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The complete program including abstracts is available on the
Western Michigan University Homer Stryker M.D. School of Medicine website:
<http://med.wmich.edu/node/287>

CME CREDIT

The CME Activity Code is available at the check-in table or on the TV screens on campus.

In support of improving patient care, Western Michigan University Homer Stryker M.D. School of Medicine is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team. Credit amount subject to change.

IPCE Credit

This activity was planned by and for the healthcare team, and learners will receive 3.5 Interprofessional Continuing Education (IPCE) credits for learning and change.

Physicians

Western Michigan University Homer Stryker M.D. School of Medicine designates this live activity for a maximum of 3.5 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Pharmacists & Pharmacy Technicians

Western Michigan University Homer Stryker M.D. School of Medicine designates this activity for 3.5 contact hours for pharmacists and pharmacy technicians. Pharmacists and pharmacy technicians should claim only credit commensurate with the extent of their participation in the activity.

DISCLOSURES

Please see the handout offered at the registration table for a listing of disclosure statements from today's presenters.

INTRODUCTION

RESEARCH, EDUCATION AND SCHOLARSHIP

The commitment and participation of Western Michigan University Homer Stryker M.D. School of Medicine (WMed), its faculty, and the Kalamazoo scientific community in “Research Day” continues on this day marking a 38th anniversary milestone. One-hundred thirty-two abstracts were received and reviewed by a panel of 56 judges. One-hundred twenty have been accepted for either oral or poster presentation.

Such success is due, of course to a large number of talented and dedicated people. We wish to acknowledge the participation of a group of faculty and thank them for volunteering their time and expertise to review the submissions. Each abstract was assigned based upon area of expertise. The judges’ evaluations were critical in determining the oral presentations and poster presentations for this year’s event.

In addition, it is my privilege to have worked with this year’s Research Day organizing committee. This committee worked diligently over an extended period of time to endeavor to bring you an exceptional learning and networking opportunity. Members of this year’s committee were:

Melinda
Abernethy
Chelo Ahmed
Laura Bauler
Ray Bayer
Maria Demma
Cabral
Monica Chi
Shanna Cole

Steven Crooks
Jack Dewey
Casey Fealko
Krishna Jain
Nichol Holodick
Mariam
Ischander
Erik Larson

Liz Lorbeer
Maureen Owens
Courtney Puffer
Maria Sheakley
John Spitsbergen
Greg Vanden
Heuvel
Dale Vandre

We hope this year’s Research Day will inspire you to pursue your own research and to, as well, support the basic, medical and healthcare research of our Southwestern Michigan Community colleagues.



Gregory Vanden Heuvel, PhD
Chair 2020 Research Day

Thank you to the following WMed professionals who dedicated their time to participate as abstract scoring judges.

Melinda Abernethy, MD

Joanne Baker, DO

Robert Baker, MD

Susan Bannon, MD

Laura Bauler, PhD

Timothy Bauler, PhD

Raymond Bayer, M2

Craig Beam, PhD

Thomas Blok, MD

Karen Bovid, MD

Richard Brandt

Theodore Brown, MD

Maria Demma Cabral, MD

Monica Chi, M2

Shanna Cole, PharmD

Steven Crooks, PhD

Parker Crutchfield, PhD

Jack Dewey, M2

Glenn Dregansky, DO

Casey Fealko, M2

Rolbert Fischre', MD

Theotonius Gomes, DO

Lisa Graves, MD

Nichol Holodick, PhD

Mariam Ischander, MD

Krishna Jain, MD

Keith Kenter, MD

Wendy Lackey, PhD

Richard Lammers, MD

Erik Larson, PhD

Mark Loehrke, MD

Elizabeth Lorbeer, EdM

Aimee Madsen, M4

Joshua Mastenbrook, MD

Thomas Melgar, MD

Tracey Mersfelder, MD

Gitonga Munene, MD

Maureen Owens

Dilip Patel, MD

Philip Pazderka, MD

Kirsten Porter-Stransky, PhD

Courtney Puffer, MA

Kelly Quesnelle, PhD

Robert Sawyer, MD

Mark Schauer, MD

Maria Sheakley, PhD

Saad Shebrain, MD

Neelkamal Soares, MD

John Spitsbergen, PhD

Shama Tareen, MD

Timothy Trichler, MD

Gregory Vanden Heuvel, PhD

Timothy VanderKooy, MD

Dale Vandre, PhD

Peter Vollbrecht, PhD

Perry Westerman, MD

WMED UPJOHN CAMPUS FLOOR PLANS

WMed Upjohn First Floor



WMed Upjohn Second Floor

TBL Hall #1 & Classroom 111

Oral Presentation Session A & D

TBL Hall #2 & Classroom 211

Oral Presentation Session B & E

Auditorium

Oral Presentation Session C & F

HALLWAYS (First and Second Floor)

Poster Displays

LOBBY (Front and Back)

Check-in
Vendor
Tables

AUDITORIUM

Keynote
Speaker

First Floor

SCHEDULE

Tuesday, March 31, 2020

5:00 p.m. – 8:00 p.m.

W.E. Upjohn Campus

300 Portage Street

Kalamazoo, MI 49007

4:30 – 5:00am

Check-in

Refreshments available

**Poster Presenters – please arrive
early to find your poster**

1st Floor Lobby

(Front and Back Door)

5:00 – 8:00am

Poster Presentation Session

SCHEDULE

Wednesday, April 1, 2020
8:00 a.m. – 12:00 p.m.

W.E. Upjohn Campus
300 Portage Street
Kalamazoo, MI 49007

8:00 – 8:30am	Check-in Refreshments available	1st Floor Lobby (Front and Back Door)
8:30 – 9:30am	Oral Presentation Session 1 Session A Session B Session C	TBL Hall #1 & Classroom 111 TBL Hall #2 & Classroom 211 Auditorium
9:30 – 9:45am	Break	
9:45 – 10:45am	Oral Presentation Session 2 Session D Session E Session F	TBL Hall #1 & Classroom 111 TBL Hall #2 & Classroom 211 Auditorium
10:45 – 11:00am	Break	
11:00 – 12:00pm	Keynote Speaker	Auditorium
12:00pm	Farewell	Auditorium

KEYNOTE SPEAKER



This is the twelfth year of this annual lecture supported by the Board of Western Michigan University Homer Stryker M.D. School of Medicine to celebrate the Research Day activities and to recognize Dr. Carter's commitment and support of research.

Susan Quaggin, MD, FASN

Professor, Northwestern University
Feinberg School of Medicine

Director, Feinberg Cardiovascular Research Institute

Chief, Division of Medicine
Nephrology and Hypertension

Susan E. Quaggin, MD, FASN, is a graduate of the University of Toronto where she completed her residency and served as chief medical resident for the University's St. Michael's Hospital. She completed her nephrology fellowship at the University of Toronto and did a postdoctoral fellowship at Yale University where she studied the genetic basis of kidney development. Dr. Quaggin completed a second post-doctoral fellowship in mouse genetics in the laboratory of Janet Rossant at the University of Toronto's Samuel Lunenfeld Research Institute. From 1997 until 2012, she was at the University of Toronto where she was a Senior Scientist at the Samuel Lunenfeld Research Institute, a practicing Nephrologist at St. Michael's Hospital, and the Gabor-Zellerman Professor in Renal Medicine.

In January 2013, Dr. Quaggin joined Northwestern University Feinberg School of Medicine where she has led efforts in closing the gap between scientific discoveries and delivering innovative patient care in regards to kidney and cardiovascular diseases. Her research has helped enhance the understanding of common glomerular diseases and inspired the development of promising therapeutics, including discoveries regarding blood vessels, lymphatics and specialized hybrid circulations.

Currently she is the Charles Horace Mayo professor of medicine at Northwestern University where she serves as the Chief of the Division of Nephrology & Hypertension and the Director of the Feinberg Cardiovascular and Renal Research Institute. Dr. Quaggin is the Chief Scientific Officer of Mannin Research Inc, a biotechnology company leading the development of a new class of vascular therapeutics. Dr. Quaggin is president-elect of the 20,000-member American Society of Nephrology, and in 2019 was elected to the National Academy of Medicine.

**ORAL
PRESENTATION
SESSIONS**

ORAL PRESENTATIONS

8:30 a.m. – 9:30 a.m.

SESSION A

TBL HALL #1 & Classroom 111

Moderator: Peter Pioli, PhD; Investigative Medicine

8:30-8:42 am **Differential Gene Expression in Aged B Cells: A Role for Sex** Brinda Ryali, BS; Nichol Holodick, PhD

8:42-8:54 am **Immuno-detection of G4 DNA structures formed from PKD1 sequences implicates structure formation in cystogenesis.** Aimee Madsen, BS; Amy Lorber, BS; Kemin Su, PhD; Gloria Alvarado, PhD; Erik Larson, PhD

9:06-9:18 am **When Life Gives You Glucose: Differences in glucose uptake and utilization suggest altered astrocyte function in obesity models** Keenan Boulnemour, BS; Kendall Smith, BA; Daniel Micheli, BS; Peter Vollbrecht, PhD

9:18-9:30 am **Identification of functional partners of translation Elongation Factor 3 in *Saccharomyces cerevisiae*** Emily Manzon, BS; Terri Kinzy, PhD

SESSION B

TBL HALL #2 & Classroom 211

Moderator: David Overton, MD; Resident Affairs & Emergency Medicine

8:30-8:42 am **National trends and outcomes of genetically inherited metabolic forms of liver cirrhosis: Results from the Nationwide Inpatient Sample (NIS) database** Eric Sieloff, MD; Duncon Vos, MS; Thomas Melgar, MD

8:42-8:54 am **Tuberculous pericarditis in the United States-Trends and associations from the Healthcare Utilization Project Nationwide Inpatient Sample Database** Neiberg Lima, MD; Duncan Vos, MS; Ricardo de Castro, MD; Rheanne Maravelas, MD; Christopher Stancic, BS; Mireya Insua, MD; Thomas Melgar, MD

8:54-9:06 am **The contribution of positional asphyxia to opioid related deaths** Joyce deJong, DO; Jenelle Lee, BS; Cuyler Huffman, MS; Abigail Grande, MPH; Theodore Brown, MD; Chloe Bielby, MPH

9:06-9:18 am **Does health insurance type affect the quality of medical care for chest pain in the emergency department?** Katelyn King, BS; John Hoyle, MD; William Evans, PhD

9:18-9:30 am **Primary pyomyositis in children in the United States-Trends and associations from the Healthcare Utilization Project Nationwide Inpatient Sample Data** Kathleen Jenkinson, DO; Anya Ring, DO; Naveen Emmanuel, DO; Rheanne Maravelas, MD; Duncan Vos, MS; Jayne Barr, MD; Sapna Sadarangani, MD; Thomas Melgar, MD

ORAL PRESENTATIONS

8:30 a.m. – 9:30 a.m.

SESSION C

Auditorium

Moderator: Robert Sawyer, MD; Surgery

8:30-8:42 am **Teacher Trial: Teaching effective cpR to 4th and 5th grade elementary students**
Cyle Rogotzke, MD; Sherrie Bencik, MD; Joseph Billian, MS;
Maureen Ford, MD; Nathan Elg, DO; Cambrie Bencik; Joshua Mastenbrook, MD

8:42-8:54 am **Going Vertical: A prospective comparison of extraction times for priority patients identified by triage tags vs colored flags during a simulated MCI**
Abigail Wen-Yu Cheng, BS; Patrick McCreesh, MS; Seth Moffatt, BS; Ryan Maziarz, BS; Duncan Vos, MS; Joshua Mastenbrook, MD

8:54-9:06 am **Weight estimation methods and associated dosing errors of pediatric patients treated by paramedics** Nabeel Mallick, BA; John Hoyle, MD; Glenn Ekblad, MD; Tracy Hover, BS; Rasha Kazi, MD; William Fales, MD

9:06-9:18 am **Caring for a dying patient: An EMS perspective** Andrew Wenger, DO; Megan Potilechio, DO; John Aguilar, MD; Joshua Mastenbrook, MD; Joseph Billian, MS; Melissa Sherfield, BS

9:18-9:30 am **A novel task trainer for balloon tamponade of GI hemorrhage**
Richard Lammers, MD; Mark Williams, BA; Joshua Mastenbrook, MD

ORAL PRESENTATIONS

9:45 a.m. – 10:45 a.m.

SESSION D

TBL HALL #1 & Classroom 111

- Moderator:** Timothy Garrow, PhD; Biomedical Sciences
- 9:45-9:57 am **Hypoxia initiates the reprogramming of muscle cells into multipotent like cells**
Nariaki Nakamura, BS; Haiying Pan, BS; Keith Kenter, MD; Yong Li, MD PhD
- 9:57-10:09 am **Hypoxic stimulation accelerates myogenic differentiation in vitro**
Loyall Harris, BS; Nariaki Nakamura, BS; Haiying Pan, BA; Yong Li, MD PhD
- 10:09-10:21 am **Evaluation of submandibular salivary gland tissue for use as an alternative postmortem toxicology specimen** Ernie Morton, MS; Prentiss Jones, PhD; Joseph Prahlow, MD; Julie Ianni
- 10:21-10:33 am **Deletion of the homeobox gene Cux1 decreases ciliogenesis in a mouse model of polycystic kidney disease** Zhi Nee Wee; Emmanuel Kumar, BA Matthew Rumschlag, BS; Conner Holthaus, BS; Melissa Pasillas; Gregory Vanden Heuvel, PhD
- 10:33-10:45 am **Retinal ganglion cell and axon regeneration in adult murine glaucoma** Sarah Webster, MS; Nathan Sklar, BS; David Linn, PhD; Cindy Linn, PhD

SESSION E

TBL HALL #2 & Classroom 211

- Moderator:** Peter Ziemkowski, MD; Student Affairs & Family and Community Medicine
- 9:45-9:57 am **Short interpregnancy intervals are associated with poor birth outcomes for women of Kalamazoo County** Rebecca Parr, MS; Duncan Vos, MS; Melissa Sherfield, BS; Catherine Kothari, PhD; Laura Bauler, PhD
- 9:57-10:09 am **Time to break the power hierarchy: Listen to women** Megan Deibel, CNM, DNP; Silvia Linares, MD; Drew Moss, BS; Megan Sandberg, BS; Claudia Waters, BS; Lynette Gumbleton, BA; Joi Presberry, MPH; Catherine Kothari, PhD
- 10:09-10:21 am **Role of psychosocial risk factors in mothers' engagement in safe sleep practices** Summer Chahin, MA; Kalani Gates, BA; Amy Damashek, PhD; Cheryl Dickson, MD; Debra Lenz, MA; Grace Lubwama, PhD; Terra Bautista, BA; Catherine Kothari, PhD
- 10:21-10:33 am **Geographic access to pediatric care & preventable ED visits for children living in high risk neighborhoods** Jacob Baxter, BS; Winnie Long, BS; Marine Bolliet, BS; Cheryl Dickson, MD; Kathleen Baker, PhD; Dennis Donkor, BS; Catherine Kothari, PhD
- 10:33-10:45 am **Increasing HIV patient adherence to ART with a smartphone-based incentive intervention** Haily Traxler, MA; Amanda Devoto, MA; David Cosottile, MA; Anthony DeFulio, PhD

ORAL PRESENTATIONS

9:45 a.m. – 10:45 a.m.

SESSION F

Auditorium

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- Moderator:** Thomas Flynn, MD; Medicine, Infectious Disease
- 9:45-9:57 am **Is bloodstream infection an epiphenomenon in surgical patients?**
Joslyn Jose, MD; Robert Sawyer, MD
- 9:57-10:09 am **Pediatric Supracondylar Humerus Fractures can be safely treated by orthopaedic surgeons with and without pediatric fellowship training**
Kelly Harms, MD; Shannon South, BA; Karen Bovid, MD; Keith Kenter, MD
- 10:09-10:21 am **To Culture or Not to Culture: Does microbiology affect mortality after intra-abdominal infection?** Laura Stearns, MD; Sarah Khalil, MD;
Robert Sawyer, MD
- 10:21-10:33 am **Radiographic measurements of the 1st Tarsometatarsal (TMT) joint following 1st metatarsophalangeal (MTP) joint arthrodesis** Christopher Traynor, MD;
James Jastifer, MD
- 10:33am-10:45am **Outcomes of medical versus surgical therapy for peritonsillar abscess**
Aaron Zebolsky, MS; Emma Swayze, MS; Seth Moffatt, BS; Corbin Sullivan, MD

**ORAL
PRESENTATION
ABSTRACTS**

DIFFERENTIAL GENE EXPRESSION IN AGED B CELLS: A ROLE FOR SEX

Brinda Ryali, BS; Nichol Holodick, PhD

MD Class of 2021, Biomedical Sciences; Western Michigan University Homer Stryker M.D. School of Medicine

Streptococcus pneumoniae is the most common cause of pneumonia, leading to death in individuals over the age of 65 eight times more frequently than those aged 5-49. In both murine and human systems, there is a greater incidence of, and susceptibility to, pneumococcal infection in males; nevertheless, the factors contributing to this gender difference are unknown. Antibodies produced by B cells are an essential immune defense against *S. pneumoniae* by binding the pathogen and preventing infection of host cells. Yet, little is known regarding B cell maintenance and function/activation in the context of sex, particularly as this relates to the aged immune system. We utilized RT-PCR arrays to determine whether B cells obtained from young and aged, male and female mice display significant changes in expression of genes related to autophagy, estrogen signaling, and TLR activation pathways essential for B cells responses and subsequent protection from *S. pneumoniae* infection. We subsequently ran RT-PCR on specific genes of interest. Our results demonstrate significant changes in gene expression in all three pathways depending on age and/or sex. We observed reduced expression of Beclin1, an autophagy related gene, in B1a cells obtained from male aged mice as compared to young males; whereas this difference was not observed in aged versus young female mice. These findings will enable further studies into sex and age dependent B-lymphocyte responses to pneumococcal infection, which is of great importance when optimizing vaccination strategies, enhancing passive protection, and/or developing other treatments for mitigating infection in the aged population.

IMMUNO-DETECTION OF G4 DNA STRUCTURES FORMED FROM PKD1 SEQUENCES IMPLICATES STRUCTURE FORMATION IN CYSTOGENESIS.

Aimee Madsen, BS; Amy Lorber, BS; Kemin Su, PhD; Gloria Alvarado, PhD; Erik Larson, PhD

MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine; Biomedical Sciences, Illinois State University; Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

A majority of Autosomal Dominant Polycystic Kidney Disease (ADPKD) cases are caused by inactivation of the PKD1 gene, where one pathogenic mutation is inherited from an affected parent and the second allele is inactivated somatically. Disruption of PKD1 results in loss of the protein product, polycystin-1, and the development of 1,000s of noncancerous cysts. It is currently unknown why PKD1 is prone to inactivating mutagenesis, but one pathway may be connected with the gene sequence itself. We have discovered that PDK1 encodes extensive structural motifs, consistent with the formation of DNA structures called G-quadruplex (G4) DNA. G4 DNA is four stranded and forms from tandem guanine repeats during transcription or replication that both regulate gene expression and increase the risk of mutagenesis. While generally associated with genetic instability, the types of sequences supporting G4 formation in the cell are diverse and largely uncharacterized. Therefore, we have investigated the ability of suspect G4 sequences in PKD1 to adopt G4 structures under physiological conditions. We developed and applied a new dot-blot detection method that depends on a G4-specific antibody for visualizing G4 formation. In contrast to controls, we found that G4 repeats in PKD1 form G4 structures in vitro. The ability of PKD1 sequences to form G4 DNA further connects structures with PKD1 gene inactivation. This is important for establishing the mutagenic pathways leading to loss of PKD1 and ADPKD, but may also help identify structural targets for ligands aimed at reducing the potential for somatic gene inactivation in at risk individuals.

