Proceedings From the 2025 Mountain West Research Summit

Edited by Alfred Amendolara DO MS, Christina Small MS, Ryan Powers, David Sant PhD, *&* John Kriak PharmD

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September 30, 2025

Preface

We are pleased to present this conference program containing select abstracts from the 2025 Mountain West Research Symposium, which took place on May 9th, 2025. This symposium showcased student and faculty research at NoordaCOM and surrounding institutions and has been growing rapidly over the past several years. Out of several hundred abstracts in total, these thirty-two have been selected as outstanding contributions by a team of symposium judges as well as editors at *Intermountain Journal of Translational Medicine.*

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Contents

1. Suggested Citation Structure

The following citation structure has been provided in AMA format and is the recommended way to cite individual abstracts.

Authors. Article Title [Abstract Number]. *Journal Title.* **Year;Volume(issue): page numbers.**

- Author names should be listed as Last Name First Initial.
- Abstract numbers can be found before titles in this document (**ex**. BMS 01) . Please note that these numbers are specific to this program are are not related to any number you may have received previously i.e., for submission or presenting at the symposium.
- For *journal title* we suggest using the shortened version of *Intermountain Journal of Translational Medicine* which is: *IMJ Translational Med.*
- This program is Volume 2 Issue 1 Supplement 1.

Ex: Kassel B, Uribe A, Ramana K. Natural plant-based steroid compound, Laxogenin, prevents hyperglycemia-induced endothelial dysfunction [BMS 01]. *IMJ Translational Med.* 2025;2(1 Supplement 1):6.

2. Biomedical Science

2.1. BMS 01: Natural plant-based steroid compound, Laxogenin, prevents hyperglycemia-induced endothelial dysfunction

Brandon Kassel*[1], Alyssa Uribe*[1], Kota V Ramana[1]

1. Noorda College of Osteopathic Medicine

*Authors contributed equally

Purpose: Diabetes afflicts hundreds of millions worldwide and predisposes populations to additional risks such as cardiovascular diseases. Endothelial dysfunction is highlighted among the early stages of cardiovascular disease and progresses significantly under hyperglycemia. Prolonged high glucose levels are known to increase reactive oxygen species (ROS) levels, leading to the breakdown of support structures that play a pivotal role in endothelial integrity. The resulting risks for atherosclerosis, coronary artery disease, heart failure, and stroke pose a threat to those living with diabetes. 5α-Hydroxy Laxogenin is a plant-derived natural compound with potential benefits for diabetes management. It improves insulin sensitivity, regulates glucose metabolism, reduces inflammation and oxidative stress, protects pancreatic beta cells, and enhances mitochondrial function. However, its role in endothelial dysfunction is not well known. This study aims to investigate the effect of Laxogenin in high glucose-induced endothelial dysfunction.

Methods: Human umbilical endothelial cells were treated with various concentrations of Laxogenin (0-100 µg/ml) in the presence and absence of high glucose (25 mM) for 24 hours. Cell viability was determined by MTT assay. Specific kits will be used to determine ICAM, VCAM, and iNOS levels. Next, we will also determine the generation of reactive species, nitric oxide, activation of NF-kB, and expression of inflammatory markers.

Results: Our results suggest that Laxogenin prevents high glucose-induced apoptosis of endothelial cells in a dose-dependent manner. Additional experiments are being conducted to understand its mechanism of action in restoring hyperglycemia-induced endothelial dysfunction.

Conclusions: Plant-derived natural steroidal compound Laxogenin prevents hyperglycemia-induced endothelial activity.

2.2. BMS 02: The Bacteriome of Fifth Water Hot Springs: A Genomic & Public Health Perspective

Ethan Powers[1], Zach Galbraith[1], Clayton Rawson[1], Trever Thurgood[2]

1. Noorda College of Osteopathic Medicine
2. Utah Valley University

Geothermal hot springs provide unique microbial habitats characterized by extreme temperatures, variable pH, and diverse geochemical conditions. This study investigates the microbial diversity of three hot spring-related locations in Diamond Fork Canyon, Utah—Diamond Fork Warm Springs, Fifth Water Hot Springs, and Monk's Hollow Trailhead. Our interests were sparked by the strong smell of sulfur near the springs and two incidences of local residents

who died in the hot springs-though forensic investigations by police reveal underlying health issues as causes of death. Utah Health Department has also reported toxins in the spring water that are most likely from algae. This research is the launch of a series of projects to compare the microbiomes of hot springs in Utah. Our methods included Oxford Nanopore MinION sequencing of the 16S rRNA gene. Samples were collected and analyzed to identify the bacterial composition, with a focus on potential opportunistic pathogens. Our results revealed a diverse bacterial community, including members of *Pseudomonas*, *Comamonas*, *Helicobacter*, and *Flavobacterium*, some of which are known for biofilm formation, antibiotic resistance, and pathogenic potential. The presence of *Helicobacter bilis* and *Helicobacter mustelae*, both associated with gastrointestinal diseases, highlights potential public health concerns for recreational visitors. Species of *Helicobacter bilis* and *Comamonas testosteroni* have exhibited traits linked to antimicrobial resilience and opportunistic infections. *Plankothrix agardhii* and *Anabaena cylindrica* are cyanobacteria that has recently had algae blooms of toxins at the site. These findings contribute to a better understanding of microbial ecology in geothermal environments and underscore the need for further research on the potential health risks posed by bacteria inhabiting hot spring ecosystems. This project focused on the bacteria of this hot spring and our future research will include other aspects of the hot spring including the resident flora of archaea, fungi, and viruses.

2.3. BMS 03: Leucine Lock: A Diagnostic Tool to Revolutionize Rapid Antigen Testing

Kaitlyn Robinson[1], Matt Goff[1], Caroline Cook[1], Jonathon Hill[1]

1. Brigham Young University

Many current rapid diagnostic tests are limited by the requirement for a sample to contain a high antigen load, thereby reducing the antigens that can be promptly detected. The Leucine Lock system addresses this limitation by creating a system capable of qualitative and quantitative antigen detection. In order to achieve specific and high-resolution antigen detection, the Leucine Lock testing method consists of a bipartite protein sensor system with each protein engineered to contain an antigen binding domain, a leucine zipper, and a split reporter system. This system uses the proximity-based dimerization of leucine zippers to detect the presence of low concentrations of an antigen of interest, significantly expanding the range of detectable antigens. Having demonstrated successful qualitative results of the dimerization of the Leucine Lock system within a solution, our efforts now focus on applying this technology to the quantitative detection of low-concentration antigens. Our current antigen targets are the small peptides insulin and klotho. The insulin sensor is in development for insulin resistance testing, and the klotho sensor is designed as a test for klotho as an indicator of chronic kidney disease. Overall, the Leucine Lock system allows for an enhancement in the sensitivity of rapid testing, enabling the detection of antigens at low physiological concentrations and increasing the number of diseases that can be tested via rapid testing. Moreover, the Leucine Lock system provides quantitative results about antigen load, increasing data available at diagnosis and allowing for greater confidence and reliability of rapid diagnostic tests. Additionally, this system can easily be changed in the future to test for a wide variety of antigens of interest.

2.4. BMS 04: Cardamomin prevents LPS-induced cytotoxicity and arachidonic acid metabolism in macrophages

Ahmad Amanullah[1], Areeb Shareef[1], Kota V Ramana[1]

1. Noorda College of Osteopathic Medicine

Purpose: Although antibiotics kill the bacteria during the infections, the bacterial debris containstoxins that initiate immune and inflammatory responses, leading to uncontrolled production of inflammatory cytokines, chemokines, and growth factors. These factors, through autocrine and paracrine manner, propagate inflammatory signaling, leading to tissue damage and dysfunction. Lipopolysaccharides (LPS), a key component of the Gram-negative bacterial outer membrane, are potent endotoxins that activate immune responses, resulting in severe inflammation.Arachidonic acid metabolism is a key pathway activated during this inflammatory response, producing mediators such as prostaglandins, prostacyclins, and leukotrienes, exacerbating inflammation and contributing to tissue damage. Cardamomin, a natural chalcone found in various plant species such as Alpinia katsumadai and Boesenbergia rotunda, has demonstrated various pharmacological properties, including anti-inflammatory and antioxidant effects. However, its specific impact on arachidonic acid metabolism in the context of LPS-induced inflammation remains unexplored. This study explores the potential of Cardamomin as a therapeutic agent by examining its regulatory effects on LPS-induced arachidonic acid metabolism, providing insights into its efficacy in mitigating inflammation and associated complications.

Methods: Human monocyte-derived macrophages (Thp1) cells were grown and maintained in DMEM media. Cells were treated with LPS in the absence and presence of different concentrations of cardamon. Cell viability was determined by MTT and live and dead cell assay kits. DCFDA staining will determine the generation of reactive oxygen species. Specific assay kits will determine the activation of NF-kB, cyclooxygenase, and thromboxane synthase and the production of prostaglandins, prostacyclins, and leukotrienes.

