human microbiomes on other disparate site microbiomes remain unknown. Previous studies have demonstrated that an immune-mediated connection exists between the gut and skin (gut-skin axis). This suggested connection has led to a host of studies exploring the use of probiotics in a therapeutic capacity to reduce the symptoms of a variety of dermatological conditions. Unfortunately, while the literature demonstrates the utility of probiotics in GI and skin microbiome disturbances, little work (Szántó et al.) has been done specifically observing the effect of probiotics on the skin microbiome of healthy individuals.

Hypothesis: We hypothesized that a 30-day course of an oral probiotic would alter the skin microbiome in healthy individuals.

Methods: Healthy participants were recruited based on inclusion and exclusion criteria. Each had their forearm and forehead swabbed to create a baseline microbiome sample. They then took a commercial oral probiotic containing *Saccharomyces boulardii* for 30 days while maintaining current hygiene practices. They then returned for collection of a second set of skin microbiome samples. Microbiome sample analysis using 16S rRNA sequencing was then conducted and statistical data analysis was performed.

Results: As a group, a two-way PERMANOVA test showed no difference between the baseline and post-treatment samples ($p=.9927$, Euclidean Similarity Index). No distinct trends were observed when the results were analyzed by species, with some individuals showing an increase and others a decrease irrespective of baseline population.

Conclusions: Based on the results of our study, we are unable to determine if the 30-day course of probiotics caused a change beyond normal month-to-month variability. Future iterations of the study will need to establish an extended baseline to determine each participant's short-term variability prior to taking oral probiotics. Additionally, increased numbers of participants will be required.



Abstract #166

Amyloid Pet Scanning for Alzheimer's Disease Diagnosis Remains Effective Despite Retracted Studies

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Lack of specificity is a significant weakness in many Alzheimer's disease (AD) diagnosis methods. This includes amyloid PET scans, which uses radioactive ligands that bind to amyloid beta ($A\beta$) plaques as a basis for image generation, suggestive of AD. Retraction of a series of studies associating AD with the oligomer $A\beta^{*56}$ could question fundamental theories of AD pathophysiology; specifically, the theory of $A\beta$ plaque association with AD. Amyloid PET scanning is based on this theory and its lack of specificity could be seen as an additional challenge. Analysis of the retracted study and diagnostic criteria for AD, including amyloid PET scanning, was performed to identify usefulness of amyloid PET scanning for AD diagnosis. A literature review was performed on the discredited study and relevant news reports, and its relevance to underlying AD pathophysiology and diagnosis. This provides an overview of diagnostic criteria for AD with a diagnostic tree showing methods involved in diagnosis, amyloid PET scanning, how it operates, and the specific radiotracers and their mechanisms of action. A molecular analysis of the literature was performed to identify potential issues with the diagnostic accuracy of amyloid PET scanning for AD. Based on our analysis, no significant association can be drawn between falsified data for the specific $A\beta$ oligomer $A\beta^{*56}$ and amyloid PET scanning in AD diagnosis.



RESEARCH COMPETITION JUDGES

Colorado Judges:

Janna Oaks, PhD
Rebecca Ryznar, PhD
Isain Zapata, PhD
Kay Hill, MA
Heather Ferrill, DO
Mike Jorgensen, PhD
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Jennifer Hellier, PhD
Matthew McEchron, PhD
Jean Bouquet, DO
Elizabeth Moffett-George, PhD
Leslie Torgersen, MD
An Dang, PhD
Kelly Ostrofsky, PhD

Utah Judges:

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Steve Harmon, DO
Benjamin Brooks, PhD
Dean Gubler, DO
Keith Bodrero, DO
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Ricarda Hallstrand, PhD
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Handwriting practice lines consisting of 28 horizontal blue lines.



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