WHEN LIFE GIVES YOU GLUCOSE: DIFFERENCES IN GLUCOSE UPTAKE AND UTILIZATION SUGGEST ALTERED ASTROCYTE FUNCTION IN OBESITY MODELS

Keenan Boulnemour, BS; Kendall Smith, BA; Daniel Micheli, BS; Peter Vollbrecht, PhD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2022; Western Michigan University Homer Stryker M.D. School of Medicine; Biomedical Sciences; Western Michigan University Homer Stryker M.D. School of Medicine

Background: Obesity affects 93 million people in the United States, is responsible for annual medical costs of \$175 billion, and is associated with health problems such as cardiovascular disease, mental illness and death. To elucidate the pathophysiological mechanisms that underlie obesity, we utilized two uniquely selected populations of rat models: obesity-prone (OP) and obesity-resistant (OR). Previous studies have reported astrogliosis in obesity models and in humans with obesity, with most of this work done in the hypothalamus and hippocampus. In an effort to understand behavioral comorbidities we are examining alterations in astrocyte function in reward circuitry.

Objective: Here we examine functional differences in glucose uptake and utilization in the nucleus accumbens (NAc) and examine the role of astrocytes using both microdialysis and western blotting techniques.

Methods: ¹³C-labeled glucose or sucrose was administered to animals in conjunction with microdialysis sampling within the NAc allowing for real-time evaluation of glucose utilization. Standard western blotting methods were utilized to examine protein expression differences within the NAc.

Results and Discussion: Obesity-prone animals demonstrated reduced ¹³C-glucose uptake within the NAc compared to obesity-resistant animals. Obesity-prone animals had greater levels of ¹³C-labeled glutamate while having lower levels of ¹³C-GABA and glutamine. Protein expression studies are ongoing.

Conclusion: Reduced glucose uptake, as well as lower radiolabeled GABA and glutamine levels, are indicative of altered astrocyte function. Continuing studies are examining differences in protein expression and function between obesity-prone and obesity-resistant rats in order to better understand the pathophysiology of obesity and its neurocognitive comorbidities.

IDENTIFICATION OF FUNCTIONAL PARTNERS OF TRANSLATION ELONGATION FACTOR 3 IN SACCHAROMYCES CEREVISIAE

Emily Manzon, BS; Terri Kinzy, PhD

Biological Sciences, Western Michigan University; Vice President for Research and Innovation, Western Michigan University

Fungal infections are responsible for 1.6 million human deaths each year. Few effective anti-fungal drugs are available, and many have serious side effects. Most of these drugs target aspects of the cell membrane, offering a limited selection as cases of resistance increase. While protein synthesis is not a common focus for drug discovery because of similarities between fungi and host cells, eukaryotic Elongation Factor 3 (eEF3) is highly conserved in fungi but not found in higher eukaryotes. This makes it an excellent target for novel anti-fungal drugs. eEF3 interacts with the ribosome during the translation elongation step of protein synthesis and is essential for yeast survival. However, little is known about the functional partners of eEF3. We are identifying genes that influence this factor with a screen for suppressors of a conditional eEF3 mutant. The mutant contains two missense mutations F803A R806A in a unique chromodomain insertion in the second ATP binding domain of eEF3 that shows significant interactions with multiple ribosome components by cryo-EM. Through UV mutagenesis, we randomly generated putative suppressor mutations that restore growth to the eEF3 temperature-sensitive phenotype. Eleven strains showed improved growth rate, reduced temperature sensitivity, and many have altered susceptibility to translation-inhibiting drugs. Whole genome sequencing of the putative suppressors showed multiple genes potentially involved in eEF3 function. Further analysis of the mutations in these proposed suppressor genes will determine their impact on cell function. These experiments will lay the foundation for the development of a novel class of anti-fungal therapeutics that target eEF3.

**NATIONAL TRENDS AND OUTCOMES OF GENETICALLY INHERITED METABOLIC
FORMS OF LIVER CIRRHOSIS:
RESULTS FROM THE NATIONWIDE INPATIENT SAMPLE (NIS) DATABASE**

Eric Sieloff, MD; Duncan Vos, MS; Thomas Melgar, MD

Internal Medicine, Biomedical Sciences, Medicine Pediatrics;
Western Michigan University Homer Stryker M.D. School of Medicine

Background: Current medical literature is lacking in terms of the prevalence and outcomes associated with liver cirrhosis due to genetically inherited errors of liver metabolism. Such diseases include alpha-1 antitrypsin deficiency, cystic fibrosis, Wilson disease, hereditary hemochromatosis, type 1 tyrosinemia and glycogen storage diseases. We performed the following analysis to determine the healthcare utilization trends for liver cirrhosis in these susceptible patients in the United States.

Methods: The National Inpatient Sample (NIS) database was used to extract data from 2010-2014 for patients with cirrhosis due to genetic causes by utilizing International Classification of Diseases (ICD-9) codes for cirrhosis of the liver without mention of alcohol (571.5) and codes associated with the listed genetic diseases above (273.4, 277.03, 275.1, 275.01, 270.2 and 271.0).

Results: Between 2010-2014 there were 8,613 weighted discharges and \$595,671,631 in hospitalization charges for patients with a diagnosis of cirrhosis secondary to genetic disorders of liver metabolism. In 2010 there were 1,339 hospital discharges at a total of \$81,498,916 which increased to 1,975 discharges in 2014 at a total of \$170,418,676. Alpha-1 antitrypsin deficiency was associated with the most discharges (n = 5,450, 63.28%) and the fewest were due to type 1 tyrosinemia (n = 50, 0.57%). There was a total of 509 in-hospital deaths between 2010-2014, with the majority associated with alpha-1 antitrypsin deficiency (n=337).

Conclusion: Substantial expenditures and patient mortality was seen associated with liver cirrhosis secondary to genetic disorders between 2010-2014. With increased research funding, improved patient outcomes and reduced long-term expenditures can be sought.

TUBERCULOUS PERICARDITIS IN THE UNITED STATES- TRENDS AND ASSOCIATIONS FROM THE HEALTHCARE UTILIZATION PROJECT NATIONWIDE INPATIENT SAMPLE DATABASE.

Neiberg Lima, MD; Duncan Vos, MS; Ricardo de Castro, MD; Rheanne Maravelas, MD;
Christopher Stancic, BS; Mireya Diaz, PhD; Thomas Melgar, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Other, Western Michigan University Homer Stryker M.D. School of Medicine; Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2020; Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine; Medicine Pediatrics

Introduction: Tuberculosis extra-pulmonary manifestations can contribute greatly to its mortality and morbidity. The purpose of our study was to better describe the characteristics, risk factors, and trends of Tuberculous Pericarditis in the United States.

Methods: This study is a retrospective review from the NIS-HCUP Database from 2002-2014. Inclusion criteria consisted of the presence of at least one billing code for TB and at least one billing code for pericarditis. We compiled lists of codes for known TB risk factors and performed procedures.

Results: There are 744 weighted discharges that have an billing code for both tuberculosis and pericarditis. The majority of the weighted discharges had an expected primary payer as Medicare. The data contained 338 weighted discharges with TB pericarditis that underwent one of the following procedures: Pericardial window, pericardiocentesis, pericardiectomy or pericardial biopsy. T2DM was reported in 16.22% of the discharges whereas 17.25% of discharges without TB pericarditis had an billing code for T2D. Cancer was present in 21.08% of the discharges whereas, 7.56% of discharges without TB pericarditis had an billing code for cancer. CKD was reported in 11.97% of the discharges the TBp patients whereas 8.08% of discharges without TB pericarditis had an billing code CKD.

Conclusions: Our study identified a low incidence in the USA over 12-year study period. Our results substantiate risk factors for TBp related to CKD and cancer. Even though the prevalence for TBp is low, it is important that clinicians be aware of this diagnosis due the mortality and morbidity associated.

THE CONTRIBUTION OF POSITIONAL ASPHYXIA TO OPIOID RELATED DEATHS

Joyce deJong, DO; Jenelle Lee, BS; Cuyler Huffman, MS; Abigail Grande, MPH; Theodore Brown, MD; Chloe Bielby, MPH

Pathology, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine; Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Diagnostic criteria for positional asphyxia are multiple and include finding the decedent in a position that does not allow for adequate respiration and an inability to extricate oneself from the position due to various conditions.

Objective: Our primary objective is to assess whether airway compromise is a contributing factor to death due to the toxic effects of opioids.

Methods: We evaluated 225 deaths where the death scene investigation documented possible airway obstruction and performed a Pearson Chi Square test to determine whether the proportion of deaths found in an airway compromising position is higher when the death was caused by opioid toxicity.

Results: With an associated p-value of $<.0001$, the proportion of decedents found in a potentially airway compromising position is greater when the death was related to opioid use. After removing the maybes [Yes (27%) vs No (11.29%)], there was also sufficient evidence, with a p-value of 0.0021, that the proportion of decedents found in a definite airway compromising position is greater in deaths related to opioid use. Other results included a higher proportion of facial compression in the opioid-related deaths (28% vs 13%, p-value 0.0057), and at least one position decedents were found in may have an increased prevalence in opioid-related deaths.

Discussion: Carefully documenting the position in which the decedent is initially found should be a significant factor in accurate reporting and may help guide future harm reduction efforts to decrease the opioid mortality rate.

DOES HEALTH INSURANCE TYPE AFFECT THE QUALITY OF MEDICAL CARE FOR CHEST PAIN IN THE EMERGENCY DEPARTMENT?

Katelyn King, BS; John Hoyle, MD; William Evans, PhD

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine; Emergency Medicine; Western Michigan University Homer Stryker M.D. School of Medicine; University of Notre Dame

Background: Since implementation of the Affordable Care Act, the percent of the US on Medicaid increased from 12% (2008) to 21% (2016). Despite this, the US still has poorer outcomes than other developed nations. Questions arise about the quality of healthcare with Medicaid.

Purpose: Evaluate differences in emergency care for privately insured versus Medicaid.

Methods: We examined the Florida Ambulatory and Emergency Department Patient Database for 2014 when Medicaid expansion began. We examined patients < 64 years old, eliminating Medicare, with "chest pain" as chief complaint. Dummy variables were created that grouped the sample into private, Medicaid, or uninsured. A regression model was used that controlled for age, gender, race, income, poverty rate per zip code, and hospital.

Results: Results are presented as percentages compared to privately insured. Total gross charges for Medicaid were 3.7% less and uninsured 9.2% less ($p<0.01$). Medicaid had 11.5% fewer admissions ($p<0.01$) and uninsured 23.9% ($p<0.05$). There was no difference in obtaining EKGs between groups. Medicaid received 6.8% less CXRs ($p<0.01$), 21.5% less CT scans ($p<0.01$) and 28.8% less cardiac catheterizations ($p<0.01$). Pharmacy charges with Medicaid were 20.9% higher ($p<0.01$).

Conclusion: Medicaid expansion increased those with insurance, but Medicaid patients did not receive the same care as private insurance patients with fewer expensive and invasive treatments, yet more medications than private insurance patients presenting with same complaint. Significant differences exist in treatment, especially procedures, between insurances, for chest pain.

PRIMARY PYOMYOSITIS IN CHILDREN IN THE UNITED STATES- TRENDS AND ASSOCIATIONS FROM THE HEALTHCARE UTILIZATION PROJECT NATIONWIDE INPATIENT SAMPLE DATA

Kathleen Jenkinson, DO; Anya Ring, DO; Naveen Emmanuel, DO; Rheanne Maravelas, MD;
Duncan Vos, MS; Jayne Barr, MD; Sapna Sadarangani, MD; Thomas Melgar, MD

Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine; Other, Western Michigan University Homer Stryker M.D. School of Medicine; Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine; , Singapore National Centre for Infectious Disease; Medicine Pediatrics

Introduction: Pyomyositis is a skeletal muscle infection that can lead to abscess formation and sepsis with a bimodal distribution peaking in early childhood. The purpose of this study is to identify characteristics, risk factors, and trends of pyomyositis in children in the United States.

Methods: This study is a retrospective review of the Healthcare Utilization Project Nationwide Inpatient Sample Database from 2002-2014. Infective myositis and/or tropical pyomyositis cases were systematically identified using ICD-9 codes. Rates of co-occurrence were obtained for various infections, risk factors, and bacterial diagnoses.

Results: During the study period, there were 18,919,261 pediatric discharges (<21 years), of which 3,193 patients were diagnosed with pyomyositis. Median age was 7.2 years (IQR 3.6, 12.1). The prevalence of pyomyositis was 0.006 – 0.117%. The prevalence appears to linearly increase during the study period.

Patients with pyomyositis were more likely to have osteomyelitis, septic arthritis, type II diabetes, obesity, and organ transplantation. Bacteremia occurred in 15% and muscle abscess in 28% of patients. Fewer than half of patients had a bacterial organism identified, with MSSA and MRSA being the most common (59%, and 22% respectively). Other organisms identified were Streptococcus, Escherichia coli, and Pseudomonas.

Conclusions: There is a rapid increase in pediatric pyomyositis in the United States. This is similar to adult reports. Immunosuppression, obesity, diabetes mellitus are risk factors, and osteomyelitis and septic arthritis are potential complications. We identified causative microorganisms that may assist in optimizing empiric antibiotics as early diagnosis and treatment are key in the management to improve outcomes.

TEACHER TRIAL: TEACHING EFFECTIVE CPR TO 4TH AND 5TH GRADE ELEMENTARY STUDENTS

Cyle Rogotzke, MD; Sherrie Bencik, MD; Joseph Billian, MS; Maureen Ford, MD;
Nathan Elg, DO; Cambrie Bencik; Joshua Mastenbrook, MD

Emergency Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Other, Western Michigan
University Homer Stryker M.D. School of Medicine; Harpers Heart Heroes; Emergency Medicine;
Western Michigan University Homer Stryker M.D. School of Medicine

Background: Cardiac arrests are a leading cause of mortality in the US. Many states have CPR training requirements for high school graduation. There is a paucity of research on CPR education and assessment in elementary students. We hypothesized that 4th and 5th grade students could attain the knowledge of, and be physically equipped to provide, hands-only CPR.

Methods: Students were taught basic resuscitation physiology and hands-only CPR using videos and inflatable CPR manikins. Knowledge gain was assessed by a thirteen-question pre-test and 2-week post-test, at which time students also performed 1-minute of hands-only CPR on an adult manikin. CPR skills were assessed by an eleven-step checklist and manikin software analyzing compression effectiveness. A secondary analysis evaluated association between compression effectiveness and age, gender, and BMI.

Results: 358 students completed the study. On average, students answered 1.1 more questions correctly on the post-test than the pre-test ($P < 0.0001$). Self-reported CPR knowledge increased from 45% to 97%. At least 8 resuscitation steps were completed by 72% (95% CI, 68-77%) of students. 76% (95% CI, 71-80%) of students were able to deliver at least half of their compressions effectively. Age, but not gender or BMI, was significantly associated with compression effectiveness ($P < 0.0001$).

Conclusions: Most students were able to learn hands-only CPR and apply the knowledge in a simulated cardiac arrest and deliver effective chest compressions. Following the intervention, the students felt more prepared and were more willing to do CPR. It would be reasonable for older elementary students to be taught hands-only CPR.

GOING VERTICAL: A PROSPECTIVE COMPARISON OF EXTRACTION TIMES FOR PRIORITY PATIENTS IDENTIFIED BY TRIAGE TAGS VS COLORED FLAGS DURING A SIMULATED MCI

Abigail Wen-Yu Cheng, BS; Patrick McCreesh, MS; Seth Moffatt, BS;
Ryan Maziarz, BS; Duncan Vos, MS; Joshua Mastenbrook, MD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine; Emergency Medicine

Background: Triage is the process of sorting patients based on illness severity and is used during mass casualty incidents (MCIs) for prioritizing treatment and transport. On average, 10% of MCI patients are identified as priority (Immediate/Red). Outcomes for these patients are highly dependent on rapid identification, treatment, and transport. Several methods exist to mark [priority] patients for rapid extraction to a casualty collection point, but there is no gold standard. We hypothesized that identifying MCI patients with a vertical cue, triage flag (TF), would result in faster extraction times than those with a wrist triage tag (TT) alone.

Methods: BDLS-trained first-year medical students were recruited for this prospective randomized cross-over study. Two 1,568 square-foot fields (TTs or TTs plus TFs) were each arranged with 32 randomly placed, triaged, pre-marked manikins (10-red, 17-yellow, 5-black). The total time for participants to report the TT barcode number via radio of only the priority manikins, a proxy for the extraction process, was recorded.

Results: Eighty-two students participated. The average (SD) completion times for the "tags" and "flags" arms were 94.5s (16.4) and 70.7s (13.2), respectively, with an average decrease of 23.8s ($p < 0.0001$), or a 25.2%-time reduction, favoring the "flags" arm.

Conclusion: Using a vertical cue, such as a triage flag, may decrease the time to extract high priority patients. A portable, rapidly deployable, and visually apparent triage marker may allow faster identification, by extraction teams, of specific patients across a field of multiple victims of varying injury severity, than a flat horizontal triage tag.

WEIGHT ESTIMATION METHODS AND ASSOCIATED DOSING ERRORS OF PEDIATRIC PATIENTS TREATED BY PARAMEDICS

Nabeel Mallick, BA; John Hoyle, MD; Glenn Ekblad, MD; Tracy Hover, BS; Rasha Kazi, MD; William Fales, MD

MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine;
Emergency Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: An accurate weight is the first step drug dosing. Paramedics have multiple options to obtain a pediatric patient's weight. We analyzed the methods used, measurement errors, and associated dosing errors.

Methods: 36 EMS crews completed four simulation scenarios: infant seizure, 18-month-old burn, 5-year-old anaphylactic shock and infant cardiac arrest. Performance was scored by direct observation and video review. Dose error was defined as $\geq 20\%$ difference from the correct dose. Near misses with the Broselow Tape (BLT) were defined as a correct dose after a measurement error.

Results: 141 scenarios were completed. Methods to obtain weight and their accuracy were (#/%-accuracy): Asked parent for patient's weight (17/12.1%-94.1%), age (35/24.8%-74.3%), BLT (89/63.1%-88.8%). There were 20 (14.2% 95% CI 9.4, 20.9) incorrect weight estimations that resulted in 18 (12.7% 95% CI 8.2, 19.3) dosing errors overall. BLT was used incorrectly in 52/89 59.1% 95% CI 48.1, 68.1) cases with 6 (6.7%, 95% CI 5.4, 23.0) dosing errors and 46/89 (51.6%, 95% CI 41.5, 61.8) near misses. BLT errors were patient leg not straight (27/52 52.0% 95% CI 38.7, 65.0), tape not tight (4/52 7.7% 95% CI 3.0, 18.2), and incorrect measurement of seated patient (18/52 34.6% 95% CI 23.2, 48.2). All BLT-associated dosing errors occurred measuring a seated patient. There was one pound to kilogram conversion error resulting in a 250% overdose.