Results: Our results so far indicate that Cardamomin alone has no effect on the Thp1 cells' growth. However, it prevented the LPS-induced cell death. Further experiments are currently in progress.

Conclusions: Cardamomin prevents LPS-induced cytotoxicity. Additional mechanistic studies are in progress.

2.5. BMS 05: A Morphological Investigation of Alcohol-Induced Persister Formation

Isaac Young[1], Ryan Newman[1], Diane Sun[1], Lamia Alam[1], Victor Jimenez Jr.[1]

1. Noorda College of Osteopathic Medicine

Persister cell bacteria are of ongoing interest in both the scientific and medical fields for their characteristic ability to survive antibiotic drug regimens, uphold recurrent infections, and survive antiseptic treatments. While there are several proposed mechanisms for persister cell formation and survival, the current study focused on evaluating alcohol as a persister cell-inducing stress compound. After inducing persister cells with alcohol (0%-5% v/v EtOH),

growth curves were performed for *Escherichia coli*, *Staphylococcus epidermidis*, and *Neisseria sicca*. Bacterial colony density was evaluated using spectrophotometry and measured with optical density (OD 600nm). The growth curves highlighted alcohol-induced persister cell growth trends and elucidated a persister cell growth threshold of 4% alcohol. Following the growth curves, antibiotic dose-dependent curves were tested on 4% alcohol-induced persister cells using different mechanism targeting antibiotics such as penicillin G., tetracycline, and moxifloxacin. The major findings of the antibiotic trials include elevated susceptibility to the antibiotic treatment in all groups apart from *S. epidermidis*, which, when treated with moxifloxacin, saw an increase in resistance evident by the 0.1-0.2 OD increase in the persister cell group. Furthermore, being the only strain to report increased resistance, *S. epidermidis* was the subject of investigation for membrane potential changes with alcohol exposure in addition to high (1024mg/L) and low (32mg/L) doses of moxifloxacin. The ensuing flow cytometry data revealed that together, alcohol-induced persister *S. epidermidis* colonies showed more depolarization compared to untreated *S. epidermidis* colonies (red/green ratio of 0.1 and 5 respectively). Yet, the persister cells treated with subsequent antibiotic saw a rebound polarization trend. This process may be a critical tool exercised by persister cells as a method of tolerance in response to physical or chemical stress. Ultimately, variability within the source of persistence-inducing stress may play a significant role in persister cell morphology and survival. Based on the chemical stress that induces persistence, morphological features may fluctuate drastically, constructing a heterogeneity of antibiotic tolerances, membrane potentials, and other morphological alterations. With the objective of fully characterizing persister cells, it is clear that morphological investigations of persister cells are critical to improving antibacterial regimens for patients and combating chronic infections worldwide.

2.6. BMS 06: Psilocybin and Psilocin Regulate Microglial Immunomodulation and Support Neuroplasticity via Serotonergic and AhR Signaling

Salma Laabi[1], Claire LeMmon[1], Callie Vogel[1], Mariana Chacon[1], Victor Jimenez Jr.[1,2]

1. Noorda College of Osteopathic Medicine
2. Roseman University of Health Sciences

Background: Psilocybin, a serotonergic psychedelic found in "magic mushrooms", has demonstrated therapeutic potential in neuropsychiatric disorders, including major depressive disorders, posttraumatic stress disorder, and pain management. While its neuroplastic and immunomodulatory effects are recognized, the underlying mechanisms remain unclear. This study investigates how psilocybin and its active metabolite, psilocin, influence microglial inflammatory responses and neurotrophic factor expression through serotonergic and AhR signaling.

Methods: *In vitro* models of resting and LPS-activated microglia were used to investigate the effects of psilocybin and psilocin on the expression of pro-inflammatory cytokines (TNF-α), antiinflammatory cytokines (IL-10), and neuroplasticity-related markers (BDNF). Receptor-specific contributions were assessed using selective antagonists for 5-HT2A, 5-HT2B, 5-HT7, TrkB, and AhR.

Results: Psilocybin and psilocin significantly suppressed TNF-α expression and increased BDNF levels in LPS-activated microglia. These effects were mediated by 5-HT2A, 5-HT2B, 5-HT7, and TrkB signaling, while AhR activation was required for psilocin-induced BDNF upregulation but not TNF-α suppression. IL-10 levels remained unchanged under normal conditions but increased significantly when serotonergic, TrkB, or AhR signaling was blocked, suggesting alternative mechanisms of immune modulation.

Conclusion: Psilocybin and psilocin promote a shift to a microglial phenotype that mitigates inflammation and a neuroprotective state via receptor-specific mechanisms, supporting the potential of these compounds as therapeutic agents for neuropsychiatric conditions associated with inflammation and impaired neuroplasticity. Their effects on TNF-α and BDNF depend on distinct serotonergic and neurotrophic pathways, with AhR playing a selective role in psilocin's action. These findings provide deeper insight into the receptor-mediated mechanisms underlying psilocybin's therapeutic potential and highlight alternative anti-inflammatory pathways that could be clinically relevant.

Full Paper: Laabi S, LeMmon C, Vogel C, Chacon M, Jimenez VM Jr. Psilocybin and psilocin regulate microglial immunomodulation and support neuroplasticity via serotonergic and AhR signaling. Int Immunopharmacol. 2025 Jun 26;159:114940. doi: 10.1016/j.intimp.2025.114940. Epub 2025 May 26. PMID: 40424654.

2.7. BMS 07: A *Galleria mellonella* Study: On Sulforaphane's Protective Effect on Immune Function during Binge Alcohol Exposure

Robert Darby[1], Dallen James[1], Scott Quimby[1], Braydon Black[1], Vincent Black[1], Victor Jimenez Jr.[1]

1. Noorda College of Osteopathic Medicine

Background: Alcohol is associated with increased mortality and morbidity. Pulmonary infections with opportunistic pathogens can occur in healthy humans, but hazardous alcohol exposure like binge alcohol intoxication (≥ 0.08% BAC) is a major risk factor. We've previously investigated the efficacy of Sulforaphane (SFN) prophylaxis in protecting human and murine alveolar macrophage function against opportunistic infections when exposed to binge alcohol conditions *in vitro*. An *in vivo* model investigating SFN and hazardous alcohol exposure in the context of infection is not well understood. The aim of this study is to 1) establish a *G. mellonella* larvae model by determining the LD50 of alcohol, SFN, Gram-Positive *S. epidermidis*, and Gram-Negative *B. thailandensis* and 2) test the protective effects of SFN prophylaxis against a bacterial infection after hazardous alcohol exposure.

Methods: Survival curves were generated using data collected at 24-hour intervals over a 72-hour period following 10μL standardized injections of SFN, alcohol, *S. epidermidis*, and *B. thailandensis*. Deaths were assessed based on larvae melanization and behavior. To assess SFN prophylaxis efficacy, 5μM SFN was administered, followed by 0.08% Alcohol at 18 hours, and finally 105 *S. epidermidis* or 102 *B. thailandensis* 3 hours later.

Results: SFN concentrations below 10μM were not lethal on *G. mellonella* larvae, demonstrating greater than 80% survival up to 100μM. Alcohol concentrations from 0.08-0.6% showed equal lethality, demonstrating 80%. *S. epidermidis* and *B. thailandensis* demonstrated a LD50

for concentrations greater than 105 and 102 CFU for *S. epidermidis* and *B. thailandensis*, respectively. SFN prophylaxis provided moderate protection against *S. epidermidis* in a binge alcohol setting, but no observable change with *B. thailandensis*.

Conclusions: *S. epidermidis*, and *B. thailandensis* exhibited dose-dependent lethality in *G. mellonella* larvae, demonstrating potential in using this model in studying drug-immune system interactions with opportunistic infections, while larvae alcohol metabolism may provide a unique model to study hazardous alcohol consumption. In addition, the *G. mellonella* model can be used to study drugs of abuse beyond alcohol to include nicotine and opioids. Taken broadly, these studies can help to demonstrate efficacy of SFN prophylaxis in an ER setting to protect against opportunistic pulmonic infections in vulnerable populations.

2.8. BMS 08: *In-silico* characterization of KCC2 and agonist for modulating addiction behavior

William Ho[1], Alfred Amendolara[1], Kenyon Mitchell[1], Jaden Miner[1], Ruth Northcott[1], Braxton Bingham[1], Andrew Payne[1]

1. Noorda College of Osteopathic Medicine

Purpose: KCC2 is a cotransporter essential for neuronal function by regulating GABAergic signaling via chloride gradients. Dysregulation of KCC2 has been linked to epilepsy and seizures, and recent studies suggest that KCC2 inhibition may contribute to behaviors observed in chronic opioid dependence. This evidence positions upregulation of KCC2 function as a promising therapeutic target for modulating addiction disorders. However, few agonists targeting KCC2 have been identified, and no binding sites have been thoroughly characterized. This study employs a machine-learning computational approach to model KCC2 protein interactions with a direct agonist.