Conclusion: Paramedic pediatric weight estimation is error prone. There were frequent near-misses and dosing errors with BLT usage. This has systems implications for weight measurement, paramedic training, and patient safety.

CARING FOR A DYING PATIENT: AN EMS PERSPECTIVE

Andrew Wenger, DO; Megan Potilechio, DO; John Auguilar, MD; Joshua Mastenbrook, MD;
Joseph Billian, MS; Melissa Sherfield, BS

Emergency Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Family and Community Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Biomedical Informatics, Western Michigan University Homer Stryker M.D. School of Medicine

Background: Emergency Medical Services (EMS) providers frequently encounter patients in end-of-life situations. These situations can become ethically challenging depending on the nature of the event, availability of advanced directives, and overall understanding of the situation by the patient and caregivers. This is particularly true for patients who are enrolled in Hospice, a specific form of end-of-life care available to patients with a terminal illness and expected lifespan of less than six months.

Objective: This study aims to survey Michigan EMS providers regarding encounters with Hospice patients to better understand challenges caring for this population and any need for additional educational curriculum.

Methods: An electronic survey was distributed via a statewide listserv to Michigan EMS providers and responses were collected via RedCap. An analysis was performed by a WMed statistician.

Results: Of 142 respondents, 98% percent had cared for a hospice patient, with 67% having greater than 10 encounters. 87% of respondents answered that they are interested in additional training regarding caring for hospice patients. Notable areas of difficulties among providers were pressure from family for more aggressive treatment (60%), inaccessible advanced care documents (79%), and difficulty contacting hospice personnel (56%).

Discussion: EMS providers are interacting with Hospice patients with increasing frequency though most have had little to no formal training in caring for this unique patient population. The results of this study indicate an educational gap that would be helpful to fill across Michigan's diverse EMS regions.

A NOVEL TASK TRAINER FOR BALLOON TAMPONADE OF GI HEMORRHAGE

Richard Lammers, MD; Mark Williams, BA; Joshua Mastenbrook, MD

Emergency Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine

INTRODUCTION: Gastro-esophageal balloon tamponade (GEBT) of massive hemorrhage from esophageal varices is an infrequent and risky procedure performed on unstable patients. Such procedures are ideally learned on simulators. Unfortunately, no commercial trainer is available.

STUDY OBJECTIVES: The primary objective was to determine if a new task trainer provides sufficient realism and enhances confidence among resident physicians learning GEBT. The secondary objective was to determine if integrating procedural training into a case simulation is educationally effective.

MATERIALS & METHODS: This was a cross-sectional study of Emergency Medicine residents from WMed who participated in a simulation exercise. An esophagus/stomach model allowing passage of a Sengstaken-Blakemore tube and inflation of balloons to therapeutic pressures was built into a mannequin. Teams of residents managed a simulated case of GI hemorrhage that required tube insertion and safe inflation of gastric and esophageal balloons, followed by debriefing. The procedure was incorporated into the scenario without prior training. Subjects completed an anonymous, online, 13-question survey. Results were analyzed using descriptive statistics.

RESULTS: Sixteen residents participated in the simulation and completed the survey. Only two subjects had prior clinical experience with the procedure. Most found the model (81%) and the case (94%) realistic. 94% said they acquired valuable knowledge and skills, and 63% reported that their confidence improved. 94% found contextual exposure to the procedure during a case simulation to be valuable. The educational methods that respondents thought were most motivating and efficient varied.

CONCLUSION: This novel gastro-esophageal balloon tamponade task trainer was realistic and educationally valuable.

HYPOXIA INITIATES THE REPROGRAMMING OF MUSCLE CELLS INTO MULTIPOTENT LIKE CELLS

Nariaki Nakamura, BS; Haiying Pan, BS; Keith Kenter, MD; Yong Li, MD PhD

Medical Engineering, Western Michigan University Homer Stryker M.D. School of Medicine; Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine

Cellular reprogramming is a phenomenon in which fully differentiated cells are reprogrammed into pluripotent stem cells. This process is done through the activation of critical transcription factors Oct4, Sox2, and Nanog. Recent studies have indicated that the addition of hypoxia to culturing conditions increased the efficiency of cellular reprogramming by increasing the expression of Oct4, Sox2, and Nanog. In addition, cells exposed to hypoxia displayed enhanced stem cell behavior such as increased cell migration, cell proliferation, and the ability to multiply differentiate. Therefore, we hypothesize that hypoxia can impart the same effect on muscle cells and reprogram them back into muscle stem cells. We investigated this by culturing muscle cells, such as myoblasts (C2C12) and primary (Pax7 positive) muscle satellite cells under hypoxia and observing changes in the level of transcription factors (Oct4, Sox2, and Nanog) and changes in the expression of muscle development gene (Msx1). We discovered that hypoxia increased the expression levels of Oct4, Sox2, and Nanog after 24 hours of hypoxia. Additionally, after 4 hours, Msx1 increased in conjunction with hypoxia inducible factor (HIF)-1alpha suggesting that Msx1 plays a pivotal role during cellular reprogramming. Our results suggest that hypoxia stimulates the reprogramming of muscle cells into progenitor-like cells, which has implications for its role in tissue regeneration and muscle healing after injury or disease.

HYPOXIC STIMULATION ACCELERATES MYOGENIC DIFFERENTIATION IN VITRO

Loyall Harris, BS; Nariaki Nakamura, BS; Haiying Pan, BA; Yong Li, MD PhD

MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine;
Medical Engineering, Western Michigan University Homer Stryker M.D. School of Medicine

Myogenic differentiation is a vital process in the repair of injured or damaged skeletal muscles. Previous studies have demonstrated that following injury, a population of cells termed injury-induced muscle stem cells (iMuSCs) can be isolated that display faster and more extensive proliferation, migration, and myogenic differentiation. It is believed that the localized hypoxia after injury results in the formation of iMuSCs as well as their amplified capacity for muscle regeneration. In this study, we hypothesize that hypoxic conditions can directly stimulate and accelerate myogenic differentiation. To prove our concept, a myoblast cell line (C2C12) and primary murine myoblasts (C57) were used to evaluate the effects of hypoxia. Cells were cultured under control or hypoxic (5% O₂) conditions for 48 to 72 hours prior to induction of myogenic differentiation. These cells were then examined for changes in morphology as well as their expression of myogenic markers by western blot and qPCR. We discovered more extensive myotube formation in the hypoxia stimulated muscle cells than the control non-treated cells. Moreover, qPCR results showed distinct increases in MyoD, MyHC, embryonic MyHC, and Pax7 in the cells with hypoxic stimulation compared to the control cells which is indicative of earlier, more rapid, and continued myogenic differentiation. These results indicate an important function of hypoxia in myogenic differentiation, especially after muscle injury. This discovery suggests an essential role for hypoxia in muscle healing that may be used in future treatments for injured and diseased muscles.

EVALUATION OF SUBMANDIBULAR SALIVARY GLAND TISSUE FOR USE AS AN ALTERNATIVE POSTMORTEM TOXICOLOGY SPECIMEN

Ernie Morton, MS; Prentiss Jones, PhD; Joseph Prahlow, MD; Julie Ianni

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine; Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine; Pathology, Western Michigan University Homer Stryker M.D. School of Medicine

Background: Biological specimens collected during autopsy and submitted for toxicological analysis provide valuable information in determining the cause of death in cases of suspected drug overdose. Specimens commonly collected during autopsy include central and/or peripheral blood, vitreous fluid, urine, and occasionally cerebral spinal fluid, bile, gastric contents, and various other tissues.

Purpose: It is advantageous to collect blood from more than one location and to collect more than one type of specimen on a case, thus providing a comparison of analytical results. Occasionally during autopsy there is a lack of appropriate alternative postmortem specimens from which to make a comparison. In this study, we attempt to justify the use of the submandibular salivary gland as an additional sample source in cases of suspected drug overdose. The testing of saliva for drug screening is commonplace in living individuals, and we hypothesize that numerous drugs and their metabolites will be present in the postmortem gland tissue.

Methods: The submandibular glands of 51 subjects, both drug-negative and drug-positive, were removed during autopsy and a portion of the tissue was homogenized. A solid phase tissue extraction was performed on the supernatant, then analyzed using liquid chromatography tandem mass spectrum (LC-MS/MS). These results were then compared to LC-MS/MS analyses of corresponding postmortem peripheral blood samples.

Discussion/Conclusion: To our knowledge, this is the first example of salivary gland tissue being used for postmortem toxicology testing. Preliminary findings suggest the technique is suitable for both opioid and non-opioid drugs when compared to blood samples.

DELETION OF THE HOMEBOX GENE CUX1 DECREASES CILIOGENESIS IN A MOUSE MODEL OF POLYCYSTIC KIDNEY DISEASE

Zhi Nee Wee; Emmanuel Kumar, BA; Matthew Rumschlag, BS; Conner Holthaus, BS;
Melissa Pasillas; Gregory Vanden Heuvel, PhD

MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine;
Biology, Kalamazoo College; Biology, Kalamazoo College; Biomedical Sciences, Western Michigan University Homer Stryker
M.D. School of Medicine

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is one of the most common inherited disorders affecting the kidney. Renal cyst development in ADPKD results from mutations in the PKD1 or PKD2 genes, which encode the proteins polycystin1 (PC1) and polycystin2 (PC2). PC1 and PC2 proteins are localized to primary cilia where they are proposed to form a receptor channel complex that detects flow transmitting a calcium-mediated signal. Primary cilia are critical to the pathogenesis of ADPKD, which is one of many ciliopathies that exhibit renal cystic disease. Cux1 is a cell cycle dependent transcriptional repressor that regulates the cyclin kinase inhibitor p27. Cux1 is highly and ectopically expressed in mice carrying a collecting duct (CD) specific mutation of Pkd1 (Pkd1 knockout) and in human ADPKD cells. Mice carrying mutations in both Cux1 and Pkd1 have reduced cystic disease and an increased life span. To begin to determine whether Cux1 regulates ciliogenesis we evaluated cilia morphology and the expression of the ciliary protein OFD1 in kidneys isolated from Pkd1 knockout and Pkd1/Cux1 double knock out mice. Cilia in Pkd1/Cux1 double knockout kidneys were significantly shorter than cilia in the Pkd1 knockout kidneys alone, consistent with previous studies showing that decreased cilia length corresponds to decreased cystic disease. In addition, expression of OFD1, an inhibitor of cilia formation was significantly increased in Pkd1/Cux1 double knockout kidneys compared to Pkd1 knockout kidneys alone. Taken together, our results suggest a novel role for Cux1 in regulating ciliogenesis in polycystic kidney disease.

RETINAL GANGLION CELL AND AXON REGENERATION IN ADULT MURINE GLAUCOMA

Sarah Webster, MS; Nathan Sklar, BS; David Linn, PhD; Cindy Linn, PhD

Biological Sciences, Western Michigan University; MD Class of 2021, Western Michigan University Homer Stryker M.D.
School of Medicine; Grand Valley State University; Biological Sciences, Western Michigan University

Glaucoma is a neurodegenerative disease of the retina, causing loss of the retinal ganglion cells (RGCs) and ultimately vision. We previously demonstrated that an $\alpha 7$ nicotinic acetylcholine receptor agonist, PNU-282987 (PNU), works as a neurogenic compound in adult mammalian retinas. We hypothesized that PNU stimulates regeneration to restore lost RGCs in an induced model of glaucoma in adult mice and that newly regenerated RGCs send axons down the optic nerve. Glaucoma-like damage was induced in adult mice by injecting 1.2M hypertonic saline into the episcleral venous plexus. This injection causes scar tissue that reduces aqueous humor outflow in the trabecular meshwork, leading to an increase in intraocular pressure, a significant loss of RGCs, and de-fasciculation of their axon bundles. Glaucomatous retinas were treated with 100 mMPNU and/or BrdU over a timeline of several days. To identify regenerated RGCs, cells were double labeled with Thy1.2 and BrdU. New cells were prevalent after just 3 days of PNU treatment. Like other models of regeneration, we determined that the source of new RGCs were from the resident Müller glia. Also, we observed axonal reorganization after PNU treatment. To test the hypothesis that new RGCs axons would converge in the optic nerve, we used a transgenic mouse line for lineage tracing studies. Our findings support the hypothesis that PNU treatment causes regeneration of lost RGCs following glaucomatous-like damage and project axons into the optic nerve. Further work is currently underway to determine if these new RGCs can restore vision.

SHORT INTERPREGNANCY INTERVALS ARE ASSOCIATED WITH POOR BIRTH OUTCOMES FOR WOMEN OF KALAMAZOO COUNTY

Rebecca Parr, MS; Duncan Vos, MS; Melissa Sherfield, BS; Catherine Kothari, PhD; Laura Bauler, PhD

MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Short Interpregnancy intervals (IPI) contribute to poor birth outcomes (PBO), including preterm birth, low birth weight, and fetal/infant mortality. IPIs are more prevalent for women of color, low SES, and less educated mothers compared to their counterparts.

Objective: This study examines the impact of IPI on birth outcomes for women in Kalamazoo County, where there is a large disparity in birth outcome by race.

Methods: A retrospective cohort study was conducted using birth records from women in Kalamazoo County between 2006-2017. IPI was defined as the time between two births minus the gestational period of the second pregnancy. Poor birth outcomes measured were low birth weight <2500g and preterm birth of <37weeks.

Results: Between 2006-2017 there were 57,949 births, to 37,527 mothers; 14,348 mothers had at least two pregnancies. The prevalence of PBOs, including preterm birth and low birthweight, increased for IPIs less than 6 months and greater than 5 years compared to the 18-24 month interval (PTB: 12.19% and 11.16% compared to 7.48%; LBW: 8.4% and 8.44% compared to 5.5%, respectively). For women of color the prevalence of preterm birth was even higher compared to white mothers with IPIs less than six months (18.92% compared to 9.08%).

Discussion/Conclusion: This suggests that pregnancy spacing is an important factor in improving the birth outcomes for mothers in Kalamazoo County, especially for women of color. Education and more effective contraceptive measures have been shown to decrease risk of pregnancy and increase IPI.

TIME TO BREAK THE POWER HIERARCHY: LISTEN TO WOMEN.

Megan Deibel, CNM, DNP; Silvia Linares, MD; Drew Moss, BS; Megan Sandberg, BS; Claudia Waters, BS;
Lynette Gumbleton, BA; Joi Presberry, MPH; Catherine Kothari, PhD

Medicine Obstetrics and Gynecology, Western Michigan University Homer Stryker M.D. School of Medicine;
MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine; Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Background: In Kalamazoo, women's voices from multiple venues (Fetal Infant Mortality Review interviews, maternal home visitation participants, and informal feedback from high-risk women) have consistently emphasized the importance of provider relationship to their healthcare satisfaction and their motivation for attending medical visits. Given the particularly crucial role that providers play during the perinatal period (ten-plus visits for health and social assessment, medical treatment, health promotion, and resource referrals), understanding women's experiences with their providers is critical to designing patient-centered care.

Goal: The goal of this study was to elicit women's relationship experiences (positive and negative) with perinatal-care providers, their priorities regarding this relationship, and their feedback for how to improve it.

Methods: One-hundred-and-seventy-eight women were pre-recruited from the Mom's Health Experience Survey, and 57 participated in 12 focus groups. The face-to-face group discussions were led by a facilitator and a co-facilitator, using a semi-structured guide with open-ended questions and follow-up probes. Conversations were audio-taped, transcribed, and consensus-coded for themes.

Results: Dominant themes emerging from women, voiced across a diverse group of participants included: Feelings of vulnerability, lack of respect from their provider, and an uneven balance of authority. Many women have the sense that the provider, not them, owns "the room." Women offered practical suggestions for building partnerships with them.

Conclusion: Pregnancy creates an immense state of vulnerability for women. Prenatal care and improved birth outcomes cannot be imagined if women are made to feel disempowered and disenfranchised as they enter into the medical system.

ROLE OF PSYCHOSOCIAL RISK FACTORS IN MOTHERS' ENGAGEMENT IN SAFE SLEEP PRACTICES

Summer Chahin, MA; Kalani Gates, BA; Amy Damashek, PhD; Cheryl Dickson, MD; Debra Lenz, MA; Grace Lubwama, PhD; Terra Bautista, BA; Catherine Kothari, PhD

Psychology, Western Michigan University; Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Kalamazoo Health and Community Services Department; YWCA; Kalamazoo Health and Community Services Department; Biomedical Sciences; Western Michigan University Homer Stryker M.D. School of Medicine

Infant mortality is a serious problem in the US (CDC, 2016). In Kalamazoo, sleep related deaths are a common cause of preventable infant mortality (Sleep-Related Infant Deaths in Kalamazoo County Fact Sheet, 2017). Such deaths can be largely prevented if caregivers follow the AAP safe sleep guidelines; however, many families experience barriers to following these guidelines. This study examined whether psychosocial risk factors act as barriers to mothers' engagement in safe sleep practices among a sample of Kalamazoo parents. Methods: Women (n = 244) were recruited from two hospitals in Kalamazoo County following the delivery of their infants. Demographic information was extracted from medical records, and women participated in a phone survey when their child was 2-4 months of age. The survey included questions about safe sleep practices and levels of depressive symptoms, substance use, and interpersonal violence. Results: Bivariate analyses indicated that mothers who were more depressed were more likely to indicate that they co-slept with their baby [t (265) = -2.1, p= 0.04]. Women who were experiencing a higher frequency of domestic violence indicated they were less likely to place their baby on a firm or hard mattress [t (34) = -2.9, p= 0.01]. Lastly, mothers who reported higher amounts of drug use reported that their infants were more likely to sleep in a crib [t (24) = -4.4, p=0.00]. Conclusion: Depression and domestic violence appear to put infants at a greater risk for sleep related death due to mother's lower likelihood of using safe sleep practices.

GEOGRAPHIC ACCESS TO PEDIATRIC CARE & PREVENTABLE ED VISITS FOR CHILDREN LIVING IN HIGH RISK NEIGHBORHOODS

Jacob Baxter, BS; Winnie Long, BS; Marine Bolliet, BS; Cheryl Dickson, MD; Kathleen Baker, PhD; Dennis Donkor, BS; Catherine Kothari, PhD

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine; Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Geography, Western Michigan University; Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Background/Intro: Children with greater access to pediatric care have fewer emergency department (ED) visits. Geographic accessibility is a key feature of pediatric access. Nationally, however, there is a shortage of primary care practices in low-income, high-risk neighborhoods.

Objective/Purpose: The goal of this study was to examine (1) the degree to which geographic access to pediatric care varied by neighborhood risk-level, and (2) whether geographic access reduced preventable ED visits by low-income children.

Methods: This secondary analysis combined census data, pediatric location, individual-level demographic and ED-utilization data. The sample was 10,570 low-income children, ages 0-5, in Kalamazoo County. Geographic access was operationalized as travel time to nearest pediatrician. Neighborhood risk factors included income, education, insurance, crime, and racial-equity. Preventable ED-visit was defined using the NYU ED-visit-severity algorithm. Geospatial analysis(ArcGIS) generated travel-time estimates. Mixed model regression analyzed fixed and random effects, controlling for clustering within neighborhood(SAS 9.4.).

Results: Adjusting for individual risk factors, low-income children's geographic access to pediatric care varied significantly by their neighborhood risk level(F261.92,p<.0001). Geographic access to pediatric care, when taken alone, reduced preventable ED visits(aOR0.993(CI 0.987,0.999)). However, geographic access did not mediate the relationship of neighborhood-level or individual-level risk with preventable ED visits: geog.access aOR 1.001(CI 0.995,1.008), neighborhood-risk aOR 1.140 (CI 1.015,1.280), individual risk aOR 1.358(CI 1.247,1.478).

Conclusion: Low-income children living in high-risk neighborhoods have reduced geographic access to pediatric care and higher rates of preventable ED visits, compared to their low-income counterparts living in lower-risk neighborhoods.

INCREASING HIV PATIENT ADHERENCE TO ART WITH A SMARTPHONE-BASED INCENTIVE INTERVENTION

Haily Traxler, MA; Amanda Devoto, MA; David Cosottile, MA; Anthony DeFulio, PhD

Psychology, Western Michigan University

Background: Antiretroviral therapy (ART) improves life expectancy and quality of life for individuals living with HIV. ART adherence of >95% drastically decreases the likelihood of transmission to others, but many people with a history of drug use do not maintain this level of adherence.

Purpose: The purpose of this study was to develop a mobile contingency management (CM) intervention for promoting medication adherence in people with a history of drug use.

Methods: Fifty participants with a history of opioid or cocaine use were enrolled in the study for six months and randomly assigned to either a control (n=25) or treatment (n=25) group. Treatment group participants received a smartphone loaded with a CM intervention app that allowed for (1) direct observation of medication consumption through video selfies, (2) easy tracking of incentive earnings, (3) easy access to adherence-related resources, and (4) a dosing reminder texting system.

Results: The proportion of individuals who achieved 95% adherence increased over time in the treatment group and decreased over time in the control group, and was significantly different in the final study month (55% vs. 19%; $p=0.015$).

Discussion/Conclusion: Usage data showed a high levels of intervention engagement and correct usage, and self-reports showed a high level of intervention acceptability.

IS BLOODSTREAM INFECTION AN EPIPHENOMENON IN SURGICAL PATIENTS?

Joslyn Jose, MD; Robert Sawyer, MD

Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Background: Bloodstream infection (BSI) is not uncommon in the ICU setting. It seems that rather than being another part of the milieu of critical illness in surgical ICU patients, BSI may be an important predictor of mortality.

Methods: Data on all infections treated between 1997 and 2017 in a single Surgical Intensive Care Unit (ICU) were prospectively collected. Patients were categorized by primary site of infection and presence or absence of associated BSI (same organisms grown from primary site and blood). Demographic and outcome variables were compared using Student's t-test or Chi-square analysis. Logistic regression analysis was used to determine independent predictors of death, including the following variables: Age, sex, trauma vs. non-trauma, APACHE II score, days from admission to infection treatment, and presence or absence of BSI.

Results: Over 6,000 patients were studied during this 20 year period, and BSI was associated with increased mortality in patients with concurrent (detected within 72 hours) infections of the abdomen, lung, urine, and other primary site infections, as demonstrated in the attached table. Regression analysis demonstrated that even after correcting for the above variables, BSI was associated with increased mortality (OR = 1.51, 95% CI = 1.21-1.89).

Conclusion: This study demonstrates a statistically significant association that cannot be overlooked. BSI was an independent predictor of mortality, despite patients receiving a longer duration of therapy. Thus, surgeons may consider obtaining blood cultures promptly if a significant primary site infection is detected; this may lead to earlier initiation of treatment and improved outcomes.

PEDIATRIC SUPRACONDYLAR HUMERUS FRACTURES CAN BE SAFELY TREATED BY ORTHOPAEDIC SURGEONS WITH AND WITHOUT PEDIATRIC FELLOWSHIP TRAINING

Kelly Harms, MD; Shannon South, BA; Karen Bovid, MD; Keith Kenter, MD

Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine; Kalamazoo College, Kalamazoo College; Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: The purpose of this study was to compare the outcomes of pediatric patients who were surgically treated for a supracondylar humerus fracture by pediatric fellowship-trained orthopaedic surgeons (PFT) to the outcomes of those surgically treated by orthopaedic surgeons without pediatric fellowship training (NPFT). We hypothesized that there would be no differences in patient outcomes.

Methods: A retrospective review of pediatric patients who underwent surgical treatment for a supracondylar humerus fracture with closed reduction and percutaneous pinning or open reduction and percutaneous pinning at a regional level 1 trauma center over a 5-year period was performed. Exclusion criteria were inadequate follow up or absence of postoperative radiographs.

Results: A total of 201 patients met the inclusion criteria. PFT group treated 15.9% of patients. The measured demographic variables were similar between groups. The average age was 5.4 years and 49.3% were female. There was no statistically significant difference in carrying angle, Baumann's angle, or lateral rotation percentage at final follow up between PFT and NPFT groups.

Conclusion: In this study, there was no difference in radiographic outcomes for patients with supracondylar humerus fractures surgically treated by either group. This suggests that this injury may be appropriately treated in communities without a pediatric-fellowship trained orthopaedic surgeon without compromised outcomes. This surgical technique can be considered a general orthopaedic surgery procedure and should be emphasized as part of an orthopaedic residency. This approach could minimize unnecessary costs and delays to treatment in this patient population.

TO CULTURE OR NOT TO CULTURE: DOES MICROBIOLOGY AFFECT MORTALITY AFTER INTRA-ABDOMINAL INFECTION?

Laura Stearns, MD; Sarah Khalil, MD; Robert Sawyer, MD

Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Intra-abdominal infections (IAI) require both antibiotic therapy and source control for adequate treatment. Culture obtained at timing of source control can help to direct antimicrobial therapy. We hypothesize that availability of cultures for the management of IAI is associated with lower mortality. All IAI treated between 1997 and 2017 at a single institution were stratified by whether or not cultures were obtained during operation or drainage procedure. Demographics and in-hospital mortality were compared by Student's t test and Chi-Square analysis, predictors of mortality by logistic regression (LR) analysis. A total of 2963 IAIs were treated, 1062 (35.8%) without culture and 1901 (64.2%) with cultures. The patients without culture had a significantly lower average APACHE II score (11.0 ± 0.2) compared to the culture group (13.4 ± 0.2) ($p < 0.0001$). The no culture group also had a significantly lower percentage of healthcare associated infections compared to the culture group (51.4% versus 70.4%, $p < 0.0001$). Independent predictors of mortality included age, APACHE II score, and history of prior cellular transfusion during hospitalization, but not the availability of cultures ($p = 0.26$). The no culture group had a significantly lower duration of antimicrobial therapy than the culture group (10.2 ± 0.3 days versus 13.9 ± 0.3 days, $p < 0.0001$). In this study, we found no evidence that obtaining cultures improved survival following the treatment of IAI. These findings suggest that the practice of culturing IAI should be abandoned and further highlight the importance of source control for determining outcomes.

RADIOGRAPHIC MEASUREMENTS OF THE 1ST TARSONOMETARSAL (TMT) JOINT FOLLOWING 1ST METATARSOPHALANGEAL (MTP) JOINT ARTHRODESIS

Christopher Traynor, MD; James Jastifer, MD

Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine;
Orthopedic Surgery, Borgess Medical Center

Background: Instability of the 1st tarsometatarsal (TMT) joint has been proposed as a cause of hallux valgus. While there is literature demonstrating how fusion of the TMT joint effects hallux valgus, there is little published on how correction of the hallux valgus impacts the 1st TMT joint alignment.

Purpose: The purpose of this study was to determine if correction of hallux valgus impacts the 1st TMT alignment. Improvement in alignment would provide evidence that hallux valgus contributes to 1st TMT instability, not vice-a-versa. Our hypothesis was that correcting hallux valgus angle (HVA) would have no effect on the 1st TMT alignment.

Methods: Radiographs of patients who underwent 1st MTP joint arthrodesis for hallux valgus performed by the senior surgeon were retrospectively reviewed. The HVA, 1-2 intermetatarsal angle (IMA), medial cuneiform-1st metatarsal angle (MCMA), distal medial cuneiform angle (DMCA), relative cuneiform slope (RCS), and 1st metatarsal-medial cuneiform angle (MMCA) were measured and recorded for all patients preoperatively and postoperatively.

Results: Of the 37 patients that met inclusion criteria, statistically significant radiographic improvements were noted in HVA (mean difference 25.3 degrees, $p < 0.0001$), IMA (mean difference 5.98 degrees, $p < 0.0001$), MCMA (mean difference 5.70 degrees, $p < 0.0001$), RCS (mean difference 3.25 degrees, $p = 0.04$), and MMCA (mean difference 7.17 degrees, $p < 0.0001$) comparing preoperative and postoperative radiographs.

Conclusions: Our findings suggest that the radiographic subluxation of the 1st TMT joint will reduce with isolated treatment of the 1st MTP joint. This provides evidence that change in the HVA causes changes in the first TMT joint, not vice-a-versa.

OUTCOMES OF MEDICAL VERSUS SURGICAL THERAPY FOR PERITONSILLAR ABSCESS

Aaron Zebolsky, MS; Emma Swayze, MS; Seth Moffatt, BS; Corbin Sullivan, MD

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
ENT, Head and Neck Specialists, Bronson Methodist Hospital

Background: Peritonsillar abscess (PTA) is a relatively common deep neck space infection that may progress to airway compromise and sepsis if managed incorrectly. Surgical therapy (ST) such as incision and drainage is the mainstay of therapy for PTA, but recent data shows that medical therapy (MT) with antibiotics and steroids alone may be equivalent. Bronson Methodist Hospital is among several institutions that have shifted towards this approach.

Objective: To evaluate the clinical characteristics and rate of treatment failure for MT and ST in patients presenting to the Bronson Emergency Department (ED) for PTA.

Study Design: Retrospective Cohort

Methods: All PTA diagnoses in the Bronson ED from 2012 to 2019 were identified via International Classification of Diseases codes 475 (9th edition) and J36 (10th edition). Failure rates for each group were calculated with a 95% confidence interval. Patient demographics, clinical presentation, and abscess size were summarized for each group.

Results: 467 patients met inclusion criteria. 172 were randomly selected for preliminary analysis of which 126 (72%) underwent MT while 46 (28%) received ST. The rate of treatment failure was 7.1% [95% CI 3.3, 13.1] in the MT group and 8.7% [95% CI 2.4, 20.8] in the ST group.

Conclusion: Preliminary analysis supports the hypothesis that MT may be equivalent to ST in the management of PTA. This represents a major shift in the management of PTA, which could greatly decrease the healthcare cost and patient discomfort associated with surgical therapy for PTA.

POSTER PRESENTATIONS

POSTER PRESENTATIONS

BASIC SCIENCE RESEARCH POSTERS

1. **Development and functional characterization of anti-phosphorylcholine antibodies against streptococcus pneumoniae** Naeem Khan, PhD; Alexander Ludlow, BS; Xiaoti Guo, PhD; Angela Brightwell, MS; Thomas Rothstein, MD PhD
2. **Synthesis of a GO/PEDOT-DMSO electroactive nanocomposite for tissue engineering application** Mitchell Kenter, BA; Adil Akkouch, PhD
3. **Design and fabrication of a knee-on-a-chip microdevice using 3D printing** Letty Thottathil, BS; Adil Akkouch, MSc, PhD
4. **A study of neuronal differentiation of hypoxia-induced reprogramming muscle cells in vitro** Rachael Tolsma, BS; Haiying Pan, MS; Nariaki Nakamura, BS; Yong Li, MD PhD
5. **Characterization of Immunoglobulin M in B Cell-Derived Extracellular Vesicles** Michael Gutknecht, PhD; Nichol Holodick, PhD; Thomas Rothstein, MD PhD
6. **Evaluation of the anti-inflammatory effects of low-dose naltrexone (LDN) in microglial cells** Hannah Millard; Jenny Lamberts, PhD; Hannah Millard
7. **Wischnewsky spots and black esophagus in deaths involving diabetic ketoacidosis: A case series** Ricardo Kaempfen, MS; Joseph Prahlow, MD; Amanda Fisher-Hubbard, MD
8. **De-differentiation of Müller Glia to Retinal Progenitors in a Mammalian Cell System** Megan Stanchfield, BS; Sarah Webster, MS; Cindy Linn, PhD
9. **Accuracy of torque limiters in orthopaedic surgery** Jeffrey Gilbertson, MD; James Jastifer, MD
10. **Epigenetic regulations implicate muscle healing processes after injuries** Haiying Pan, BS; Nariaki Nakamura, MS; Keith Kenter, MD; Yong Li, MD PhD
11. **Quantitative analysis of bone formation by micro-computed tomography** Shaan Manawar, BS; Adil Akkouch, PhD
12. **A bioinformatic approach to identifying sites of instability in PKD1** John Dewey, BS; Erik Larson, PhD
13. **Another piece to the puzzle of sample handling: Evaluation of Preanalytical Homogenization on Postmortem Blood Specimens** Deon Turner, BS; Julie Ianni, BS; James Ciaramitaro, BS; Paul Moorman, BS; Prentiss Jones, PhD
14. **Overexpression of the homeobox gene Cux1 in transgenic mice increases ciliogenesis in the kidney** Emmanuel Kumar, BA; Matthew Rumschlag, BS; Conner Holthaus, BS; Zhi Nee Wee, Melissa Pasillas; Gregory Vanden Heuvel, PhD
15. **Feasibility of plastic as an alternative to metal for prototyping and biomechanical testing of 3D printed surgical screws** Cody Bearden, MD; Peter Gustafson, PhD; Josh Veenstra, MD; James Jastifer, MD

COMMUNITY & PUBLIC HEALTH RESEARCH POSTERS

16. **Hospital admissions for Mitral Stenosis in Pregnancy in the United States. A twelve-year analysis.** Neiberg Lima, MD; Carol Lima, MD; Ricardo de Casto, MD; Cuyler Huffman, MS; Mireya Diaz, PhD; Silvia Linares, MD; Mark Schauer, MD; Thomas Melgar, MD
17. **Impact of patient provider relationship on post-partum contraception choice**
Lydia Hillier, BSN; Serena Smith, BS; Laura Bauler, PhD; Catherine Kothari, PhD
18. **Veterans and the Opioid Epidemic: Medicolegal Death Investigation of Opioid-Related Deaths of Michigan Veterans** John Frederick, BA; John Dewey, BS; Aditya Mehta, BS; Tyler Gibb, PhD
19. **An Intervention Designed to Increase Post-Partum Visit Attendance Rates at a Federally Qualified Health Center** Megan Potilechio, DO; Dalal Kassir, MD; Angela Barreto, MD; Mahmoud Kassir, MD; Michael Mattia, MD; Tabish Naz, MD; Lauren Piper, DO; Joseph Billian, MS; Jennifer Moubray, BS
20. **"The quicker they could be done with me, the better": Women's perspectives on time, equity, and quality perinatal healthcare** Pamela Wadsworth, PhD; Abigail Duerst, BS; Catherine Kothari, PhD
21. **RACE AND INTERSECTIONALITY: Women's stories of powerlessness and invisibility in healthcare** Elissa Allen, PhD; Yvonne Jackson, EdD; Evelyn Ainsley McWilliams, BA; Anmol Hans, BS; Terra Bautista, BA; Elishae Johnson, PhD; Fernando Ospina, MA; Joi Presberry, MPH; Lynette Gumbleton, BA; Catherine Kothari, PhD
22. **Ten Cases of Valeryl Fentanyl in Southwest Michigan** Christine Stevens, BS; Erinn Ton, BS; Michael Markey, MD; Prentiss Jones, PhD
23. **Chagas Heart Disease in the United States - A thirteen year analysis.** Neiberg Lima, MD; Duncan Vos, BS; Ricardo de Castro, MD; Adam Ladzinski, DO; Carol Lima, MD; Thomas Melgar, MD

MEDICAL EDUCATION RESEARCH POSTERS

24. **A sacroiliac joint simulator for ultrasound guided SI joint injections training**
Thomas Melgar, MD; Aniruddha Paranjpe, MD; Carleigh Zahn, DO
25. **REDCap and RShiny Together to Survey and Deliver Personalized Feedback of a Well-Being Assessment** Duncan Vos, MS; Anita F. Bell, BS; Richard Brandt, BS; Karen Horneffer-Ginter, PhD
26. **Introducing Mindfulness into the UME Curriculum: Assessing the utility of a student-facilitated experiential approach.** Maria Magidenko, BA; Allison Zheng, BS; Adrienne Aardema, BS; Melissa Pellman, MS; Megan Sandberg, BS; Daniel Micheli, BS; Karen Horneffer-Ginter, PhD
27. **What Goes In, Must Come Out: Superior Vena Cava Syndrome in Retained Long-Term Implanted Ports** Dilpat Kumar, MD; Muhammad Rehman, MD; Vishal Deepak, MD; Prashant Patel, DO

28. **Making outbreak investigations real to medical students** Mireya Diaz, PhD
29. **Development of soft tissue simulators for biopsy and suturing training among students and residents** Aniruddha Paranjpe, MD; Thomas Melgar, MD; Carleigh Zahn, MD
30. **Identifying the presence of secondary traumatic stress symptoms among emergency medicine residents at WMU Homer Stryker MD School of Medicine** Elise Klesick, DO; Paige Neaterour, MD; Clay Mishler, MD; Brenton Kinker, MD; Jon Parker, DO; Wesley Turner, DO; Alexander Brech, MD; Raxit Parikh, DO; Richard Lammers, MD; Tendeukai Warren, MD
31. **A survey of opioid prescription practices and pain management education in orthopedic surgeons** Kelsey Suggs, MS; Keith Kenter, MD

SOCIAL & BEHAVIORAL SCIENCES RESEARCH POSTERS

32. **Death Registers: How hospice professionals use future-oriented language to manage the expectations of patients' families** Maya Giaquinta, BS; Daniel Menchik, PhD
33. **Underrepresentation of women in clinical research and its outcome** Charlene Lin, BA; Tyler Gibb, JD, PhD
34. **Evaluation of medical student factors that may influence the decision to pursue a career in orthopaedic surgery** Lucy Meyer, BA; Symone Brown; Kevin Black, MD; Ann Van Heest, MD; Lisa Cannada, MD; Keith Kenter, MD; Mary Mulcahey, MD
35. **Sentiment Analysis of initiating messages posted around a brain cancer diagnosis in a moderated cancer online community** Ka Sam, BS; Melissa Sherfield, BS; Mireya Diaz, PhD
36. **Evaluation of a contingency management smartphone-smartcard platform in a community clinic** Mark Rzeszutek, MS; Anthony DeFulio, PhD

CLINICAL RESEARCH POSTERS

37. **Robotic Excision of Type IV Choledochal Cyst with Hepaticoduodenostomy** Sarah Khalil, MD; Kyra Folkert, MD; Michael Leinwand, MD
38. **Sudden death after bounce house - A late complication of congenital diaphragmatic hernia** Kendall Smith, BA; Brandy Shattuck, MD; James Elliott
39. **Non-ischemic cardiomyopathy as a rare adverse effect of clozapine** Abhinav Garg, MD; Anandbir Bath, MD; Jagadeesh Kalavakunta, MD
40. **Case Study: Incidental finding of multiple myeloma in patient with back pain** Rubina Baig, MD; Mahmoud Kassir, MD; Wesley Eichorn, DO
41. **Clinical Outcomes in diabetic patients with ambulatory care pharmacist intervention: Ambulatory care and the pharmacist's role in diabetes management** Elizabeth Graham; Jessica Proxiv, PharmD; Dean Van Loo, PharmD
42. **Determining drug-seeking behavior in the emergency department: Provider Perspectives** Joshua White, BS; Natasha Trainer, BS; Parker Crutchfield, PhD; Duncan Vos, MS