Methods: An *in-silico* model of KCC2 was generated using published cryo-EM structural data. The protein surface was analyzed for potential active sites by evaluating parameters such as size, depth, hydrophobicity, and capacity for intermolecular interactions, including hydrogen bonding and Van der Waals forces. Ligand models for experimental agonists and FDA-approved negative controls were collated into a library. This library was screened against the identified binding sites using a rigid docking protocol. Ligand interactions were scored based on parameters including Van der Waals energy, Coulomb energy, hydrophobicity, and hydrogen bonding potential.

Results: Surface analysis revealed nine potential active sites on KCC2 with SiteScores ranging from 0.895 to 0.979, indicating high reliability in distinguishing drug-binding regions. The highest scoring site was in the transmembrane domain (SER896-PHE1090). Key residue interactions consistently involved HIE1051 (Pi-Pi stacking), ASN1086 (hydrogen bonding), and PHE1090 (Pi-Pi stacking) across all agonist candidates. Agonist candidates averaged a DockingScore of −4.5228, compared to −3.6087 for negative controls, supporting the specificity of these binding sites.

Conclusions: In conclusion, this computational approach identified nine promising KCC2 binding sites. Although the scores generated in our study are lower than those for well-characterized protein-ligand interactions, improvements could be made through induced-fit

modeling to account for conformational changes. While further binding and functional assays are needed to validate these interactions, our findings o_er insights to rational drug design aimed at modulating substance abuse behaviors.

3. Case Studies

3.1. CS 01: Holistic Management of Glucose Dysregulation Mimicking Autoimmune Disease

Jacob Warner-Palacio[1], Hannah Hunsaker[1], Amanda McKenna[1], Brigita Budginas[1], Alexander Tam[1], Levi Fridricksson[1], Parker Feltner[1], David Sant[1], Kyle Bills[1]

1. Noorda College of Osteopathic Medicine

A 13-year-old female (AW) presented with positive Anti-Nuclear Antibodies (ANAs) with speckled nuclei, chronic migraines, joint swelling, desquamation, frequent epistaxis, and severe psychiatric symptoms, including multiple hospitalizations for suicide attempts. Despite referrals to more than 8 treatment providers for physiologic and psychologic treatment, symptoms have persisted for more than 4 years. Diagnosed with Generalized Anxiety Disorder (GAD) and Major Depressive Disorder (MDD), she was referred to Rheumatology for suspected autoimmune disease primarily based on the presence of speckled nuclei ANA. Despite classic autoimmune markers, negative tests for Crohn's Disease, Celiac Disease, and Gluten Sensitivity coupled with atypical clinical features prompted exploration of glucose dysregulation as an alternative etiology.

Continuous glucose monitoring (CGM) revealed profound dysregulation, including nocturnal glucose fluctuations (81–218 mg/dL), frequent non-feeding glucose spikes >180 mg/dL, and postprandial reactive hypoglycemia, suggesting hypothalamic involvement. Based on these findings, a ketogenic diet (<15gcarbohydrates/day) was prescribed to recalibrate metabolic homeostasis.

During the intervention, AW's glucose stabilized (mean 108 mg/dL, CV 14%), and nocturnal fluctuations ceased. Strikingly, ANAs and speckled nuclei were no longer detectable, and her psychiatric symptoms fully resolved. Repeat neuropsychological evaluation found no diagnostic criteria for depression or anxiety. Migraines, desquamation, and epistaxis also resolved, and AW achieved a healthy BMI after a 30-pound weight loss. Carbohydrate reintroduction was met with sustained metabolic stability and no recurrence of symptoms.

This case highlights the potential for glucose dysregulation to mimic autoimmune disease, raising critical questions about current diagnostic and referral paradigms. By focusing on root causes, this holistic, osteopathic approach prevented unnecessary autoimmune diagnoses, avoided lifelong medications, and achieved systemic resolution through personalized dietary intervention. The findings underscore the importance of integrating metabolic assessments into autoimmune workups, particularly in complex cases with atypical presentations. Additionally, this case illustrates the transformative potential of DO-centered care, which prioritizes the interplay of structure and function and the body's innate ability to self-regulate.

Further investigation into the hypothalamic-glucose-ANA pathway may redefine the understanding of autoimmune mimics and their treatment. Expanding such holistic strategies in clinical practice can promote accurate diagnoses, improve patient outcomes, and exemplify osteopathic principles in addressing multifactorial health challenges.

3.2. CS 02: Urothelial Renal Pelvis Carcinoma: Use of Traditional and Organic Tobacco

Aratana Nutcharoen[1], Clayton Rawson[1], Tipsuda Junsanto-Bahri[1]

1. Noorda College of Osteopathic Medicine

Traditional tobacco smoking has been strongly associated with renal pelvis and ureter cancers. However, only a few studies have explored the association between organic tobacco cigarettes, such as Natural American Spirit (NAS) and such cancers. NAS cigarettes have been perceived by smokers as posing lower health risks, but this perception may be misleading as the combustion of organic matter in NAS cigarettes produces a wide range of volatile toxicants. Urothelial carcinoma of the renal pelvis is a rare malignancy that arises from the urothelial lining of the upper urinary tract. It shares histological similarities with bladder cancer and is strongly linked to smoking. The disease often presents with painless hematuria and can be aggressive, with the potential for local invasion and recurrence if not detected early.

We present a 70-year-old male who smoked traditional and organic tobacco cigarettes and developed a rare urothelial renal pelvis carcinoma. A retrograde cystourethrogram confirmed a non-invasive, high-grade urothelial cell carcinoma and a Ki-67 immunostain showed high proliferation index. The patient completed 4 cycles of Gemzar and Cisplatin neoadjuvant chemotherapy and underwent a robot-assisted nephroureterectomy. There was a recurrence of the tumor in the bladder in which the patient underwent transurethral resection of bladder tumor with complete tumor removal.

This case highlights the clinical challenges and management of urothelial carcinoma of the renal pelvis, a rare malignancy often linked to smoking. The patient's history of tobacco use, including NAS cigarettes, underscores the potential misconceptions regarding "natural" or "organic" tobacco products and their associated risks. Diagnostic advancements enabled the identification of a highgrade, non-invasive renal pelvic tumor, which was effectively treated with Gemzar and Cisplatinbased chemotherapy and nephroureterectomy. The treatment of urothelial carcinoma of the renal pelvis involves a comprehensive approach, including surgery, chemotherapy, and long-term surveillance. In this case, radical nephroureterectomy successfully removed the primary tumor, while preoperative Gemzar and Cisplatin-based chemotherapy helped address potential microscopic disease. Given the aggressive nature of high-grade urothelial carcinoma, close followup with cystoscopy and imaging remains essential to detect recurrence or secondary tumor development. Therefore, screening for urothelial carcinomas among tobacco smokers should not be overlooked.

3.3. CS 03: Therapeutic Ultrasound & Exercise to Improve Breastfeeding Postpartum

Crystal Miskin[1], Elizabeth Willison[1]

1. Rocky Mountain University of Health Professions

Background: Patients often complain of feeding challenges with a newborn, which significantly impact maternal well-being. These impairments include ductal narrowing/plugging (commonly called "clogged ducts") and mastitis. The Academy of Breastfeeding Medicine (ABM) Clinical Protocol #36 was published in 2022 and provides the best practices for lacta-

tion support. Despite the updated lactation recommendations, patients continue to receive outdated advice from physicians and other primary care providers. Physical therapists are primary care providers who can administer ultrasound, guide patients in appropriate exercises, and offer education to improve the quality of life during this postpartum period.

Methods:A series of 3 case studies of local lactating mothers from June to October 2024 was conducted. All patients presented to physical therapy (PT) with primary complaints of pain and palpable lumps in one or both breasts. One patient was seen in PT directly after self-diagnosis of clogged ducts. Two individuals were diagnosed with acute mastitis by an urgent care provider and then sought treatment from PT. The physical therapist deferred evaluation until 24 hours after initiating the antibiotic medication.

Results: The physical therapist followed the ABM guidelines by educating patients on the etiology and treatment of plugged ducts and mastitis and using therapeutic ultrasound, lymphatic drainage, and exercise to treat the ducts. The two patients with medical treatment in urgent care reported contradictory instructions from medical providers. All 3 patients had one treatment session of PT. Follow-up was conducted at 3 months and confirmed complete symptom resolution.

Conclusion: Physical Therapists are uniquely positioned to utilize ABM guidelines to treat plugged ducts in the postpartum period effectively. Interdisciplinary collaboration between physical therapists and other primary healthcare providers is recommended to increase awareness and utilization of the updated ABM guidelines.

Clinical Application: To mitigate the local discrepancy between the ABM guidelines and current practicing clinicians, Clinical Protocol #36 and specifically, the therapeutic ultrasound parameters provided in the publication, is now being taught within the Doctor of Physical Therapy and Master of Physician Assistant Studies curricula at Rocky Mountain University of Health Professions.