43. **Pulmonary Embolism: A rare complication of Mycoplasma Pneumoniae**
Khadijah Hussain, BS; Prasanth Pillai, DO; Mariam Ischander, MD
44. **Virtual reality use for symptom management in palliative care: A Pilot study to assess user perceptions** Tracy Johnson, BA; Laura Bauler, PhD; Duncan Vos, MS; Alan Hifko, MD; Mohammad Ahmed, BS; Paras Garg, MS; Michael Raphelson, MD
45. **BRAT 1 MUTATION: Rapid Whole Genome Sequencing as an early diagnostic tool in a newborn with antiepileptic resistant seizures** Estefani Hee Chung, MD; Julia Frueh, MD; Angela Lai, MD; Andrea Scheurer, MD
46. **Acute exposure and subsequent death via intracorporeal concealment of methamphetamine in two unrelated cases** Ernest Morton, MS; Elizabeth Douglas, MD; Prentiss Jones Jr., PhD
47. **Unintentional drowning with the contributing factor of carbon monoxide intoxication**
Raymond Bayer, BS; Joseph Prahlow, MD
48. **"Diabetic nephropathy and end stage renal disease in a 28-year-old, or is it?"**
Zainab Mahmood; Jayne Barr, MD
49. **Bilateral facial nerve palsy in a pregnant acute HIV patient** Neil Hughes, MD; Muhammad Ebad Rehman, MD; Michael Baumgartner, MD; Thomas Melgar, MD
50. **A Quality Improvement Project: Utility and usability of a diabetes medication poster in an Internal Medicine/Medicine-Pediatric Clinic** Wasif Shamsi, MD; Nirmal Muthukumarasamy, MD; Loren Weber, DO; Russell Van Maele, DO; Emilee SurVance, DO; Kevin Kavanaugh, MD; Tracey Mersfelder, PharmD
51. **Tumefactive Demyelination: Multiple Sclerosis presenting as a single ring-enhancing lesion**
Eric Edewaard, MD; Vishal Deepak, MD; Raymond Bayer, BS; Laura Bauler, PhD; Prashant Patel, DO
52. **5-Fluoracil causing acute coronary thrombosis** Ricardo de Castro, MD; Michelle Helbig, MD; Mike Francisco, PA; Mridul Parmar, MD; Mohammad Omaira, MD; William Nichols, DO
53. **Broken bones and an adrenal mass** Khadijah Hussain, BS; Graham McLaren, MD; Saad Shebrain, MD
54. **Toward standardization of hospitalization for adults with decompensated disordered eating: A case series and lessons learned** Maria Demma Cabral, MD; Nic Helmstetter, MD; Anya Ring, DO
55. **The phantom of lactic acidosis due to Metformin in a patient with heart failure.**
Ricardo de Castro, MD; Neiberg Lima, MD; Mridul Parmar, MD; Vishal Deepak, MD; William Nichols, DO; Susan Bannon, MD

56. **Hyperglycemia during refeeding syndrome in severe anorexia nervosa: A case report**
Maria Demma Cabral, MD; Ethel Clemente, MD; Corey Lager, MD; Nital Murthi, MD;
Cheryl Roberts, RD
57. **Improving documentation of long-acting, reversible contraceptive medication and procedure counseling**
Andrew Luciano, MD; Alison Radigan, MD; Rebecca Kaminski, DO;
William Scott Humphrey, MD
58. **Retinal hemorrhages in a 6-month-old child related to disseminated intravascular coagulation**
Maria Magidenko, BA; Amanda Fisher-Hubbard, MD; Joseph Prahlow, MD;
Theodore Brown, MD
59. **Novel Middle Ear Malformation Causing Congenital Hearing Loss: A case report and literature review**
Aaron Zebolsky, MS; Corbin Sullivan, MD
60. **Unusual case of splenic rupture from undiagnosed hypercoagulability disorder**
Allison Zheng, BS; Elizabeth Douglas, MD
61. **Awareness and accessibility of contraception**
David Lee, MD; Abigail Cheng, BS; Alexis Jones, BA; Emma Swayze, MS; Kathryn Jones, MS; Monica Ellis, BS;
Gisella Newbery, BA; Arushi Tripathy, BS; Erica Myrick, MS; Debra Taubel, MD;
Kelsy Schultz, BA; Alyssa Woodwyk, MS, CAPM
62. **A literature review on the association between Vitamin D deficiency and multiple sclerosis**
Mariyam Sheidu, BS; Maria Demma Cabral, MD
63. **Induced methemoglobinemia caused by Benzocaine spray.**
Ricardo de Castro, MD; Neiberg Lima, MD; Mridul Parmar, MD; Vishal Deepak, MD; William Nichols, DO;
Susan Bannon, MD
64. **Statin-Associated Necrotizing Autoimmune Myopathy**
Ricardo de Castro, MD; Abbas Jowkar, MD
65. **Secondary organizing pneumonia in a 5-year-old patient with down syndrome and T cell deficiency**
Minh Nguyen, DO; Roua Azmeh, MD; Mariam Ischander, MD
66. **Around The World: A short case aeries of atypical intracranial bullet tracks**
Keenan Boulnemour, BS; Joseph Prahlow, MD
67. **Brugada syndrome mimicking acute coronary infarct**
Ricardo de Castro, MD; Neiberg Lima, MD; Stela Sampaio, MD; Susan Bannon, MD
68. **Methemoglobinemia and vaginal benzocaine.**
Ricardo de Castro, MD; Neiberg Lima, MD; Marcos Madeiro, MD; Susan Bannon, MD
69. **Laparoscopic resection of a pheochromocytoma (paraganglioma) of the Organ of Zuckerkandl in a pediatric patient**
Katherine Kramme, DO; Robin Fountain, MD; Michael Leinwand, MD

70. **Case series of Eastern Equine Encephalitis Virus in Western Michigan** Adam Ladzinski, DO; Matthew Rumschlag, MS; Aditya Mehta, MD; Eric Edewaard, MD; Larry Morgan, DO; Brett Jagger, MD PhD
71. **Langerhans cell histiocytosis (LCH) of GI tract in a 6-month-old female** Megan Potilechio, DO; Anya Ring, DO
72. **Prophylaxis therapy using adjunctive azithromycin with standard cephalosporin vs. cephalosporin alone for cesarean delivery at Bronson Hospital** Dean Van Loo, PharmD; Sylvia Wasson
73. **Evaluation of Prophylactic Amiodarone use in coronary artery bypass graft patients** Catherine Wilson; Julie Schmidt, PharmD; Dean Van Loo, PharmD
74. **Opioid System Implicated in Treatment of Depression** Jay Patel, MD; Bruce Ruekberg, MD; Kathleen Gross, MD
75. **Emotional lability in an atypical acute lymphoblastic leukemia patient with methotrexate-induced leukoencephalopathy** Keenan Boulnemour, BS; Laura Bauler, PhD; Alyssa Erskine, DO; Mark Schauer, MD
76. **A tale of two malignancies - Coincidence or unifying pathogenesis** Katelyn King, BS; Lucas Rich, BS; April Korneli, DO; Prashant Patel, DO
77. **Ear swelling and an unusual diagnosis of Cutaneous leishmaniasis** Ricardo de Castro, MD; Neiberg Lima, MD; Adam Ladzinski, DO; Davi Leitao, MD; Benjamin Avner, MD
78. **General vs Local and Regional Anesthesia for Recurrent Groin Hernias: An Outcome Study from American College of Surgeon-NSQIP Database** Kendall Smith, BA; Kent Grosh, MD; Vinayak Dewoolkar, MD; John Collins, MD; Saad Shebrain, MBCh, MMM
79. **Spontaneous splenic rupture due to infectious mononucleosis** Megan Burke, MD; Mekala Neelakantan, BS; Karan Pandher, BS; Dilip Patel, MD
80. **Factors associated with readmission following shoulder arthroplasty** Emma Swayze, MS; Christine Bowman, MD; Mark Sytsma, MD
81. **Growing teratoma syndrome: an extremely rare finding in testicular cancer** Jack Stover, BA; Kevin Herzog, MD; Kirk Payne, MD
82. **Comparison of pre-hospital ROSC Rates for manual-only vs mechanical-assisted CPR using the LUCAS-2: A Retrospective Study** Raphael Szymanski, BS; oshua Mastenbrook, MD; Duncan Vos, MS; Kristina Le, BS; Ronald Slagell, EMT-P; Cheryl Dickson, MD
83. **Tension Hemopneumothorax in the setting of mechanical CPR during prehospital cardiac arrest: A case report** Dustin Rowland, MS; Nicholas Vryhof, MD; David Overton, MD; Joshua Mastenbrook, MD
84. **Does colonoscopy need to be done now?: Quantitating the value of clinical history in diagnosing diverticular hemorrhage** Fariah Ahmad, MD; Iftiker Ahmad, MD; Barbara Pawlaczyk, MD

85. **A novel use of staged transcatheter aortic and mitral value-in-valve in a high risk patient**
Lucy Wan, BS; Christopher Rogers, DO, FACAI, FACC; Joel Reinoehl, MD, FACC
86. **Prophylactic Enoxaparin adjusted by anti-factor Xa Peak Levels in surgical oncology patients.** Katherine Kramme, MD; Paya Sarraf, MS; Gitonga Munene, MD
87. **Robotic-assisted laparoscopic surgery as therapeutic approach for severe inguinodynia after laparoscopic inguinal hernia repair** Ayman Shehadeh, BS; Cole Kircher, DO; Saad Shebrain, MD
88. **Hypertrophic Cardiomyopathy causing sudden cardiac death in adolescent athletes**
Matthew Sierra, BS; Jeffrey Jentzen, MD PhD; Theodore Brown, MD
89. **Hospital admissions and trends for tuberculous peritonitis in the United States: Results from the National Inpatient Sample (NIS) database** Eric Sieloff, MD; Adam Ladzinski, DO; Neiberg Lima, MD; Duncan Vos, MS; Thomas Melgar, MD
90. **A 34-Year-Old Recovering Alcoholic with Acute Liver Failure** Sravani Alluri, MD; William Humphrey, MD; Dalal Kassir, MD; Megan Potilechio, DO; Laura Marsh, DO; Susan Jevort-Eichorn, DO; Kristi VanDerKolk, MD

**POSTER
PRESENTATION
ABSTRACTS**

DEVELOPMENT AND FUNCTIONAL CHARACTERIZATION OF ANTI-PHOSPHORYLCHOLINE ANTIBODIES AGAINST STREPTOCOCCUS PNEUMONIAE

Naeem Khan, PhD; Alexander Ludlow, BS; Xiaoti Guo, PhD; Angela Brightwell, MS; Thomas Rothstein, MD PhD

Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine;
Western Michigan University Homer Stryker M.D. School of Medicine

Phosphorylcholine (PC) is an immunodominant determinant of *Streptococcus pneumoniae* (also referred as pneumococcus). PC is also a component of some other bacteria, apoptotic cells, and oxidized low-density lipoproteins (OxLDL). *S. pneumoniae* is the most common pathogen responsible for causing bacterial pneumonia. Infants, the elderly and immunocompromised individuals are at high risk of acquiring pneumococcal infections. Moreover, individuals over age 65 are 7-fold more susceptible to pneumonia than younger (ages 5-49) individuals. B1 cells constitute a unique subpopulation of normal B lymphocytes. B1 cells have been most extensively studied in the mouse system, however, the human B1-like cells have been recently identified although their origin and functions are still elusive. Antibodies present in normal serum produced by B1 cells without exogenous antigenic stimulation are termed natural antibodies. These constitutively produced natural antibodies provide the first line of defense against invading pathogens including *S. pneumoniae*. In the present work we studied the activity of anti-PC antibodies produced by human B1-like cells. We developed 21 PC specific antibodies by sorting PC-binding B cells (both B1-like and B2 cells) from healthy volunteers, and rescuing antibody from individual B cells by single cell PCR, cloning and expression. The molecular characterization of these antibodies revealed the diverse usage of V(Heavy) and V(kappa) genes. We evaluated antibody binding to pneumococcal PC by whole cell ELISA. We identified 4 broadly cross-reactive antibodies (2 from B1 like and 2 from B2 cells) that bind multiple pneumococcal serotypes. These antibodies were further examined for their ability to enhance the phagocytosis of pneumococci by macrophages in *in vitro* opsonophagocytic killing assay (OPKA). Our analysis of these antibodies demonstrates that functional anti-PC antibodies are not restricted to B1-like cells but are also produced by B2 cells; however, the antibodies produced by B1-like cells are more potent in destroying bacteria compared to the antibodies produced by B2 cells. Recently we have reported an age-related decline in B1-like cells. These results suggest that a major mechanism responsible for age-related susceptibility to, and severity of, pneumococcal infection may lie in an age-dependent loss of B1-like cells that constitutively produce the most effective antibodies against pneumococci.

SYNTHESIS OF A GO/PEDOT-DMSO ELECTROACTIVE NANOCOMPOSITE FOR TISSUE ENGINEERING APPLICATION

Mitchell Kenter, BA; Adil Akkouch, PhD

Medical Engineering, Western Michigan University Homer Stryker M.D. School of Medicine

Electrical stimulation is being evaluated in regenerative medicine for its potential to promote stem cells adhesion, migration, and proliferation. Poly(3,4-ethylenedioxythiophene) (PEDOT) is a conductive polymer with excellent stability and biocompatibility. To enhance its conductivity, dopants such as dimethyl sulfoxide (DMSO) can be added. Engineered graphene oxide (GO) can also be introduced as an oxidant to enhance conductivity and mechanical properties. We hypothesize that GO/PEDOT-DMSO will exhibit superior conductivity and electrical stability compared to undoped PEDOT. The goal of this study is to synthesize a GO/PEDOT-DMSO composite and to assess its chemical, morphological and electrical properties. GO/PEDOT-DMSO nanocomposites were synthesized by oxidative polymerization of 3, 4-Ethylenedioxythiophene monomer (EDOT) in the presence of GO at different EDOT:DMSO ratios. Briefly, in a 100 mL three-necked flask ferric chloride in H₂O was added to DMSO (0, 1, 5 and 10% wt) under stirring (1200 rpm, 20 min). Afterward, a mixture of EDOT (0.02 M) and 5 mg/mL of GO in methanol was added dropwise while stirring for 6-hours. GO/PEDOT-DMSO particles were collected by filtration, washed with methanol:H₂O and dried at 60 °C in a vacuum oven. The resulting nanocomposite GO/PEDOT-DMSO was characterized by XRF, FT-IR, EDS and its morphological and electrical properties were investigated. The GO/PEDOT-DMSO_5% resulted in the higher doping, which was confirmed by the elemental composition studies. Furthermore, the GO/PEDOT-DMSO_5% exhibited significantly higher electrical conductivity and stability as compared to pure PEDOT. Overall, the results suggested that the GO/PEDOT-DMSO could potentially be used as an electroconductive substrate for electrical stimulation therapy.

DESIGN AND FABRICATION OF A KNEE-ON-A-CHIP MICRODEVICE USING 3D PRINTING

Letty Thottathil, BS; Adil Akkouch, MSc, PhD

MD Class of 2022, Orthopaedic Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Organs-on-a-chip is a class of device that integrates and mimics diverse biological functions by culturing cells from different organs into a system of few cm² in size. These devices are attractive to study disease progression, drug screening and physiological processes. The field of organs-on-a-chip is based on advances in stem cells, tissue engineering and microfluidics. Microfluidics fabrication consists of the creation of a master mold and replication into a polymeric microfluidic prototype. Master molds are created using photolithography, a complex, time consuming and expensive procedure. To date, R&D in microfluidics is limited to centers equipped with specialized equipment and facilities. Recently, 3D printing has attracted great interest because of its high speed, accuracy and repeatability to build complex structures. The goal of this study is to design an organ-in-a-chip using 3D printing to study the interactions between different tissues in the knee joint. The overall printing process is divided into 6-steps: 1-Produce 3D model using FreeCAD, by translating our "user requirements" to engineering specifications (microchannels size and shape; inlet and outlet size and valves location). 2-Convert the CAD drawing to STL format (standard tessellation language), the 3D printers' language. 3-Transfer the STL-file to the printer software to designate the size, orientation and printing parameters. 4-Print the device using high-resolution UV-LCS printer. 5-Remove, clean and cure the device under UV-light. 6-Test printing fidelity by comparing the measured and designed dimensions using stereo-microscopy. This multi-tissue-in-a-chip device is expected to be a useful tool for the study of osteoarthritis development and potential treatment.

A STUDY OF NEURONAL DIFFERENTIATION OF HYPOXIA-INDUCED REPROGRAMMING MUSCLE CELLS IN VITRO

Rachael Tolsma, BS; Haiying Pan, MS; Nariaki Nakamura, BS; Yong Li, MD PhD

MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Our previous research suggests that muscle cells are reprogrammed into progenitors after injury. These cells are similar to multipotent stem cells and can differentiate into multiple lineages such as muscle, fat and neuronal-like cells. However, the mechanism behind this reprogramming and their involvement in muscle healing are largely unknown. Recent studies in our lab suggest that hypoxia induced by injury plays an essential role in the reprogramming of muscle cells. Therefore, we hypothesize that hypoxia promotes the reprogramming of muscle cells into multipotent cells. This study will focus on the neuronal differentiation potential of reprogrammed myocytes by studying whether hypoxia can stimulate muscle cells to form neuromuscular junctions (NMJs). The proposals in this experiment are: 1. To test if hypoxia exposed cells can be induced to undergo neuronal differentiation in vitro and 2. To test if the neuronal differentiation extends into the formation of NMJs in vitro. We cultured primary myoblasts under hypoxia for 48 hours and put the cells into neural differentiation media. Stem cell and neuronal markers were identified via qPCR and immunocytochemical staining. Our preliminary results suggest that hypoxia can prime muscle cells into differentiating in neural media and form NMJs. The results of this study suggest that hypoxia is involved in the formation of NMJs and that cellular reprogramming plays a role in muscle regeneration. We will continue to study this topic to provide more evidence that reprogrammed muscle cells can enhance muscle healing and assist in functional recovery.

CHARACTERIZATION OF IMMUNOGLOBULIN M IN B CELL-DERIVED EXTRACELLULAR VESICLES

Michael Gutknecht, PhD; Nichol Holodick, PhD; Thomas Rothstein, MD PhD

Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Intercellular communication mediated through secreted bioactive molecules is essential for the maintenance of homeostasis and in turn becomes dysregulated under pathologic conditions. A fundamental cell biological process shared by all forms of life, from bacteria, to plants, to higher order mammals, is the release of bioactive microscopic vesicles. Eukaryotic extracellular vesicles (EV) are comprised of a phospholipid bilayer membrane, similar to the plasma membrane, and are characterized by two notable qualities: regulated concentration and topographic distribution of membrane-associated factors, and accumulation of a distinct repertoire of luminal components, including proteins and nucleic acids, that exist in isolation from the extracellular milieu. Although B cells maintain the unique ability to express antibody, or immunoglobulin (Ig), on both the cell surface and in a secreted, soluble form, and produce comparatively significant quantities of EV, previous studies have largely neglected Ig function in B cell-derived EV. We examined the composition of EV produced by human B lymphoma cell lines and primary B cells from wild type and mus knockout mice, which fail to make the secreted form of immunoglobulin M (IgM). Using a combination of sucrose gradient fractionation, fluorescence activated cell sorting, and biochemical analysis, we found that B cell EV lumens contain IgM and can function as a depot thereof. Further, IgM encapsulation is regulated across B cell subsets and by cytokine stimulation. Our data suggest that, although previously unrecognized, the sequestration of IgM in EV may impact how IgM is released and the effect IgM has under normal and disease states.