4. Clinical and Translational Research

4.1. CTR 01: Development and Validation of a Novel Pelvic Floor Measure

Megan Gold[1], Ashley Vrinten[1], Megan Pratt[1], Alyssa Lyman[1], Kelsey Hopkinson[1], Hina Garg[1]

1. Rocky Mountain University of Health Professions

Purpose/Hypothesis: Clinically feasible ways to assess pelvic floor muscle function are underdeveloped. Pelvic floor muscles engagement during lifting and walking is critical due to its sphincteric and supportive functions; thus, an objective and clinical measure of Stress Urinary Incontinence (SUI) is needed. We developed, validated, and assessed the clinical responsiveness of a novel pelvic floor dysfunction measure in postpartum women.

Number of Subjects: 23

Methods: The 15-item Pelvic Floor Stress Test (PFST) was developed using expert opinion. It included progressive functional movements requiring intra-abdominal pressure management and pelvic floor muscle loading. Participants (age mean[SD]=30.78[6.71] yrs, BMI mean[SD]=26.60[4.35], past deliveries mean[SD]=2.74[1.74]) completed the PFST, International Consultation on Incontinence Questionnaire-short form (ICIQ-SF) and modified Australian Pelvic Floor Questionnaire bladder domain (mPFQ) at three timepoints: initial visit (T0), 1-week interval (T1), and the final visit (T2) after a 6-week core and hip training program. Cronbach's alpha, Pearson product-moment correlation coefficients for internal consistency, test-retest reliability, and concurrent validity assessments; and paired t-tests for T0-T2 for clinical responsiveness were utilized.

Results: PFST took 5-25 minutes to administer and demonstrated acceptable internal consistency (Cronbach's alpha=0.78), strong test-retest reliability (r=0.86, $p<0.05$), and minimal concurrent validity with ICIQ-SF (r=-0.32, $p>0.05$) and mPFQ (r=-0.31, $p>0.05$). PFST was also clinically responsive (T0 mean[SD]=21.52[3.75] vs T2 mean[SD]=27.96[2.25], $p<0.05$, effect size=1.84).

Discussion: The PFST is internally consistent, reliable, and clinically responsive. Minimal correlations between the PFST, ICIQ-SF, and mPFQ highlight two different constructs (performance vs self-report or SUI vs. other incontinence).

Clinical Relevance: PFST is a performance-based, clinically feasible measure of SUI in postpartum women and can inform future interventions targeting pelvic floor functional deficits.

4.2. CTR 02: A Targeted Look of the Barriers to Prenatal Care in Provo, Utah

My Ha[1], Margaret Freking[1], Kirpa Batth[1], Adira Ray[1], Aleeza Namit[1]

1. Noorda College of Osteopathic Medicine

Infant mortality (IM) rate is defined as the death of a person under the age of 1 years old. According to the Center for Disease Control and Prevention the national IM rate in 2020 was at 5.43 deaths per 1,000 births. According to the Utah department of Health, the 2020 Utah rate of IM was also at 5.4 deaths per 1,000 births. The national rates for IM have decreased since the

1990's with its largest decline between 1990 and 1999. However, the State of Utah has seen their trends plateauing. While there are a wide variety of factors that impact IM rates across the nation, the number of prenatal visits correlate with IM rates. While previous studies indicate components that contribute to lack of prenatal care visits and access include inadequate transportation, insurance difficulties, and work conflicts, among others; there is still very little research done on this topic. This research study identifies these barriers in a targeted approach surveying participants from a clinic in Provo, Utah. 54 responses were recorded and analyzed. Major barriers identified included appointment availability (19 responses), work conflicts (12 responses) and both insurance and partner conflicts (12 responses each). These results align with existing literature, which suggest that there is a correlation between increased prenatal visits and lower infant mortality rates. To address these barriers, several strategies can be implemented, such as providing more flexible scheduling options, improving workplace accommodations for pregnant individuals and their partners, and addressing insurance-related concerns. However, future studies are necessary to evaluate if these results are unique to Provo or if they can be applied statewide.

4.3. CTR 03: Correlation Between Body Weight and Eccentric Hamstring Strength in American Football Players

Ty Hacking[1], Malorie Wilwand[1], Brett Mortensen[1], Wayne Johnson[1]

1. Brigham Young University

Introduction: Hamstring strength and explosiveness is imperative for collegiate American football players to perform at the highest level. Understanding the respective correlations, based on players positions, between eccentric hamstring strength (HS) and body weight (BW) among football players may help coaches and players to develop strength protocols required for specific positions. We hypothesize that increasing BW will result in increased eccentric HS.

Purpose: This study aims to examine the relationship between football players BW and their max eccentricHS.

Methods: As a secondary analysis from the HAMIR study, 95 (age: 21.4 ± 2.00 yr; Ht: 187.7 ± 6.17 cm; Wt: 102.4 ± 17.9 kg) actively rostered and uninjured Division I football players participated in the study and were grouped by position: the big group (OL & DL) (age: 21.6 ± 1.78 yr; Ht: 192.2 ± 5.77; Wt: 122.5 ± 16.1 kg), the combo group (TE & LB) (age: 21.6 ± 2.08 yr; Ht: 189.2 ± 4.42 cm; Wt: 107.0 ± 4.45 kg), and the skills group (DB, K, WR, QB, & RB) (age: 21.2 ± 2.09 yr; Ht: 184.3 ± 5.13 cm; Wt: 88.5 ± 7.70 kg). Athletes were weighed and then max eccentric HS was measured as each participant performed three Nordic curls on a Nordbord device. The average max force exerted from the right and left leg from 3 trials was recorded for data analysis.

Results: Overall, we noted a weak correlation between players BW and their max eccentric HS (r = 0.34, p = <0.0008, Force: 451.6 ± 83.5 N). However, both the combo and skills group showed moderate correlation respectively (r = 0.57, p = <0.006, Force: 476.1 ± 63.8 N; r = 0.37, p = <0.01, Force: 433.0 ± 68.2 N). The big group showed a weak correlation (r = 0.31, p = <0.12, Force: 463.3 ± 112.3 N).

Conclusion: The observed positive correlation confirms our hypothesis that larger players would have greater eccentric HS. The moderate correlation in the combo and skills group implies that BW does affect football players eccentric HS. This finding is important because it supports the coaching stance that collegiate football players' strength enhances with weight gain. However, in the largest players this correlation was weaker. This weaker correlation shows that increasing BW alone does not fully indicate increasing eccentric HS. Thus, other factors such as adipose tissue gain, or larger bone mass need to be considered when assessing eccentric HS in relation to BW.

4.4. CTR 04: Exploring the relationship between self-reported anxiety, depression, and neurocognitive biomarkers in patients with substance use disorders

Patrick Brain[1], Natalie Griffin[1], Christopher Gowans[1], Amanda Brandis[1], Amanda Page[1], Blake Harris[1], Braden Ashcraft[1], Jess DeLange[1], Sophia Delgado[1], John Glinski[1], Makenzie Homan[1], Ben Latey[1], Jasmine Pannu[1], Lorissa Thorpe[1], Kyle Bills[1], Andrew Payne[1]

1. Noorda College of Osteopathic Medicine

Purpose: Substance use disorders (SUDs) often co-occur with anxiety and depression, complicating recovery. Roughly 80% of people with SUD meet the diagnostic criteria for a comorbid psychiatric disorder. Among the two most common comorbidities were depressive and anxiety disorders. We aim to identify relationships between self-reported anxiety and depression scores with various biomarkers obtained utilizing EEGs, specifically the P300 delay and frontal alpha asymmetry (FAA), among populations at inpatient settings for SUD. Using these potential relationships, SUD recovery can be tailored to increase the efficacy of treatment for those with comorbid anxiety and/or depression disorders.

Methods: 53 (n=40 M, n=13 F) participants were recruited from two inpatient treatment facilities. Patients completed both the HAM-A anxiety assessment and a PHQ-9 depression assessment, which provides a quantitative measure of clinical anxiety and depression. Participants then performed a series of cognitive tests during EEG recording, including an oddball tone identification test, a Flanker test, and a baseline EEG recording. A trail making test was also administered after the EEG session had completed. The EEG waveforms were analyzed using WAVI Scan to determine the P300 delay and FAA.

Results: Of 40 male participants, 26 (65%) had scores within the diagnostic criteria on either the HAM-A or PHQ-9. Of 13 female participants, 10 (76.9%) had scores within the diagnostic criteria on either the HAM-A or PHQ-9. 73.33% of male participants and 77.77% of female participants who scored outside of their respective FAA target range recorded HAM-A and PHQ-9 scores within the range of a clinical anxiety or depression disorder. Additionally, 81.25% of male participants and 100% of female participants with P300 delay values not in their target range, recorded HAM-A and PHQ-9 scores in the range of a clinical anxiety or depressive disorder.

Conclusions: Initial results show a greater percentage of participants with self-reported anxiety and/or depression have an increased likelihood of falling outside of the normal range

for FAA and P300 delay. Although there is a likely connection between these variables, continued research is required to establish a greater understanding of this relationship.

4.5. CTR 05: Normative Respiratory Baseline for Geriatric Diaphragmatic Breathing

Connor Wright[1], Elizabeth Martin[1], Emily Call[1], Ulrike Mitchell[1]

1. Brigham Young University

Background: Studies show that geriatric populations more often experience respiratory diseases and decreased breathing function. Many tests of respiratory function are invasive, complex, and may pose health risks to the geriatric population. The purpose of our ongoing study was to use non-invasive methods to establish normative values for diaphragm function in healthy, 'normally' active adults aged 50+, which can be used to provide reference data for clinicians and future studies. We assessed tidal volume, inspiratory reserve volume, diaphragm thickness and mobility, and breathing mechanics (chest and abdominal breathing).

Methods: 40 'normally' active, healthy participants ages 50+ were recruited via email, postings, social media, and word-of-mouth. After consenting, volunteers participated in a series of assessments using:
1. Diagnostic ultrasound to assess diaphragm mobility and thickness
2. Handheld spirometer measurements to record tidal volume and vital capacity, concurrent with ultrasound imaging
3. Respiratory sensors to assess chest and abdominal movement with quiet breathing

Participants (lying supine) were instructed to take normal breaths followed by one deep breath. Diaphragm thickness was recorded via ultrasound in the right lateral intercostal space between ribs T8 and T9, with mobility recorded from a right anterolateral view inferior to T10. Breathing mechanics were measured in standing and supine positions with respiratory sensors attached around the xiphoid process and the navel.

Results: Average chest displacement was greater while standing (chest: 4.63cm, abdomen: 3.90cm), and average abdomen displacement was greater while supine (chest: 2.43cm, abdomen: 5.51cm).Average diaphragm excursion was 3.05cm during quiet breathing and 5.75cm during a deep breath, and average sniff velocity was 6.48cm/s. Average diaphragm thickness was 0.40cm at peak deep inhalation and 0.26cm at the end of exhalation. Spirometer values for the average tidal volume were 1.14mL and average vital capacity were 3.10mL. (Results averaged from 40 participants)

Discussion: Averages above do not reflect the differences between the "younger" geriatric population (ages 50-60) and the "older" participants (ages 70+). Participants have largely been from the BYU faculty/staff and thus the results may not be generalizable. Recruitment for the 70-80+ age group has been difficult.

4.6. CTR 06: Understanding Life After Traumatic Brain Injury: A Qualitative Exploration Through Self-Determination Theory

Natalie King[1], Bryan Gee[1], Mary Shotwell[1], Mark Campbell[1]

1. Rocky Mountain University of Health Professions

Background: Traumatic brain injury (TBI) is a major global health concern, affecting millions of people each year. TBIs are caused by impacts or penetrative injuries to the brain, often resulting in long-term physical, cognitive, and emotional impairments that can drastically reduce survivors' quality of life. These impairments influence not only daily activities but also emotional well-being, social participation, and overall life satisfaction, highlighting the importance of a comprehensive approach to rehabilitation. The purpose of this study is to explore the lived experiences of TBI survivors, with a particular focus on how aspects of autonomy, competence, and relatedness—core components of the Self-Determination Theory (SDT)— influence their quality of life. By applying SDT as the theoretical framework, this study aims to uncover the psychological and environmental factors that either facilitate or impede the ability of TBI survivors to achieve a sense of well-being and life satisfaction.

Methods: This research employed a phenomenological qualitative approach to understand how survivors navigate their post-injury lives. Fourteen TBI survivors, aged 18 to 65, were interviewed, and data was analyzed using a multi-stage coding process, integrating theoretical triangulation with AI-assisted analysis for robust theme identification.

Results: Utilizing the components of the SDT, four themes emerged from the data, including 1) autonomy, 2) competence, 3) relatedness, and 4) dynamics of quality of life.

Conclusion: This study offers valuable insights into the multifaceted factors influencing quality of life among TBI survivors, emphasizing the interconnected roles of autonomy, competence, relatedness, and overall well-being. While supporting existing research, the findings also reveal ongoing challenges, including social isolation, limited resource access, and the need for continuous adaptation in daily life. Interventions that foster autonomy, strengthen social connections, and ensure equitable access to support can greatly enhance the recovery process and improve long-term outcomes for TBI survivors. Further research is essential to refine strategies that promote a holistic approach to TBI rehabilitation and enhance life satisfaction.

4.7. CTR 07: Functional Changes Occuring During 10-Week Parkinson's Disease Group Fitness Classes and Subsequent 8-Week Break

Tyler Luszeck[1], Greg Koberstein[1], Rhodri Purcell[1], Kelsey Hokinson[1], Misti Timpson[1], Christa Young[1]

1. Rocky Mountain University of Health Professions

Purpose: Parkinson's Disease (PD) is a progressive disease that leads to functional decline and loss of independence. This functional decline places an increased burden on loved ones and caregivers. The purpose of this study is to understand the influence that participation in a community-based exercise program has on people with Parkinson's Disease and their caregivers.

Methods: Semi-structured interviews were conducted via Zoom and lasted 25-50 minutes. The transcriptions of the interviews were reviewed for accuracy and analyzed by three of the authors to limit bias.

Results: Transcript analysis showed that caregivers perceived positive changes in their own and their loved ones' lived experience with PD because of participating in the community-

based exercise program. Areas of reported improvement for caregivers included mental health, social interaction, and knowledge and understanding of PD. Areas which caregivers perceived improvement in their loved ones included emotional health, functional independence, personal communication and relationships, and motivation.

Conclusion: PD can have a significant impact on not only the individual diagnosed but also on their caregivers. PD can lead to burdens in social participation, impact mental health, and lead to greater reliance on caregivers from a physical standpoint. Community exercise programs can have a positive impact on caregivers and lead to greater social participation, independence, mental health, and quality of life for both caregivers and individuals with PD.

Clinical Relevance: Participation in a community-based exercise program can lead to clinical improvements for people with PD, but also to greater confidence, independence, improved mobility, and an overall decreased burden of care placed on carepartners.

4.8. CTR 08: Practical tool for predicting risk of mental health issues following TBI

James Graham[1], Amanda Hoffman[1], Sarah Beetch[1], Matt Malcolm[1]

1. Colorado State University

Traumatic brain injury (TBI) is recognized as a chronic health condition with long-term implications. Medical stability, while significant, is just the first step in a life-long, and often difficult, journey. TBI survivors are at risk for developing post-traumatic mental health problems including depression, anxiety, substance abuse, and severe psychiatric disorders, in the months following hospital discharge. Mental health challenges are easier to prevent or treat early on rather than waiting until they are firmly established. Many patients and their families do not get connected to beneficial outpatient or community resources that could help them better manage the unanticipated complications of living with a brain injury; most TBI patients seen in the emergency department do not receive follow-up care within three months after injury.

We developed a practical tool to predict an individual's risk for experiencing mental health challenges based on information in the electronic medical records during an individual's hospital stay. We used an established approach that translates complex statistical models into 'simple' tools for clinical practice. These point system tools are well-established for other health conditions and outcomes, but have not been applied to post-traumatic mental health issues.

We will describe how the statistical model was created and how the output from the model was converted to a practical and clinically friendly format. We will also demonstrate how different versions of the tool can be effectively used in everyday practice healthcare providers, families, and individuals with brain injury to proactively obtain the resources and services needed to better monitor and manage their mental health following discharge from the hospital.

4.9. CTR 09: Earlier Return to Sports, Reduced Donor-Site Morbidity with Doubled Peroneus Longus Versus Quadrupled Hamstring Tendon Autograft in ACL Reconstruction

Usama Bin Saeed[1], Asad Ramzan[1], Marryam Anwar[1], Hamza Tariq[1]

1. Noorda College of Osteopathic Medicine

Background: Graft choice for anterior cruciate ligament reconstruction (ACLR) has been evolving. The peroneus longus tendon (PLT) has been seen as a suitable choice for ACLR, providing comparable results to those of hamstring tendon (HT) autograft, but its clinical relevance in terms of return to sports, to our knowledge, has not been studied.

Methods: Two hundred and thirty-two patients who sustained an isolated ACL injury were enrolled and underwent ACLR using doubled PLT autograft or quadrupled HT autograft; 158 were followed for 24 months. Functional scores (International Knee Documentation Committee [IKDC] and Tegner-Lysholm scores) were assessed preoperatively and at 3,6, 12, and 24 months postoperatively. Graft diameter and graft harvesting time were measured intra-operatively. Donor-site morbidity was evaluated using subjective evaluation. Time to return to sports in both groups was compared.