EVALUATION OF THE ANTI-INFLAMMATORY EFFECTS OF LOW-DOSE NALTREXONE (LDN) IN MICROGLIAL CELLS

Hannah Millard; Jenny Lamberts, PhD; Hannah Millard,

Pharmaceutical Sciences, Ferris State University

Chronic neuroinflammation is a factor that contributes to the development of Parkinson's Disease (PD), a neurodegenerative condition. Activated microglial cells play a role in neuroinflammation by releasing pro-inflammatory markers like nitric oxide (NO) and cytotoxic cytokines. Microglia can be activated in a number of different ways, one of which is TLR4 receptor stimulation in response to lipopolysaccharide (LPS) and other infectious proteins. Naltrexone, an opioid antagonist, has been shown to inhibit the TLR4 receptor at low doses. Consequently, low-dose naltrexone (LDN) exhibits anti-inflammatory properties in Crohn's disease and multiple sclerosis, among other disease states. However, there is a lack of in-vitro studies that examine the relationship between LDN and microglial activation. The goal of this study was to determine the molecular mechanism of LDN's anti-inflammatory effects. SIM-A9 microglial cells were activated with LPS and treated with increasing concentrations of LDN. A Griess assay was performed to measure NO production. Then, data were analyzed using GraphPad Prism software. The results of this study demonstrated no significant reduction in NO production from LPS-stimulated SIM-A9 cells following LDN treatment. Future experiments will address some of this study's limitations, including: testing longer incubation periods, including pre-treatment experiments, using different cell types, measuring other pro-inflammatory markers, or measuring NO using a different assay. There continues to be a need to determine the molecular mechanisms of LDN in reducing inflammation. The long-term goal of this research is to reduce the severity of PD by inhibiting neuroinflammation caused by activated microglia.

WISCHNEWSKY SPOTS AND BLACK ESOPHAGUS IN DEATHS INVOLVING DIABETIC KETOACIDOSIS: A CASE SERIES

Ricardo Kaempfen, MS; Joseph Prahlow, MD; Amanda Fisher-Hubbard, MD

MD Class of 2022; Pathology, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Mucosal lesions within the upper gastrointestinal tract at autopsy are relatively rare but can be important in determining a cause of death. Two such lesions are acute esophageal necrosis (AEN, or "black esophagus") and Wischnewsky spots of the gastric mucosa. This report details 3 cases where diabetic ketoacidosis (DKA) was a primary or contributing cause of death. Black esophagus and Wischnewsky spots present concurrently in all 3 cases.

Case Reports: The first two cases presented were determined to have primary causes of death of acute pyelonephritis and toxic effects of methamphetamine respectively. Both cases were complicated by hypertensive and atherosclerotic cardiovascular disease, which could contribute to the pathological findings of AEN and Wischnewsky spots. No hypothermia was reported in either case. In the third case, the decedent died of DKA. Uncontrolled diabetes mellitus had led to recent amputation of a great toe. The pathological findings were complicated by possible hypothermia.

Discussion: AEN has been reported in few case studies that have mainly centered around alcohol abuse and diabetes mellitus but have been as far reaching as hypothermia and Steven's Johnson syndrome. Wischnewsky spots are lesions of the gastric mucosa that are classically thought to be associated with fatal hypothermia but have been seen in conjunction with DKA. In this series, AEN and Wischnewsky spots presented concurrently in all cases, suggesting a possible common or connected etiology, especially when considering previously reported simultaneous presentation in hypothermia. Thermogenic dysregulation and ischemia in diabetic ketoacidosis are explored as possible pathologic mechanisms.

DE-DIFFERENTIATION OF MÜLLER GLIA TO RETINAL PROGENITORS IN A MAMMALIAN CELL SYSTEM

Megan Stanchfield, BS; Sarah Webster, MS; Cindy Linn, PhD

Biological Sciences Western Michigan University

Previous studies from this lab have determined that de-differentiation of Müller glia (MG) occurs after application of an $\alpha 7$ nicotinic acetylcholine receptor agonist, PNU-282987 (PNU), to retinal pigment epithelial (RPE) cells in adult rodents. This study was designed to analyze gene expression changes that occur when adult MG are exposed to PNU-treated RPE cells, leading to de-differentiation of MG to retinal progenitor cells. RNAseq was performed on MG following contact with RPE-J cells treated with PNU. Up or down-regulated genes were compared with published literature of MG de-differentiation that occurs in lower vertebrate regeneration or during early mammalian development. Between 8-12 hours, upregulation was observed in gene HB-EGF, which is induced in MG at an injury site in the zebrafish retina. After 48 hours, significant upregulation was found in genes *Ascl1* and *Lin28a*, known to be rapidly induced in de-differentiating MG in zebrafish. Upregulation was found in other factors known to be involved in mammalian development and zebrafish regeneration, and downregulation in some factors necessary for MG differentiation. Fold changes associated with these genes were verified using RT-qPCR. Using immunocytochemistry, we were able to confirm the presence of nestin and CHX10 in MG 48 hours post treatment with PNU-treated RPE supernatant. Both are retinal progenitor cell markers, which provides evidence that MG are de-differentiating in response to this treatment. The results from this study will further our understanding of adult mammalian neurogenesis, will lead to new insights into typical mammalian neurogenesis limitations and provide potential strategies to treat neurodegenerative diseases.

ACCURACY OF TORQUE LIMITERS IN ORTHOPAEDIC SURGERY

Jeffrey Gilbertson, MD; James Jastifer, MD

Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine;
Orthopaedics, Borgess Medical Center

Background: Torque limiters (TLs) are designed for locking screw insertion to ensure adequate insertional torque for reliable fixation, but also to prevent overtightening. Manufacturers recommend periodic calibration of TLs.

Methods: We used a calibrated Mark-10 Series TT02 digital torque tool tester to test TLs in various orthopaedic sets in clinical use at two teaching hospitals. A T-handle was attached to the TL and continuous, hand-driven clockwise force was applied until the limit was reached. The result was recorded in Newton metres (Nm). This process was repeated for a total of 4 measurements per TL. The mean measurement for each TL was then standardized and expressed as a percentage of the intended limit set by the manufacturer. A mean, standard deviation, and range was then calculated all TLs tested, and the distribution of data was graphed via a histogram in increments of 5% of the intended limit.

Results: Thirty-two TLs were tested. The standard deviation for consecutive measurements per TL was 0.047 Nm (1.5% of intended limit). The average recorded limit for all 32 TLs was 93.6% of the intended limit (SD 10.2%, range 71.9% - 110.0%). A histogram was created with the dataset and demonstrated a bimodal distribution with peaks at intervals of 85-90% and 100-105% of the intended limit.

Conclusions: The average recorded limit for TLs in this study was less than intended by the manufacturer. The range in values may be a result of the time since calibration, the amount of clinical use, manner of use, or the sterilization process.

EPIGENETIC REGULATIONS IMPLICATE MUSCLE HEALING PROCESSES AFTER INJURIES

Haiying Pan, BS; Nariaki Nakamura, MS; Keith Kenter, MD; Yong Li, MD PhD

Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine

Injuries result in micro-environmental changes and influences the release of niche factors that govern resident stem cell behavior during muscle healing. Our previous study suggests that cellular reprogramming can be initiated by the strong stimuli in the injured skeletal muscles. We successfully identified the injured muscle-derived stem cells (iMuSCs) and discovered their multipotent behaviors. However, the mechanism behinds the reprogramming is largely unknown, which has prevented the understanding of basic biology and pathogenesis as well as limiting the better therapeutic potential to repair the injured tissues. Epigenetic modifications can control the fate and behaviors of stem cells during development, in which histone methylations provided epigenetic regulation in stem cell-mediated regeneration of adult tissues. Epigenetics can regulate tissue homeostasis and stabilize stem cells function as well. We hypothesize that the injured milieu can influence the cellular reprogramming through epigenetic pathways that implicate muscle healing. We discovered the timeframe of histone methylation activations after muscle injury. Moreover, we detected the epigenetics synchronize the induction and behavior of iMuSCs, and Msh homeobox 1 (Msx1) is promoted and contributed as an epigenetic mediator in regulating cellular reprogramming. Our results suggest muscle injury mediates and influences the release of niche factors on transcriptional regulation through epigenetic modification, vs. histone methylation. Those intracellular processes associated with cellular reprogramming and determined the tissue healing. Thus, the strategy of targeting epigenetic pathways may impact the reprogramming stem cells, homeostasis, and functions in the injury site that significantly implicate the muscle healing processes.

QUANTITATIVE ANALYSIS OF BONE FORMATION BY MICRO-COMPUTED TOMOGRAPHY

Shaan Manawar, BS; Adil Akkouch, PhD

MD Class of 2021, Orthopaedic Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Micro-computed tomography (microCT) is a high-resolution 3D imaging, similar to tomography and x-ray computed tomography. X-rays are used to create cross-sections of a physical object that can be used to recreate a virtual model without destroying the original specimen, but on a small scale. The aim of this study is to use microCT technology to evaluate bone formation in rat calvarial defect treated with 3D printed composite scaffolds. nHA/PLGA-PCL and PCL (control) scaffolds were manufactured using a Regemat v1 bioprinter equipped with a fused-deposition modeling system. Male Sprague Dawley rats aged 12-weeks were used and all protocols for animal procedures were approved by the Office of Animal Resources at the University of Iowa. Under general anesthesia, full-thickness defects measuring 11x11-mm were created in the parietal bones then scaffolds were inserted (n=6). After 12 weeks, skulls were harvested, formalin fixed and scanned using a SkyScan-1272 at 70-kV, 142- μ A, and pixel size of 10- μ m. Reconstruction of skulls was performed with NRecon software. Bone mineral density and bone volume fraction were used to evaluate new bone formation within a region of interest of 10-mm from the center of the defects, using CTAn software. 3D volume rendering and 3D imaging of the defect area were done using CTvox software. The x-ray threshold was first calibrated and then applied to all samples. Quantitatively, defects treated with nHA/PLGA-PCL had significant increase in bone formation and BMD compared to PCL group. We were able to generate a workflow for bone scanning, reconstruction and data analysis using microCT.

A BIOINFORMATIC APPROACH TO IDENTIFYING SITES OF INSTABILITY IN PKD1

John Dewey, BS; Erik Larson, PhD

MD Class of 2022, Biomedical Sciences; Western Michigan University Homer Stryker M.D. School of Medicine

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is common (1/500) and leads to end-stage renal disease. Most cases are caused by mutations in the PKD1 gene, with one mutant allele being inherited and the second allele becoming inactivated somatically. Current evidence indicates that the PKD1 gene is unusually prone to inactivating mutagenesis, with an affected kidney holding diverse PKD1 mutations across thousands of cysts. Unfortunately, the mechanisms of gene inactivation are unknown. Our previous studies identified DNA structural motifs within PKD1 that may explain its inherent instability: PKD1 is highly repetitive, with tandem intronic repeats that are known to be associated with mutagenesis. This is because some repetitive DNAs can support non-duplex DNA conformations that interfere with DNA metabolism. In order to better understand mechanisms of mutagenesis, our objective was to characterize the repeat sequences within PKD1 and determine their likelihood to form structures in vivo. Therefore, we applied three different structure-determination algorithms to PKD1 and compared the outputs. We also mapped PKD1 pseudogenes onto PKD1 with respect to these sequence repeats. We found that all three structure-prediction programs identified similar canonical motifs, supporting a model whereby PKD1 encodes widespread structural elements that promote locus-specific rearrangements and mutation. In addition to these canonical motifs, PKD1 encodes unique non-canonical structural motifs. Since PKD1 inactivation leads to cystogenesis, the identification of structures promoting these mutagenic events is important for understanding the etiology of ADPKD and may identify unique gene-specific structures to target for treatment.

ANOTHER PIECE TO THE PUZZLE OF SAMPLE HANDLING: EVALUATION OF PREANALYTICAL HOMOGENIZATION ON POSTMORTEM BLOOD SPECIMENS

Deon Turner, BS; Julie Ianni, BS; James Ciaramitaro, BS; Paul Moorman, BS; Prentiss Jones, PhD

Biology, Western Michigan University;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

The quality of the sample plays a key role in the reliability of results especially involving autopsy specimens from deceased individuals. In postmortem autopsy cases blood is considered the gold standard sample for analysis in determining the cause of death. Although blood is considered the gold standard it still faces many challenges for securing an adequate sample quality for analysis. More often than not postmortem specimens are not particularly ideal due to gross hemolysis, coagulation, putrefaction, and other compromising biological processes. General techniques like phlebotomy for collecting blood have been used to improve the quality of samples, unfortunately, these techniques have only minimally improved sample quality and they still carry non-ideal conditions for postmortem analysis. Acknowledging this, this study evaluates the use of homogenization as a preanalytical step prior to analysis to determine whether there is a fundamental improvement in the quality of postmortem blood specimens. For the study postmortem blood samples were homogenized prior to sample extraction then processed using a solid-phase extraction technique and subsequently analyzed via a liquid chromatograph tandem mass spectrometer. The generated results were then compared with unhomogenized samples to evaluate differences these samples carried amongst one another. Overall, homogenization appeared to preserve the drugs found in unhomogenized samples, suggesting homogenization does not negatively impact drug analysis. Additionally, drugs not detected in unhomogenized samples were detected, suggesting a possible advantage to homogenization. Sample homogenization may improve specimen quality and advance knowledge regarding sample handling for postmortem studies.

OVEREXPRESSION OF THE HOMEBOX GENE CUX1 IN TRANSGENIC MICE INCREASES CILIOGENESIS IN THE KIDNEY

Emmanuel Kumar, BA; Matthew Rumschlag, BS; Conner Holthaus, BS; Zhi Nee Wee;
Melissa Pasillas; Gregory Vanden Heuvel, PhD

MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine; Biology, Kalamazoo College;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is one of the most common genetic disorders affecting the kidney, occurring in 1 in every 200 individuals. Renal cyst development in ADPKD results from mutations in the PKD1 or PKD2 genes, which encode the proteins polycystin1 (PC1) and polycystin2 (PC2). PC1 and PC2 proteins are localized to primary cilia, hair-like organelles found on most eukaryotic cells, that function as sensors of stimuli from outside the cell and mediate the transmission of extracellular signals to the nucleus. Cilia in polycystic kidneys are abnormally long and are thought to increase signaling into the cell resulting in increased cell proliferation in the diseased kidneys. Cux1 is a transcription factor that is highly expressed in kidney development and in polycystic kidney disease. Cux1 is an inhibitor of the cyclin kinase inhibitor p27 promoting cell proliferation. Transgenic mice overexpressing Cux1 show increased cell proliferation and renal hyperplasia, but do not develop polycystic kidney disease. To begin to determine whether Cux1 plays a role in regulating ciliogenesis we evaluated cilia morphology and the expression of ciliary proteins in the kidneys of Cux1 transgenic mice and wild type controls. Cilia in Cux1 transgenic mouse kidneys were significantly longer than in control kidneys. Moreover, expression of OFD1, an inhibitor of cilia formation, was significantly decreased in the Cux1 transgenic mice. Taken together, these results suggest that, in addition to regulating the cell cycle, Cux1 regulates cilia formation in the kidney, a novel new role for this protein in the kidney.

FEASIBILITY OF PLASTIC AS AN ALTERNATIVE TO METAL FOR PROTOTYPING AND BIOMECHANICAL TESTING OF 3D PRINTED SURGICAL SCREWS

Cody Bearden, MD; Peter Gustafson, PhD; Josh Veenstra, MD; James Jastifer, MD

Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine;
Mechanical and Aerospace Engineering, Western Michigan University; Orthopaedics, Borgess Medical Center

Introduction: The ability to alter the different screw parameters in isolation allows for the testing of their differential impact on pullout strength. 3D printed plastic is relatively inexpensive compared to 3D printed metal and available from a broader set of suppliers. However, the literature is currently lacking with regard to biomechanical testing of plastic screws and their ability to serve as a model for metal screws in the laboratory setting. The purpose of this study was to evaluate plastic as an alternative to metal for the biomechanical testing of screw pullout strength. **Methods:** 4 screws designs with varying pitch and taper were 3D printed in both plastic and metal. A mechanical pullout test was then performed, comparing the plastic and metal screws of the same design. **Results:** The maximum pullout strength was comparable between the plastic (284.4 +/- 42.5 N) and stainless (282.3 +/- 33.2 N) screws. The stainless screws demonstrated increased stiffness compared to the plastic screws (506 +/- 48.7 N vs 244.5 +/- 49.2 N). There was a 22.5% failure rate amongst the plastic screws during testing. **Discussion:** The method of using plastic as a surrogate for metal in the testing of 3D printed screws shows promise, but there are caveats. The pullout strength is similar between the plastic and metal screws tested here, but the high failure rate demonstrated in this study may be prohibitive. Future research may be necessary to identify the optimal plastic material and manufacturing technique for this application.

HOSPITAL ADMISSIONS FOR MITRAL STENOSIS IN PREGNANCY IN THE UNITED STATES. A TWELVE-YEAR ANALYSIS.

Neiberg Lima, MD; Carol Lima, MD; Ricardo de Casto, MD; Cuyler Huffman, MS; Mireya Diaz, PhD;
Silvia Linares, MD; Mark Schauer, MD; Thomas Melgar, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Hospital Geral de Fortaleza;
Other, Western Michigan University Homer Stryker M.D. School of Medicine; Medicine Obstetrics and Gynecology, Western Michigan University Homer Stryker M.D. School of Medicine; Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine

Background: Maternal cardiac disease is the major cause of maternal morbidity and mortality. Even though mitral stenosis (MS) is rare in the US, it is a high-risk condition during pregnancy.

Methods: This study is a retrospective review of the HCUP-NIS Database from 2002-2014. Inclusion criteria consisted of the presence of at least one billing code for pregnancy and at least one billing code for mitral stenosis (MS). The comparison group consists of the presence of at least one billing code for pregnancy and no billing code for MS. We compiled lists of codes for known co-occurrences and performed procedures.

Results: There were 2014 weighted discharges for both pregnancy and MS. The data contained 104 weighted discharges with MS in Pregnancy that underwent one cardiac intervention. Patients who had at least one diagnosis for MS had a larger mean cost per discharge. Pulmonary Hypertension (PH), Atrial Arrhythmias (AA), Stroke and Heart Failure (HF) were respectively reported in 25.71%, 7.14%, 0.95% and 19.28% of the discharges with billing code for MS and pregnancy whereas in patients without billing codes for MS only 0.04%, 0.07%, 0.05%, 0.22% had those conditions. No deaths were identified in this group.

Conclusion: Our study identified a low incidence of MS in the USA over our 12-year study period. Our results substantiate MS as a risk factors for PH, AA, HF and stroke in pregnant patients. Even though, the mortality is low, it is important that clinicians be aware of this diagnosis due higher costs and morbidity.