Results: The mean diameter of PLT autograft was significantly larger than that of HT autograft, and the mean graft- harvesting time was less ($p < 0.001$). Patients in the PLT group returned to sports a mean of 34 days earlier than those in the HT group ($p < 0.001$) and had a lower rate of donor-site morbidity and, at 6 months, better patient-reported outcomes at the knee ($p < 0.001$). There were no significant differences between the groups in the rate of graft rupture or in IKDC and Tegner-Lysholm scores at the 24-month follow-up.

Conclusions: PLT is a suitable autograft for ACLR in terms of graft diameter and graft-harvesting time and may offer athletes an earlier return to sports related to better outcomes at 6 months of follow-up. HT autograft was associated with increased thigh weakness. Both grafts, however, performed similarly at 24 months postoperatively.

4.10. CTR 10: Isokinetic Dynamometry: Shoulder Strength in the Youth Overhead Athlete

Ian Leahy[1], Erin Florkiewicz[1], Mary Shotwell[1]

1. Rocky Mountain University of Health Professions

Accurately measuring shoulder strength in overhead athletes is critical, as sufficient strength is essential for safe and sustained performance during repetitive athletic movements. Isokinetic dynamometry (ID) offers dynamic strength assessments that surpass the capabilities of static methods, such as manual muscle testing and handheld dynamometry. The dynamic assessment provided by ID may enhance upper extremity evaluation, aiding in the prediction of injury risk and the determination of return-to-sport criteria for overhead athletes.

The purpose of this review is to examine the existing literature concerning the application of isokinetic shoulder strength testing in rehabilitation and clinical decision-making processes, among youth athletes who perform repetitive overhead activities.

A comprehensive literature search was conducted using PubMed and EBSCO Host databases, covering publications from 2000-2024. Search terms included "isokinetic dynamometry," "shoulder," and "youth athlete." Inclusion criteria focused on youth athletes (<18 years) engaged in overhead sports, excluding those with neurological conditions or those designated as college or professional athletes. The PRISMA-ScR guidelines were followed.

A total of 23 articles met the inclusion criteria. Volleyball and swimming were the most studied sports, with the most common testing position being the seated 90/90 position. Variations in testing speeds and outcome measures, such as peak torque and external rotation (ER) ratios, were identified.

Isokinetic dynamometry is a valuable tool for assessing shoulder strength in youth overhead athletes. It provides critical insights into muscle strength dynamics, aiding in injury prevention and rehabilitation. Further research is needed to optimize strength assessment protocols and enhance clinical decision-making for safe return-to-sport practices.

4.11. CTR 11: The Intersection of MS & COVID-19: Quantitative & Qualitative Outcomes

Steven Landspurg[1], Michael Kantor[2], Jessica Raymond[1], Megan Kisner[1], Hina Garg[1]

1. Rocky Mountain University of Health Professions
2. Ohio Northern University

People with multiple Sclerosis (PwMS) constitute a vulnerable population and may have experienced a disproportionate healthcare burden during the COVID-19 pandemic. Limited evidence is currently available on the impact of COVID-19 infection on the quality of life and lived experiences of PwMS. This pilot study, thus, aimed to first, (1) describe the impact of contracting COVID-19 infection on outcomes of mobility, disease management, and well-being, (2) determine correlations between demographic factors, MS and COVID-19 clinical factors, and (3) to explore the perceptions of PwMS who contracted the infection. Twenty-two PwMS who contracted the COVID-19 infection completed an online survey, and eight participated in a semistructured interview. Descriptive and correlation statistics were calculated. Interviews were transcribed and coded. A total of 22 PwMS (M/F=7/15, mean ± SD age=44.5 ± 16.95 yrs; height: 66.32 ± 4.86 inches; weight 177.09 ± 42.43 lbs, COVID-19 diagnosis duration>2yrs =87.5%) participated. Relapsing-remitting MS (68%), COVID-19 vaccination status (86% vaccinated with 1-4 booster shots), hospitalizations (82%) with lengths of stay ranging between 2 and 42 days were reported. Common COVID-19 symptoms included vomiting/diarrhea (n=95%), muscle aches (91%), difficulty breathing(82%), and cough and loss of smell (68%). Treatment options included clonal antibodies and Mucinex (95%). Most patients reported full recovery from the COVID-19 infection (86%), while 18% reported an adverse change in their MS type and assistive device (27%), relapse (32%), and continued need for family support (59%) after the infection. Number of MS relapse symptoms were significantly correlated with relapse duration (r=0.66, p=0.033). Major themes included medical and self-management advice on covid infection and recovery, medical and behavioral suggestions to healthcare providers, the cross-interaction between COVID-19 infection and MS, changes in MS management, perceptions of health and MS, COVID-19 infection symptoms and experience, difficulties with long-term recovery including emotional, financial, social, physical and

functional impact, lessons learned and lingering post-COVID-19 symptoms. Findings from this survey enhance our general understanding of the consequences of COVID-19 infection and recovery in PwMS and can help develop comprehensive treatment strategies.

4.12. CTR 12: Opioid Use: Tourniquet vs Non-Touriquet In Total Knee Arthroplasty

Sawyer Baum[1], Jordon Otten[1], Parker Ballard[1]

1. Noorda College of Osteopathic Medicine

Background: The use of a thigh tourniquet during total knee arthroplasty (TKA) is common practice to reduce intraoperative blood loss and improve visualization. However, its impact on postoperative pain, opioid usage, recovery, and complications needs more research.

Methods: We reviewed randomized trials, meta-analyses, and cohort studies from the past 20 years comparing TKA with and without a tourniquet, focusing on postoperative opioid consumption, pain (short- and long-term), economic factors (hospital stay, cost, additional interventions), functional outcomes, patient satisfaction, and the prevalence of deep vein thrombosis (DVT) and infection.

Results: Tourniquet use was associated with higher early postoperative pain and modestly greater opioid consumption in many studies (Ejaz et al., 2014; Gao et al., 2023). No significant long-term pain differences were observed, and by 3–12 months postoperative, knee function and range of motion were similar between tourniquet and no-tourniquet groups (Johnsen et al., 2024). Tourniquet use did not reduce overall blood loss or transfusions (Olivecrona et al., 2013), and it conferred minimal if any reduction in operative time (Magan et al., 2022). Patients who had TKA without a tourniquet often experienced slightly shorter hospital stays (Albayrak & Ugur, 2023) and faster early rehabilitation (Ejaz et al., 2014). Patient satisfaction rates at 6 months were uniformly high in both groups (≈94% "very" or "extremely" satisfied) (Kahlenberg et al., 2018). Importantly, tourniquet use was linked to a higher risk of certain complications, including roughly double the risk of DVT (Zhang et al., 2014) and increased surgical-site infection rates (Magan et al., 2022), although absolute event rates were low.

Conclusions: Eliminating the tourniquet in TKA does not compromise long-term outcomes or patient satisfaction, and may lead to improved early recovery and fewer thromboembolic or infectious complications. Current evidence suggests that routine tourniquet use provides little clinical benefit to the patient (Johnsen et al., 2024). Surgeons should weigh the slight intraoperative convenience against the potential for increased pain and complications. Further high-quality studies are needed to confirm these findings in diverse patient populations and to assess any long-term implant-related outcomes.

4.13. CTR 13: Insurance and IOL Selection

Conrad Ashby[1], Kayvon Moin[1], David Sant[1], Phillip Hoopes[1], Majid Moshirfar[1]

1. Noorda College of Osteopathic Medicine

Cataracts are cloudy areas that develop in vision due to proteins breaking down in the cornea, and are a leading cause of blindness. They can be treated by intraocular lens (IOL) replacement. Several types of IOL exist, and some are considered "premium lenses" and therefore

not covered by insurance companies. One particular type of lens, the Toric lens, is used for individuals with astigmatism. Unfortunately, many individuals cannot afford the cost of Toric lenses and have to live life with improperly adjusted vision after cataract surgery. This study investigates if the rates of individuals getting the appropriate lenses vary between insurance types. The rates of people getting Toric lenses on Medicare or Medicare Advantage plans is significantly lower than the rates of individuals with commercial insurance. This data suggests that discussions need to be opened regarding the classification of Toric lenses as "premium" to allow for individuals on Medicare or Medicare Advantage to receive appropriate lenses during IOL replacements.

4.14. CTR 14: Exploring Quality of Life After Traumatic Brain Injury: Insights from the Person-Environment-Occupation Model

Natalie King[1], Bryan Gee[1], Mary Shotwell[1], Parker Ballard[1]

1. Rocky Mountain University of Health Professions

Background: Traumatic brain injury (TBI) is a major global health concern, affecting millions of people each year. TBI often results in long-term physical, cognitive, and emotional impairments that can drastically reduce survivors' quality of life. These impairments influence daily activities, emotional well-being, social participation, and overall life satisfaction, highlighting the importance of a comprehensive approach to rehabilitation. This study seeks to provide deeper insights into the factors that influence the quality of life for TBI survivors.

Methods: This research employed a phenomenological qualitative approach to understand how survivors navigate their post-injury lives. Fourteen TBI survivors, aged 18 to 65, were interviewed, and data was analyzed using a multi-stage coding process, integrating theoretical triangulation with AI-assisted analysis for robust theme identification.

Findings: Utilizing the constructs from the PEO model, four themes emerged: 1) personal factors, 2) environmental factors, 3) occupational factors, and 4) dynamics of quality of life.

Conclusion: Key findings highlight the complex, multifaceted nature of quality of life following TBI, identifying major personal, environmental, and occupational challenges that either support or hinder their quality of life. The study emphasizes the importance of tailored, person-centered rehabilitation strategies that address physical, cognitive, and environmental barriers. This study provides critical insights into enhancing occupational therapy interventions and improving longterm outcomes for TBI survivors. The findings underscore the need for holistic care approaches to enhance the quality of life and independence in this population.

4.15. CTR 15: I Get by with a Little Help from My Graft: Knee Extensor Strength Symmetry Differs by Graft Type After Anterior Cruciate Ligament Reconstruction

Erin Florkiewicz[1], Michael Crowell[1], Will Pitt[1], Paul Kuwik[1], Joanna Borawski[1], Jamie Morris[1]

1. Rocky Mountain University of Health Professions

Context: Knee extensor strength plays a vital role in restoring normal knee function and reducing the risk of re-injury after Anterior Cruciate Ligament Reconstruction (ACLR). This study aimed to determine if the knee extensor strength limb symmetry index (KES LSI) differs

in patients who received either a bone-patellar tendon-bone (BPTB) or quadriceps tendon (QT) graft after ACLR.

Methods: This study is a secondary analysis of previously collected prospective data from two IRBapproved case-control studies among United States Military Academy cadets with a history of ACLR and a group of healthy matched controls. This analysis involved only the participants with a history of ACLR. Strength testing was conducted using the HUMAC NORM Extremity System (CSMi, Stoughton, MA, USA) or Biodex Dynamometer (Biodex Medical Systems, Shirley, NY, USA). The primary dependent variable of interest (KES LSI) was calculated from the peak knee extensor torque of the ACLR limb and the uninvolved limb. An analysis of covariance with two levels (BPTB and QT autografts) and time since surgery as a covariate was employed to examine if differences existed in KES LSI between patients with different graft types.

Results: Fifty-nine participants were included in the analysis, with 32 having BPTB grafts (mean ± SD; age 20 ± 2 years, 14 females, weight 81 ± 15 kg, time from surgery 20 ± 9 months), and 27 having QT grafts (mean age 21 ± 2 years, 15 females, weight 75 ± 10 kg, time from surgery 14 ± 4 months). When accounting for time since surgery, participants with BPTB grafts demonstrated greater KES LSI [87% (95% confidence interval (CI) 79, 95) than participants with QT grafts [70% (95% CI 62, 79)] [F=7.55, p<0.01; mean difference: 17% (95% CI 5, 29)].

Conclusions: Patients with a history of ACLR using a QT graft demonstrated a 17% lower KES LSI compared to those with a BPTB graft. Given that each 1% decrease in KES LSI is associated with a 3% increase in knee re-injury risk, these findings highlight the potential influence of graft type on KES recovery and subsequent re-injury risk.

4.16. CTR 16: Neurocognitive Impacts of Migraine: Patterns, Phenotypes, and Potential Interventions

Kyle Reaveley[1], Jacob Warner[1], Kennedy Madrid[1], Jordyn Huecker[1], Alexander Tisdale[1], Christina Small[1], Kyle Bills[1]

1. Noorda College of Osteopathic Medicine

Purpose: Migraine, a multifactorial condition affecting many systems including neurological, psychological, orthopedic, metabolic, and endocrine, presents with significant neurocognitive consequences. Beyond pain, migraines involve mechanisms such as cortical spreading depression, neuromuscular dysfunction, and inflammation, contributing to symptoms like increased neuronal firing, cortical spreading depression, inflammation, brain fog, hypersensitivities, and memory impairments. By identifying significant changes in neurocognitive performance during high migraine frequency and remission, both targeted therapies and migraine phenotypes can be linked to changes in neurocognitive performance. This study aims to investigate the relationships between phenotypical presentations, migraines, and neurocognitive function.

Methods: Neurocognitive performance in migraine patients (N=173) was assessed using Creyos evaluating 12 metrics, including episodic memory, visuospatial processing, and attention. Scores were compared to population norms to identify deficits and improvements following treatments such as chiropractic care, dietary modifications, posture aids, medications, and injections. K-means clustering was applied to identify phenotypic patterns,

exploring associations with mental health, cervical pathologies, glucose regulation, and migraine severity.

Results: Preliminary descriptive statistical findings indicate multiple areas with below-average performance among migraine patients. Significant below-average metrics include episodic (q<0.001) and verbal short-term memory (q<0.001), visuospatial processing (q<0.001) and rotation (q<0.001), deductive reasoning (q<0.001), and attention ((q<0.001) and inhibition (q<0.001). Measures for working memory (q<0.001) and deductive reasoning (q=0.006) were found to be above average. Using K-means clustering on these neurocognitive exam results, three distinctive phenotypes emerge: consistently low below average scores, consistently above average scores, and another group, who is average, except deficits in response inhibition and mental rotations. Studies are ongoing to consider a variety of factors (mental health diagnoses, cervical curve and pathologies, medications, aura, glucose regulation, and migraine severity) to investigate factors that may play into the development of these different phenotypes.

Conclusions: These findings indicate a significant negative relationship between migraines and neurocognitive performance. Further investigation with an extensive clustering model will provide information on the different factors that play into the severity of neurocognitive deficit in each domain. Understanding specific neurocognitive domains affected by migraines and the factors that cluster with different deficit phenotypes may guide more precise treatment methods.

5. Education

5.1. ED 01: Medical Spanish Curriculum Increases Participant Confidence and Spanish Language Skills at NoordaCOM

Shelbi Salinas[1], Lixlia Pérez-Planell[1], Stephanie Chavez[1], Rachaell Diaz[1], David Sant[1], Carlos Angulo[1]

1. Noorda College of Osteopathic Medicine

Background: The Spanish-speaking population in the U.S. increased by 26% in 2022, emphasizing the need for Spanish-speaking healthcare providers to overcome language barriers and improve care delivery. In response, a team of six students and a native Spanish-speaking professor at Noorda College of Osteopathic Medicine developed a tiered Medical Spanish curriculum. This curriculum comprises beginner, intermediate, and advanced courses designed to enhance medical students' proficiency in Spanish for patient interviews, physical exams, and patient education.

Methods: The beginner course was implemented in January 2024 with 20 students enrolled in a 15-week program. Participants completed post-course surveys containing Likert scale and open-ended questions to evaluate regarding student communication skills and confidence in using Spanish.

Results: Thirteen female and seven male students completed the course. Of the 20 students, 17 spoke English as a primary language. All but one student indicated an understanding of Spanish at beginner level. No participants had taken a medical Spanish course previously. A survey was created to ask students varying questions regarding their confidence, ability and knowledge of their medical Spanish skills. 'Strongly Disagree'/'Disagree' indicated a great lack of ability and confidence in their medical Spanish skills. In contrast, 'Strongly Agree'/'Agree' indicated a strong level of confidence and ability in their use of medical Spanish. Survey results from before the course began demonstrated that a majority of students felt that they had a lack of confidence and ability in medical Spanish, 88.6% of students answering 'Strongly Disagree'/'Disagree' and 5.95% of students answering 'Strongly Agree'/'Agree'.

After course completion, the students felt improvement with their confidence and ability in medical Spanish. The surveys demonstrated 2.05% of students answered 'Strongly Disagree'/'Disagree' and 95% answered 'Strongly Agree'/'Agree', demonstrating a quantifiable increase in their confidence and ability in medical Spanish skills.

Conclusion: The Medical Spanish curriculum at NoordaCOM has proven to be highly beneficial, with students reporting improved confidence and proficiency in medical Spanish. These findings emphasize the importance of integrating language education into medical training to better serve the growing Spanish-speaking population. Feedback will be gathered from students in both current and future courses to ensure continuous improvement to maximize the program's impact.

5.2. ED 02: Evaluating the Efficacy of AI Note-Taking Software in Documenting Osteopathic Manipulative Medicine Treatment Encounters

Trevor Jurges[1], Jessica Pentlarge[1], Diane Gabriel[1], Michael Militus[1], Diane Gabriel[1], Nathaneal Yang[1], Samhitha Yadalla[1], Sarah Siddiqui[1], Shahem Attallah[1], Kyle Bills[1], Nathan Barnhurst[1]

1. Noorda College of Osteopathic Medicine

Introduction: Recent research shows that physicians spend nearly half of their workday interacting with electronic health records (EHR), with a significant portion of this time occurring during patient visits. This contributes to a substantial documentation burden both during and outside of encounters. While artificial intelligence (AI) softwares are increasingly being used to generate clinical notes, allowing physicians to focus on patient interactions, there is limited research on their effectiveness in documenting osteopathic manipulative medicine (OMM) encounters.