IMPACT OF PATIENT PROVIDER RELATIONSHIP ON POST-PARTUM CONTRACEPTION CHOICE

Lydia Hillier, BSN; Serena Smith, BS; Laura Bauler, PhD; Catherine Kothari, PhD

MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Post-partum contraception choice is an important predictor of effective family planning. Individuals utilizing the least effective forms of contraception have the highest rates of unplanned pregnancies and short interpregnancy intervals which contribute to poor birth outcomes. Patients with quality patient:provider relationships are more likely to use and be comfortable talking about contraception.

Objective: To determine if patient:provider relationship quality impacts post-partum contraception choice, we examined survey data from 244 women 8-weeks post-partum to assess the quality of the relationship as measured by effective communication and patient empowerment, post-partum contraception choice, and patient demographics.

Results: Of women surveyed 46% used medical contraception (sterility, intrauterine device, or hormonal methods), 21% used condoms, and 33% used natural family planning, abstinence, withdrawal or no birth control. Of those not currently using contraception, 25% were open to becoming pregnant, while 35% lacked an 8-week post-partum visit. The quality of the patient:provider relationship did not correlate with a patients choice of more medically involved contraception ($p = 0.972$). However, patients with weaker patient:provider relationships more often lacked a primary care provider, were poorer, and utilize Medicaid.

Discussion/Conclusion: In contrast to the general population, post-partum women have increased healthcare system contact throughout pregnancy, which may improve patient comfort and self-advocacy within the healthcare system. For these women, it is possible that their life circumstances, comfort with the healthcare system, and future family plans play a much larger role in contraception choice than patient:provider relationship.

VETERANS AND THE OPIOID EPIDEMIC: MEDICOLEGAL DEATH INVESTIGATION OF OPIOID-RELATED DEATHS OF MICHIGAN VETERANS

John Frederick, BA; John Dewey, BS; Aditya Mehta, BS; Tyler Gibb, PhD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Medical Ethics, Humanities, and Law, Western Michigan University Homer Stryker M.D. School of Medicine

Military veterans face unique challenges, placing them at a higher risk for opioid prescription, opioid use disorder, and fatal overdose. Veterans are at higher risk than non-veterans for chronic pain, PTSD, TBI, and fatal opioid overdose. Considering the current opioid epidemic, this study examines the rates of medicolegally-investigated opioid-related deaths among veterans in 12 counties in Michigan since 2008. Our analysis revealed that opioids were present in postmortem toxicology in 8.9% of investigated deaths. Additionally, we found an increase in opioid-related deaths among veterans beginning in 2015 and peaking in 2018. There were a total of 15 opioid-related deaths between 2008-2014, and 264 deaths between 2015 and 2019, outlining the rapid escalation to "crisis" levels. The number of deaths decreased in 2019, perhaps suggesting that preventive efforts are proving effective, and a "peak" of the opioid epidemic among veterans. Our study provides novel data, identifying fentanyl, methadone and oxycodone as the most commonly found opioids in veteran opioid-related deaths, differing from previous studies identifying hydrocodone, morphine, and fentanyl as the most common opioids in veteran overdoses. The presence of methadone in postmortem toxicology suggests a wider availability of methadone to veterans compared to previous studies. Given the novel findings of both the recent decline in opioid-related deaths and the prevalence of methadone among opioid-related veteran deaths, we believe this study offers compelling new directions for investigation in the midst of the highly-relevant opioid epidemic, especially among the high-risk population of our military veterans.

AN INTERVENTION DESIGNED TO INCREASE POST-PARTUM VISIT ATTENDANCE RATES AT A FEDERALLY QUALIFIED HEALTH CENTER

Megan Potilechio, DO; Dalal Kassir, MD; Angela Barreto, MD; Mahmoud Kassir, MD; Michael Mattia, MD;
Tabish Naz, MD; Lauren Piper, DO; Joseph Billian, MS; Jennifer Moubray, BS

Family and Community Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Kalamazoo County has a high infant mortality rate, 6.7 per 1000 live births from 2013-2017. Mothers and infants are at highest risk of complications within the first few days following a delivery. The initial 6 weeks post-delivery can be crucial to evaluate medical complications, provide contraceptive counseling, screen for postpartum depression and evaluate other social concerns. This project was designed to improve post-partum visit attendance and neonatal mortality at a federally qualified health center in Kalamazoo County.

Methods: All patients that were seen for prenatal care by the WMED Family Medicine Residents were enrolled into this study. Scheduling templates were developed in which newborn and maternal post-partum visits were scheduled together. We compared post-partum attendance rates from 01/01/2017-12/31/2017 to postpartum visit attendance rates from 08/07/2018 (Implementation of couplet scheduling) to current. Data was collected at three-month intervals. Improvements in post partum visit attendance rates were analyzed using the Chi-square test of independence. We also examined which factors are significantly related to post-partum visit attendance including whether this was a woman's first pregnancy, age at delivery, race, ethnicity, primary language, gestational age at first prenatal care visit, number of prenatal care visits, gestational age at delivery and infant gender. To quantify the effect of each factor on attendance we used odds ratios and Bonferroni adjusted confidence intervals. There is a significant increase of post-partum visit attendance rates from 49% to 72% following implementation of couplet scheduling.

"THE QUICKER THEY COULD BE DONE WITH ME, THE BETTER": WOMEN'S PERSPECTIVES ON TIME, EQUITY, AND QUALITY PERINATAL HEALTHCARE

Pamela Wadsworth, PhD; Abigail Duerst, BS; Catherine Kothari, PhD

Bronson School of Nursing, Western Michigan University; MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine; Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Background: Provider-patient mis-communication is identified by infant mortality (IM) review teams across the nation. Two-thirds of IM-reviews in Kalamazoo issued recommendations to strengthen communication. Women's perinatal care feedback is critical to create equitable, quality, patient-centered care and improve health outcomes.

Objective: The goal was to elicit perspectives from a diverse set of women regarding communication barriers they faced and advice for improving perinatal care.

Materials and Methods: Women were pre-recruited from the Mom's Health Experience Survey into the Community Voice (n=57). Topics explored were perinatal healthcare experiences. Focus group discussions were led using semi-structured interviews. Conversations were transcribed, reviewed, and consensus-coded for themes.

Results and Discussion: Dominant themes related to how care delivery systems structure provider-patient communication. Three structural elements emerged from focus group data: continuity of care, adequate information exchange, and visit time. Barriers included: mandated provider changes, rotating providers, lack of communication between providers, lack of time for relationship formation and exchange information with healthcare providers. Facilitators to high-quality patient communication and care included continuity of care from pre-conception throughout the postpartum period, communication between the healthcare team, online portals, and relationships with healthcare providers.

Conclusion: Continuity of care, adequate information exchange, and sufficient time were three critical elements to patient-centered communication. Healthcare organizations should consider allocating more time for perinatal office visits and strategies for making the most of the visit time available, prioritizing continuity within and across encounters, and streamlining information exchange.

RACE AND INTERSECTIONALITY: WOMEN'S STORIES OF POWERLESSNESS AND INVISIBILITY IN HEALTHCARE

Elissa Allen, PhD; Yvonne Jackson, EdD; Evelyn Ainsley McWilliams, BA; Anmol Hans, BS; Terra Bautista, BA; Elishae Johnson, PhD; Fernando Ospina, MA; Joi Presberry, MPH; Lynette Gumbleton, BA; Catherine Kothari, PhD

Bronson School of Nursing, Western Michigan University; Department of Physical Therapy, Western Michigan University; MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine; Kalamazoo County Health and Human Services; HelpNet Bronson Battle Creek, Bronson Methodist Hospital; Psychiatry, Western Michigan University Homer Stryker M.D. School of Medicine; Other, Western Michigan University Homer Stryker M.D. School of Medicine

Background: Black women experience higher rates of infant mortality and adverse birth outcomes compared to white women. Structured inequity, along with interpersonal discrimination, are primary contributors. Within Kalamazoo County, black mothers are twice as likely to live in poverty, report experiencing discrimination on a regular basis and are significantly more likely to have inadequate prenatal care.

Research aims: To understand women's personal experiences with medical providers, explore their expectations of medical providers and practices, and examine variations by race/ethnicity and socioeconomic status.

Methods: One-hundred-and-seventy-eight women were pre-recruited from the Mom's Health Experience Survey. Fifty-seven of them participated in Community Voice Panel (CVP) focus groups. Twelve focus groups were conducted by two female facilitators and discussed women's experiences spanning from home life to medical office experiences and back. All focus groups were recorded, transcribed, and consensus-coded for themes.

Results: Thematic analysis revealed differences in treatment of women of color (WOC) in the health care system. Powerlessness and invisibility were pervasive feelings in WOC, described as feeling "like a mouse in a corner." The intersection of class, age, and gender with race exacerbates the power differential women experience. Women also described positive provider experiences and strategies to improve the provider-WOC patient relationship.

Conclusion: WOC described systematic discrimination within the healthcare system and gave suggestions for improving the quality of care. Their suggestions serve as a call to providers to challenge their methods of delivering healthcare to WOC to improve health outcomes and overall experiences.

TEN CASES OF VALERYL FENTANYL IN SOUTHWEST MICHIGAN

Christine Stevens, BS; Erinn Ton, BS; Michael Markey, MD; Prentiss Jones, PhD

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine; Sparrow Forensic Pathology; Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Valeryl fentanyl, a synthetic opioid, is rarely found in drug overdoses in the United States. Since it was put on temporarily Schedule I status in 2017, valeryl fentanyl cases in the USA have drastically decreased. Its recent reappearance in SouthWest Michigan indicates that valeryl fentanyl may be on the rise as an intended component of illicitly-made opioids and should be tested for, as little literature exists describing valeryl fentanyl abuse trends, etiology, and mortality rates.

Case Description: Ten cases of drug overdose involving valeryl fentanyl are described. Cases were deemed positive when valeryl fentanyl was detected in postmortem blood. These cases occurred between July 2018 and November 2019 in Kalamazoo, Muskegon, Calhoun, Ionia, and Ingham county. The cause of death in all but one case was toxic effect of drug(s). The ages of the deceased ranged from 18-55 years old. Valeryl fentanyl was often found along with 4ANPP, norfentanyl, fentanyl, and morphine.

Discussion/Conclusion: While fentanyl and heroin are commonly found together, fentanyl is often misleadingly sold as, or mixed with, heroin, valeryl fentanyl is an uncommon compound in drug overdoses. The fact that almost all of the cases described here were also positive for norfentanyl, fentanyl, 4-ANPP, and morphine, may suggest that the valeryl fentanyl is coming from the same source and is likely being mixed with heroin. Laboratories need to test for valeryl fentanyl given the dearth of clinical information and because detection can help law enforcement monitor drug trafficking trends and determine if regulations are working.

CHAGAS HEART DISEASE IN THE UNITED STATES - A THIRTEEN YEAR ANALYSIS.

Neiberg Lima, MD; Duncan Vos, BS; Ricardo de Castro, MD; Adam Ladzinski, DO;
Carol Lima, MD; Thomas Melgar, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine; Hospital Geral de Fortaleza

Introduction: Chagas Heart Disease (CHD) is endemic in Latin America, causes tachyarrhythmias, bradyarrhythmias and heart failure. It is under-recognized in the US. The real epidemiology of CHD is not well known in the USA.

Methods: This study is a retrospective review from the NIS-HCUP Database from 2002-2014. Inclusion criteria consisted of the presence of a billing code for CHD. Two control groups were created; discharged patients with ischemic heart disease (IHD) and with non-ischemic heart disease (NIHD). We compiled lists of codes for known complications of cardiomyopathies, performed procedures and compared in these groups.

Results: There were 1383 weighted discharges with a billing code for CHD. Length of stay and hospitalization cost medians were higher in CHD group. The majority of the patients with CHD were Hispanic. Patients with CHD, IHD and NIHD were reported with Pulmonary Hypertension in 11.3%, 3.09% and 12.46%; with sinoatrial node dysfunction in 4.5%, 1.52% and 2.11%; with atrial tachyarrhythmias in 32.06%, 21.39% and 35.07%; with heart failure in 65.6%, 28.16% and 53.69%; with severe AV node block in 5.57%, 0.9% 1.36%; with stroke in 6.85%, 0.9% and 1.36%; with ventricular arrhythmias in 23.88%, 7.22% and 6.57%. The proportion of CHD, IHD and NIHD that resulted in death during hospitalization was 3.21%, 3.40% and 4.29%.

Conclusions: Our study identified a low occurrence of CHD in the USA over 13-year study period. While the prevalence for CHD is low, it is important that clinicians be aware of this diagnosis due the mortality and morbidity associated.

A SACROILIAC JOINT SIMULATOR FOR ULTRASOUND GUIDED SI JOINT INJECTIONS TRAINING

Thomas Melgar, MD; Aniruddha Paranjpe, MD; Carleigh Zahn, DO

Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine;
Department of Internal Medicine, Division of Rheumatology, University of Iowa Healthcare

Introduction: Injection of the sacroiliac (SI) joint is an important treatment modality for patients with low back pain with and without spondyloarthropathies of SI joint. Performing the procedure using landmarks fails to reach the sacroiliac joint space in most cases. Ultrasound guidance can improve the success rate. No ultrasound capable SI joint injection simulator is commercially available to train physicians. Similar simulators for other joints cost \$1,500-\$7,000. We set out to create a low-cost high-fidelity SI joint injection simulator.

Methods: A plaster cast was taken of the lumbosacral region of a volunteer and rendered waterproof using a latex sealant. Artificial foam bones of the sacrum and pelvis (\$78) was obtained from Sawbones™. Straight pins supported the bones in the cast. Six liters of ballistic gel was made using high concentrations of Knox® gelatin (\$15). Gelatin was poured into the mold and refrigerated one liter at a time to avoid floating of the foam bones from the desired location.

Results: Three ultrasound capable SI joint simulator were created from the same mold and used to train an average of 45 internal medicine, med-peds and family medicine residents and third and fourth year medical students. Learners had the opportunity to visualize the needle insertion into the sacroiliac joint using dynamic ultrasound. Since the gel is transparent the learner can correlate the image on the ultrasound machine with direct visual inspection of the needle and pelvic anatomy.

Discussion: A low-cost, high-fidelity simulator can be created to train learners on SI joint injections.

REDCAP AND RSHINY TOGETHER TO SURVEY AND DELIVER PERSONALIZED FEEDBACK OF A WELL-BEING ASSESSMENT

Duncan Vos, MS; Anita F. Bell, BS; Richard Brandt, BS; Karen Horneffer-Ginter, PhD

Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine;
Medical Education, Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine

Background: Finding assessment tools that strengthen engagement and heighten perceptions of relevance are key to successfully delivering wellness initiatives. REDCap (Research Electronic Data Capture) and ShinyR are data tools commonly used independently. ShinyR applications can be written to query a REDCap database in real-time, typically to automate data-pulls. To the best of the authors' knowledge, REDCap and ShinyR have not been used together to pull data in real-time in order to provide participants with an immediate personalized visual representation of their responses.

Objective: The goal of the current study is to examine the functionality of using REDCap and ShinyR to implement a well-being assessment immediately followed by a visual representation of the participant's responses.

Methods: A well-being assessment was developed in REDCap prompting participants to input their personal ratings of importance for each of six dimensions of well-being as well as time allocated to each dimension. Completion of the well-being assessment auto-directs the participant to the ShinyR application URL to view their personal results. Using an application programming interface (API), ShinyR programmatically pulls REDCap responses and performs transformations and computations to the data to provide participants with a visual representation of their personal assessment in real-time. Generated data demonstrate the utility of the well-being assessment and the personalized post-assessment well-being results.

Results: Generated data demonstrate successful functionality of a well-being assessment and post-assessment display of personalized results.

Conclusion: REDCap and ShinyR can be used together for a user-friendly real-time experience that strengthens engagement and heightens perceptions of a wellness initiative.

INTRODUCING MINDFULNESS INTO THE UME CURRICULUM: ASSESSING THE UTILITY OF A STUDENT-FACILITATED EXPERIENTIAL APPROACH.

Maria Magidenko, BA; Allison Zheng, BS; Adrienne Aardema, BS; Melissa Pellman, MS; Megan Sandberg, BS; Daniel Micheli, BS; Karen Horneffer-Ginter, PhD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Medical Ethics, Humanities, and Law, Western Michigan University Homer Stryker M.D. School of Medicine

Background: Given its physical and emotional benefits, mindfulness has received increased attention in the medical field. However, it is not clear if mandatory mindfulness events promote adoption of mindful practices.

Objective: This study evaluated the effectiveness of a student-led experiential teaching approach in encouraging medical students to adopt a mindfulness practice.

Methods: A mindfulness event was hosted, including an overview of mindfulness research, examples of zero-second practices, a sitting meditation, and a choice of 3 breakout sessions (e.g. walking, yoga). Students were invited to participate in anonymous pre- and post-surveys, including current mindfulness interests and experiences as well as the Applied Mindfulness Process Scale (AMPS) and Perceived Stress Scale (PSS). Of the class of 84 students, 38 completed both surveys. Quantitative statistical analysis was performed in SPSS and qualitative responses were analyzed.

Results: Pre- and post-AMPS and PSS scores showed no statistically significant difference. Students felt less judged practicing mindfulness after the mindfulness event ($p=0.026$). Being able to choose breakout sessions was rated most effective (50% indicating "very much"). Lack of time appeared to be the biggest obstacle in practicing mindfulness (62% of students who elected to comment). 68% of students were somewhat or more motivated to practice mindfulness after the event.

Discussion: These results indicate that incorporating mindfulness into the medical school curriculum may be useful in decreasing stigma and increasing mindful practices. Recognizing multiple forms of mindfulness and providing options may help establish a mindfulness practice amongst medical students.

WHAT GOES IN, MUST COME OUT: SUPERIOR VENA CAVA SYNDROME IN RETAINED LONG-TERM IMPLANTED PORTS

Dilpat Kumar, MD; Muhammad Rehman, MD; Vishal Deepak, MD; Prashant Patel, DO

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Implanted central venous port catheters (ports) are widely used for chemotherapy, total parenteral nutrition and blood monitoring. If placed in the subclavian vein, up to 15% of patients who receive implanted ports have immediate complications, including venous injury, pneumothorax and pneumomediastinum. Long-term ports are associated with delayed complications, including thrombosis, occurring in 1.9-21.5% of patients. Although rare, if thrombosis of the port's catheter occurs, it can cause significant occlusion of the vein and result in superior vena cava (SVC) syndrome. We report this feared, potentially avoidable complication in two cases of SVC syndrome that developed in patients with previous diffuse large B cell lymphoma (DLBCL) in remission with retained long-term implanted ports.