Hypothesis: Not all AI softwares are created equally. This study aims to identify whether a certain program is more accurate than others at capturing and documenting an OMM-specific patient encounter—both the diagnosis and treatment of somatic dysfunction.

Research Design and Methods: Four AI softwares were used to record seven patient encounters that involved OMT. Student doctors and physicians then reviewed the generated notes and compared one software's note to another for each encounter, and generated a score based on the follow criteria: consistency of the primary diagnosis with the physician's diagnosis, accuracy of documentation of somatic dysfunction diagnosis and treatment, inclusion of appropriate ICD-10 codes, note formulation speed, and ease of use.

Results: Every software omitted at least one treatment technique from the documentation based on what occurred in the patient encounter. A differentiating factor between softwares that scored highly versus poorly was the accuracy of the documentation based on what happened. These and other criteria collectively contributed to the total score for each software. The AI softwares were ranked based on their total scores, from highest to lowest: Freed achieved the highest score at 81.43%, followed by Heidi with 79.64%, Nabla with 66.67%, and Swifty with 26.19%.

Conclusion: These results can guide osteopathic physicians in selecting the most effective AI software for documenting OMM encounters. Our goal is to reduce documentation burdens, alleviate physician fatigue and burnout, and ultimately improve patient outcomes while focusing on osteopathic medical care.

5.3. ED 03: Hands-On Learning Powers Graduate SLP Endoscopy Training: A Pilot Study

Russell deJesus[1], Phil Sechtem[2]

1. University of Utah
2. Rocky Mountain University of Health Professions

Introduction: The need for flexible endoscopic examination of swallowing (FEES) and videostroboscopy training is increasing (Langmore et al., 2022; Patel et al., 2018). While Teten

et al. (2013) outline graduate-level competencies for videostroboscopic assessment, endoscopic training continues to vary across institutions. Utah currently does not have specific instrumental assessment requirements. Many students lack hands-on endoscopy experience because of limited equipment, dedicated graduate courses, and qualified supervisors. Unsurprisingly, new clinicians report feeling "panicky" when conducting endoscopic assessments in the field (deJesus, 2025, Manuscript in preparation).

Procedures: The purpose of this study was to define the need for a hands-on simulation component in graduate SLP endoscopic instruction. We asked whether hands-on simulation impacts the self-confidence of graduate SLP students in performing endoscopy and whether specific components of the training correspond with confidence levels in performing endoscopy. We patterned the 20-item self-efficacy questionnaire after the SIG-13 Dysphagia Competency Verification Tool and the tutorial by Patel et al. (2018). We compared 2 training groups against 1 control group by conducting Wilcoxon signed-rank and Mann-Whitney U tests. We report the items with the largest Cliff's delta effect sizes.

Results: Our findings are consistent with the hypothesis that simulation-based training impacts the self-efficacy of graduate SLP students performing endoscopy. *In vivo* instrumental manipulation and patient interaction provided additional benefit to the students' selfconfidence. There is a need for a hands-on component in SLP endoscopic instruction. Future research should investigate practical ways that institutions can overcome financial and staffing barriers to provide hands-on instruction.

5.4. ED 04: Physical Activity and Multiple Disabilities: Caregiver & Clinician Perspectives

Valerie Perkoski[1], Mary Shotwell[1]

1. Rocky Mountain University of Health Professions

Introduction: Individuals with intellectual and developmental disabilities (IDDs), specifically those with severe and profound intellectual disabilities (SPIDs), are likely to experience poorer health outcomes than those without disabilities or those with mild or moderate intellectual disabilities (MMIDs). Little information is available regarding physical activity (PA) among adults with SPIDs with mobility impairments (MI). This study explores the experience of PA among those with SPIDs/MIs based on the perspectives of family caregivers and clinicians.

Methods: Semi-structured interviews were conducted with eight family caregivers and eight clinicians to obtain data about participants' experiences with PA.

Results: Utilizing the five constructs from the socio-ecological model (SEM), seventeen themes emerged from family caregiver responses: (1) intrapersonal: attitudes, physical factors, knowledge, and values, (2) interpersonal: supports outside the home, supports within the home, and home environment considerations, (3) organizational: disability-inclusive organizations, academic institutions, and medical institutions, (4) community: environment and priorities, and (5) policy: home and community-based services (HCBS), financial, academic and programming, accessibility, and hospital policies. The most prevalent PA facilitators reported by family caregivers were (1) PA preferences as uniquely individualized, (2) encouraging PA possibilities, and (3) building, outdoor, and transportation accessibility, while the most com-

monly reported barriers were (1) building, outdoor, and transportation inaccessibility, (2) care recipients' dependence on the caregiver or others, and (3) care recipients' diagnoses, bodily structure, pain, or weakness. Excluding hospital policies, themes were the same for clinician participants. The most prevalent PA facilitators reported by clinicians were (1) PA preferences as uniquely individualized, (2) organizations that provide PA for adults with multiple disabilities, and (3) building, outdoor, and transportation accessibility. Clinicians reported that the most prevalent barriers to PA were (1) building, outdoor, and transportation inaccessibility, (2) necessity of education on needs and opportunities for PA, and (3) clients' diagnoses, bodily structure, weakness, or pain.

Conclusion: Family caregiver and clinician participants provided rich descriptions of how adults with SPIDs/MIs experience PA. Numerous PA themes, barriers, and facilitators were identified within all levels of the SEM model to help understand and promote PA opportunities for those with SPIDs/MIs to improve their health outcomes.

5.5. ED 05: Investigating the Impact of Mindfulness Meditation on Reducing Stress

Cenell Boch[1], Thomas Cappaert[2] Mary Shotwell[2] Celesta Schmelzer[3] Cora Arledge[4]

1. North Park University
2. Rocky Mountain University of Health Professions
3. Fairfield Medical Center
4. Mount Carmel College of Nursing

Mindfulness-based interventions (MBIs) and self-compassion practices have been investigated as ways to reduce work-related stress and increase self-compassion among nurses. According to the National Nursing Workforce Survey there are approximately 4.2 million Registered Nurses (RNs), approximately 950,000 Licensed Practical Nurses/Licensed Vocational Nurses (LPNs/LVNs), and approximately 325,000 Nurse Practitioners (NPs). The nursing workforce challenges have included: increasing demands, large number of nurses retiring, and concerns about compensation and work-related stress. Coronavirus-19 exacerbated daily stressors for nurses due to long hours, understaffing, and potential burnout in healthcare personnel. There is evidence that nurses who participate in mindfulness activities may experience significant changes related to stress, anxiety, and mood; however more quantitative research studies are needed to investigate and substantiate the impact of mindfulness-based interventions. In addition, minimizing stress may enhance efforts for job satisfaction and retention. This dissertation study is informed by a Pilot study that was conducted by the doctoral student approximately 6 months before the dissertation. The Pilot study included thirty-two participants enrolled at the beginning of the study and 26 completed the intervention (Intervention group n = 17; Control group n = 9). A two-tailed Mann-Whitney U sample rank-sum test was used to explore differences between groups on the two outcome variables – Perceived Stress Scale (PSS) and the Self Compassion Scale (SC). Post-intervention assessments were conducted, and statistically significant differences were found between the Intervention and Control group for two constructs ("Feel confident handling problems" and "Take a more balanced view of life situations" (SC#3). The Pilot study found observable improvements in

the raw data and statistically significant differences for the Intervention group, however more research was warranted.

Therefore, the purpose of this dissertation research was to investigate the impact of a daily ten minute fourweek mindfulness program on perceived stress and self-compassion among nurses in a both a rural community hospital and a larger metropolitan hospital. Fifty-six nurses completed pretest/posttest 10-item Perceived Stress Scale (PSS) and 12-item Self-Compassion (SC) surveys. A Mann Whitney U two-sample rank-sum test examined mean difference between the Intervention and Control group. The following median scores were statistically significantly different between the Intervention and Control groups: for PSS4 (question #4) "Felt confident to handle problems" for the Intervention median = 23.86, Control median 33.48 at alpha level .05; p = .026; Total PSS Posttest scores Intervention median = 33.35, Control median = 23.98 at alpha level .05; p=.032; SC5 (question #5) "I see failing as being human" for the Intervention group median = 32.84, Control 23.83 at alpha level .05; p =.037; SC9 (question #9) "I tend to obsess and fixate on everything wrong" for the Intervention median = 24.07, Control 33.26 at alpha level .05; p =.034; and SC subscale Over Identification (questions #1 and #9) Intervention median = 33.70, Control 23.66 at alpha level .05; p =.021. In conclusion this quantitative research intervention found positive statistically significant differences for five individual constructs of the Perceived Stress Scale (PSS) and the Self Compassion Scale (SC) and further supports the notion that mindfulness meditation may reduce work-related stress and improve self-compassion among those in the nursing population.