Case Presentation: Case Series; Case 1: A 93-year-old woman with a history of DLBCL status post port placement, treated with R-CHOP and R-CVP with adriamycin chemotherapy, now in remission for 3 years presented with a positional headache for 4 weeks. Associated symptoms included facial flushing, dizziness, dyspnea, chest tightness, and fluctuating left arm swelling over the same period of time. Her exam revealed normal vital signs, but distended neck vessels, facial plethora and a port in the right chest wall. Computed tomography (CT) of the chest with contrast revealed an acute-to-subacute occlusion of the SVC due to thrombosis of the distal tip of the port catheter. Case 2: A 34-year-old man with a history of DLBCL status post port placement, treated with R-CHOP chemotherapy, now in remission for 2 years presented with facial swelling for 2 days. Associated symptoms included a positional headache, dizziness, and bilateral ear fullness. His exam revealed tachycardia (120-130 beats/minute), facial swelling and plethora, maxillary sinus tenderness and a port in the right chest wall. CT venogram of the chest revealed occlusion of SVC due to thrombosis of the port catheter. Both patients had ports placed prior to the initiation of chemotherapy, but these retained ports were not removed following completion of chemotherapy or after positive-emission-tomography-proven remission. In response to their port-associated SVC syndrome, both were started on an unfractionated heparin drip, followed by an oral anticoagulant and surgical removal of port after several months of anticoagulation was recommended. Port removal was deferred by our patient in case 1, thus she elected to continue long-term anticoagulation. However, port removal was pursued by our patient in case 2, with notable improvement in symptoms after removal of the port.

Discussion: SVC syndrome presents as arm and facial swelling, positional headache, retro-orbital pain, blurred vision, stridor, and dyspnea. It has been linked to malignancy in ~80% of the cases, however the incidence of thrombosis as a cause of SVC syndrome has greatly increased with the use of implantable ports and is estimated to be 0.2-3.3%. This risk is further increased in the setting of prothrombotic conditions, like active malignancy. Our cases highlight the importance of removing the implanted port soon after chemotherapy is completed and remission is confirmed in patients with DLBCL to prevent this important complication and to reduce to burden of treatment associated with anticoagulant.

MAKING OUTBREAK INVESTIGATIONS REAL TO MEDICAL STUDENTS

Mireya Diaz, PhD

Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Objective: Rapid spread of outbreaks, like the current coronavirus, in a world with dimmed frontiers underscores the relevance of this topic in the medical curriculum. Limited literature on how to deliver this content in a format that combines experiential, competency, and team-based frameworks motivated to assess a learning activity developed under such foundations.

Methods: The effectiveness and students' perception of the activity were evaluated in a prospective cohort of 84 first-year medical students during Fall 2019. Competencies gained as shown in a team presentation, as well as students' perception of competencies gained and activity's utility were gathered. The learning activity was not graded. Estimates of students' perception account for correlated data within teams.

Results: Team presentations indicated that most competencies were acquired, with room for improvement in issues such as outbreak detection, epidemic curve type, generating informative hypotheses about most likely outbreak sources, and designing a study suitable for answering the hypothesis. Based on 56 responders representing all teams, most (82.6%) agreed or strongly agreed that the learning activity was useful in providing the necessary skills to conduct an outbreak investigation beyond what was learnt in class.

Conclusion: Providing students with experiential learning opportunities in which they can practice their recently acquired skills (i.e. recognize symptoms, elaborate a differential diagnosis) engaged them in the non-clinical components of the activity (i.e. epidemiology context). Such opportunities can also gauge outside a formal evaluation the level of mastery achieved and deficiencies not only in the specific but also in related competencies.

DEVELOPMENT OF SOFT TISSUE SIMULATORS FOR BIOPSY AND SUTURING TRAINING AMONG STUDENTS AND RESIDENTS

Aniruddha Paranjpe, MD; Thomas Melgar, MD; Carleigh Zahn, MD

Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine;
Department of Internal Medicine, Division of Rheumatology, University of Iowa Healthcare

Background: Abscess drainage, cyst removal, shave biopsy, skin tag removal are commonly performed outpatient procedures for which medical students, medical residents need training. While multiple commercial training models exist to assist trainees in practicing various outpatient dermatological procedures, these do not provide skills of palpation since they often lack the 3 soft tissue layers found anatomically including dermis, subcutaneous tissue and muscle fibers.

Method: Silicon based casts were made in stages by adding dye and allowing the silicon to solidify creating multiple layers of soft tissue, with muscle fibers at the base, subcutaneous layer above the muscle layer and skin layer most superficially. A mesh was placed within the subcutaneous layer while hardening. This provided tensile strength for the simulators to allowing trainees to approximate the skin layers during suturing. The skin layer was hardened within textured plaster molds to develop skin tags and warts with a skin like texture. Cysts were developed filling latex glove finger tips with non-scented moisturizer. These cysts were placed between the subcutaneous and skin layers of the model during the hardening process.

Results/ Discussion: Medical student and Resident trainees used scalpel, forceps and sutures with hemostats to perform skin tag removal, perform shave biopsy and cysts removal. The mesh located between subcutaneous and skin layers allowed for the tensile strength needed to approximate the superficial skin layer together during suturing. Our model highlights how low-cost soft tissue simulators can be developed and used to train medical students and medical residents in performing common soft tissue outpatient procedures.

IDENTIFYING THE PRESENCE OF SECONDARY TRAUMATIC STRESS SYMPTOMS AMONG EMERGENCY MEDICINE RESIDENTS AT WMU HOMER STRYKER MD SCHOOL OF MEDICINE

Elise Klesick, DO; Paige Neaterour, MD; Clay Mishler, MD; Brenton Kinker, MD; Jon Parker, DO; Wesley Turner, DO; Alexander Brech, MD; Raxit Parikh, DO; Richard Lammers, MD; Tendeukai Warren, MD

Emergency Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Emergency physicians and residents face primary trauma daily while caring for patients at work and are at risk for secondary traumatic stress (STS). Prior research has shown that STS has a prevalence of 16-17% among health care workers in the acute care or trauma setting. Dr. Charles Figley defined STS as "the natural, consequent behaviors and emotions resulting from knowledge about a traumatizing event experienced by a significant other. It is the stress resulting from helping or wanting to help a traumatized or suffering person." This study examined the emergency medicine resident population at WMU Homer Stryker MD School of Medicine to identify the prevalence of these STS symptoms. The secondary traumatic stress survey by Bride et al. was sent out to PGY1-PGY3 Emergency medicine residents. Respondents were kept anonymous and data were collected for cross-sectional analysis through REDCap. A total of 28 residents responded to the survey. All respondents reported experiencing primary trauma since starting residency and all participants reported at least one symptom of STS. Residents averaged experiencing 11 symptoms. Twenty-five percent (7/28) had at least one daily symptom. The most frequent daily symptom was "Expecting bad things to happen", while "Feeling Jumpy" was reported by the fewest residents. "Intrusive Thoughts" were experienced at least once per week by the most residents (53.6%). Our study suggests that STS symptoms are experienced by a significant number of emergency medicine residents at WMU and that trauma is experienced by emergency medicine residents with regularity.

A SURVEY OF OPIOID PRESCRIPTION PRACTICES AND PAIN MANAGEMENT EDUCATION IN ORTHOPEDIC SURGEONS

Kelsey Suggs, MS; Keith Kenter, MD

MD Class of 2022, Orthopaedic Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Opioid overdoses are a leading cause of injury-related death in the U.S. with prescription opioids largely contributing to cases of abuse[1]. Orthopedic surgeons are among the highest prescribers of opioids with prescriptions often in excess of pills[1,2,3]. This may be a result of the lack of education regarding pain management[4,5]. We hypothesize that there is no standard pain management prescribing regimen after shoulder arthroscopy with U.S. surgeons and this will be similar to when compared to other countries. Furthermore, we believe that orthopedic surgeons, in general, do not receive adequate training or guidelines in postoperative pain management regimens.

Methods: We implemented a survey of Magellan Society for Orthopedic Surgeons members at a recent meeting. Questions regarding postoperative pain management regimens following shoulder arthroscopy were recorded. Also asked was their educational experience or where they learned this regimen.

Results: 34 orthopedic surgeons from 15 countries responded. There was minimal to no formal education regarding post-operative pain management. Comments on their regimens ranged from "do not know reason", "trial and error" or "gestalt". The survey also demonstrated great variability between pain control regimens for the same operation regardless of country.

Conclusions: Our study confirms the lack of training regarding postoperative pain management in orthopedic surgery in the U.S., but also illuminates that this is not uniquely a U.S. problem. Our pilot data underscores the need for further research to understand the relationship between pain management training and differences in opioid abuse in the U.S. compared to populations in other countries.

DEATH REGISTERS: HOW HOSPICE PROFESSIONALS USE FUTURE-ORIENTED LANGUAGE TO MANAGE THE EXPECTATIONS OF PATIENTS' FAMILIES

Maya Giaquinta, BS; Daniel Menchik, PhD

Lyman Briggs College, Michigan State University

Hospice is a venue organized to provide a "good death" for patients and family. Since many hospice patients are bedridden and often incoherent or unconscious, much of this venue's interactions take place between hospice professionals and patients' families. The families of patients desire definitive prognoses, as knowing what to expect can help them to act. In light of this need, how then do hospice professionals use language to achieve and maintain buy-in from patients' families? Drawing on eight months of observation in Hospice House Interdisciplinary Team (IDT) meetings, we analyze the verbal interactions between hospice professionals and families of patients, focusing in particular on registers of prognosis, to better understand how hospice professionals use language to manage family expectations. In order to accomplish these professional goals, hospice professionals use future grammars, primarily comprising predictive and subjunctive verbs. Imperative verbs are rarely used. Paying attention to the uses of these linguistic registers helps us further understand some key qualities of the good death, and in general, may offer a richer understanding of death itself.

UNDERREPRESENTATION OF WOMEN IN CLINICAL RESEARCH AND ITS OUTCOME

Charlene Lin, BA; Tyler Gibb, JD, PhD

MD Class of 2020; Medical Ethics, Humanities, and Law;
Western Michigan University Homer Stryker M.D. School of Medicine

Background: Women are traditionally underrepresented in medical studies, in particular, clinical research. Not only do women respond to specific treatments differently due to physiological differences, but they also have to deal with unique social stressors. Male patient narrative and men's response to medical care are often considered as the standard, even though these guidelines might not apply as well to women.

Objective: This project aims to explain how the disparity works in distinctive clinical scenarios, and how it influences the health outcomes of male versus female patients.

Methods: We examined a meta-analysis, several systemic reviews and expert pieces. We compared and contrasted symptoms and the success of the treatment in diseases including cardiovascular diseases, pain management, and mental illnesses. We looked at how female patients are treated in these scenarios compared to male patients.

Results: Women tend to receive less adequate care in most cases. They only represent 26.7% of clinical research subjects in cardiovascular diseases. Women tend to experience multiple pain simultaneously and have higher rates of musculoskeletal pain conditions. Data on substance use disorder is inconclusive. When it comes to mental health, women have higher prevalence of depression. Yet, women have lower rate of suicide completion of 21% versus 79%, most likely due to social factors.

Conclusion: There are still steps to be taken to improve female experiences when it comes to medical care. We should focus our efforts on changing medical research and education to increase discussion of female narratives.

EVALUATION OF MEDICAL STUDENT FACTORS THAT MAY INFLUENCE THE DECISION TO PURSUE A CAREER IN ORTHOPAEDIC SURGERY

Lucy Meyer, BA; Symone Brown; Kevin Black, MD; Ann Van Heest, MD; Lisa Cannada, MD;
Keith Kenter, MD; Mary Mulcahey, MD

Tulane University School of Medicine; Department of Orthopaedic Surgery; Penn State University; Department of Orthopaedic Surgery; University of Minnesota; Department of Orthopaedic Surgery; University of Florida Jacksonville; Department of Orthopaedic Surgery; Western Michigan University Homer Stryker M.D. School of Medicine; Orthopaedic Surgery

Background: As more women embark on medical careers an increasing number are pursuing careers in surgical subspecialties. Despite these improvements, orthopaedic surgery continues to have the lowest female representation amongst surgical subspecialties. The purpose of this project was to determine the motivating and deterring factors for medical students, particularly females, interested in a career in orthopaedics.

Methods: An anonymous electronic survey was sent to PGY-1 and PGY-2 orthopaedic residents at 5 ACGME-accredited institutions and to medical students at 3 LCME-accredited institutions. The survey consisted of questions regarding the participants' medical school demographics, motivations for pursuing careers in various fields and factors that may have deterred them from choosing a career in orthopaedic surgery.

Results: Overall response rate: medical students - 25% (455/1788); orthopaedic residents - 21% (167/780). 40% of students and 46% of residents indicated experiences before medical school most heavily influenced their decision for a specialty and most impact was from an individual. Patient care was the most important factor to pursue orthopaedic surgery (77% students, 73% residents). The competitive match process and a lack of work-life balance were the most deterring factors to pursue orthopaedic surgery. Both groups responded freely to verbal deterrents they received from faculty/friends for considering orthopaedic surgery which demonstrated a male gender bias.

Conclusion: This study highlights the need to mentor students regarding their career choice and providing positive role models. More importantly, minimizing negative comments may encourage more women to pursue a career in orthopaedic surgery.

SENTIMENT ANALYSIS OF INITIATING MESSAGES POSTED AROUND A BRAIN CANCER DIAGNOSIS IN A MODERATED CANCER ONLINE COMMUNITY

Ka Sam, BS; Melissa Sherfield, BS; Mireya Diaz, PhD

MD Class of 2023, Biomedical Sciences; Western Michigan University Homer Stryker M.D. School of Medicine

Background: Social media has become a haven for patients and their loved ones where they can exchange information and find support. Analysis of posted messages can provide valuable knowledge about disease experiences.

Objective: To perform sentiment analysis of anonymous messages about individuals recently diagnosed with brain cancer.

Methods: Ninety-seven free-text messages posted in a moderated cancer forum were analyzed with text mining tools. Retrieval of messages' polarity and emotions (Plutchick's wheel) was conducted using Bing and NRC emotion lexicons. Overall estimates were meta-analyzed. Potential differences of items between patients' age group, sex, tumor severity, time since diagnosis, and messenger's relationship to patient were assessed. Principal component (PCA) and multiple correspondence (MCA) analyses on emotions were performed to assess their co-occurrence in messages and lexicon respectively. (IRB: WMed-2019-0487)

Results: Messages display on average 9.7% (95% CI 8.9, 10.6) positive, and 11.0% (95% CI 10.1, 12.0) negative affect. Polarity is lexicon-dependent. Fear was the most prevalent (10.7%, 95% CI 9.8, 11.7) emotion, present in all messages. The eight basic emotions loaded into three components (73% variance explained), corresponding to positive emotions, negative emotions, and their combination. Messages with higher or unspecified severity showed slightly increased negative affect ($p=0.019$).

Discussion: Initiating messages around a brain cancer diagnosis portray a neutral affect by far, and certain amount of fear. Affect differs by disease severity. Future endeavors include addition of the other thread's messages, their content analysis, assessment of threads from other cancer sites and care phases to characterize them and compare them.

EVALUATION OF A CONTINGENCY MANAGEMENT SMARTPHONE-SMARTCARD PLATFORM IN A COMMUNITY CLINIC

Mark Rzeszutek, MS; Anthony DeFulio, PhD

Psychology, Western Michigan University

Background: Contingency management (CM) is one of the most effective psychosocial interventions for increasing drug abstinence and attendance to recovery-related appointments, but it has not been broadly adopted within the treatment community. A smartphone-smartcard platform for implementing CM was developed to overcome barriers to CM adoption and increase its dissemination and use as an adjunct to treatment.

Purpose: The purpose of this retrospective study was to assess the effectiveness and acceptability of a smartphone CM service as an adjunct to traditional treatment provided in a Midwestern inner-city clinic.

Methods: A smartphone-smartcard platform allowing easy implementation of CM was offered to patients at a clinic in large Midwestern city. Patients who used the platform ($N = 108$) could receive monetary incentives for attending scheduled therapy appointments and for urine samples that were consistent with illicit drug abstinence and medication adherence. These patients were later matched and compared to similar patients at another center located in the same city that was operated by the same provider.

Results: Patients who received the intervention were significantly more likely to attend appointments and produce urine samples consistent with treatment goals than their controls. Patients and therapists reported high satisfaction with the platform.

Conclusion: Acceptance of the service was high and clinical outcomes were improved for patients using the smartphone-smartcard CM platform. Given its efficacy, ease of implementation and the convenience of the use of the platform for all stakeholders, this appears to be a promising approach to increasing access to CM and improving clinical outcomes.

ROBOTIC EXCISION OF TYPE IV CHOLEDOCHAL CYST WITH HEPATICODUODENOSTOMY

Sarah Khalil, MD; Kyra Folkert, MD; Michael Leinwand, MD

Surgery, Western Michigan University Homer Stryker M.D. School of Medicine; Pediatric Surgery, Bronson Methodist Hospital

We present a case presentation of a robotic choledochal cyst excision with choledochoduodenostomy reconstruction. Choledochal cysts are due to congenital malformation of bile ducts and require resection due to their risk of malignant transformation. Historically these resections were done open due to the difficulty in creating the hepaticojejunostomy without tension on the anastomosis. Our supporting video highlights the benefits of robotic surgery with its superior visualization and articulating instruments facilitating a complex dissection and anastomosis. The patient is an 8 year-old girl who presented with right upper quadrant pain and weight loss and was found on ultrasound and MRCP to have a type IV choledochal cyst. She did well postoperatively without any complications. A brief review of the relevant literature is included. As compared to hepaticojejunostomy, hepaticoduodenostomy for reconstruction after excision of type IV choledochal cyst is well supported in the literature. It has been shown to have shorter operative times, a lower risk of postoperative bile leak, and decreased fat malabsorption, without an increased risk of cholangitis.

SUDDEN DEATH AFTER BOUNCE HOUSE - A LATE COMPLICATION OF CONGENITAL DIAPHRAGMATIC HERNIA

Kendall Smith, BA; Brandy Shattuck, MD; James Elliott,

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Pathology, Western Michigan University Homer Stryker M.D. School of Medicine; Elkhart County Coroner

Introduction: Congenital diaphragmatic hernia (CDH) is a condition characterized by incomplete formation of the diaphragm, most commonly presenting prenatally or at birth.

Case History: We are presenting a case of a 3-year-old female who died of cardiac arrest hours after jumping in a bounce house at a festival. On autopsy, the patient was found to have a previously undiagnosed CDH, which likely herniated in response to pressure changes associated with jumping. The patient experienced several hours of vomiting prior to her death due to incarceration of the abdominal organs that had traversed the opening. Respiratory compromise and cardiac arrest ultimately ensued due to compression of the heart and lungs to the right side of the chest cavity.

Conclusion: Late onset CDH can be difficult to diagnose but should be considered for patients presenting with acute gastrointestinal or respiratory symptoms.

NON-ISCHEMIC CARDIOMYOPATHY AS A RARE ADVERSE EFFECT OF CLOZAPINE

Abhinav Garg, MD; Anandbir Bath, MD; Jagadeesh Kalavakunta, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Interventional Cardiology, Borgess Medical Center

A 50-year-old female with a past medical history of hypertension, hyperlipidemia, tobacco abuse and multiple psychiatric issues presented to the emergency department with complaints of gradually worsening shortness of breath, productive cough and left anterior chest pain that was worse with coughing and certain positions. The patient also complained of orthopnea and the inability to lay flat. The patient has a significant past medical history of resistant schizophrenia being treated with clozapine. The patient was tachypneic and hypoxic on presentation. Physical examination revealed normal heart sounds with no murmurs or gallops. Lab workup showed BNP 3200, hyponatremia and negative troponins. EKG showed sinus bradycardia with first degree AV block. Transthoracic echo showed severe global hypokinesis of the left ventricle with EF 20 to 25% and moderately dilated left ventricle. The patient underwent cardiac catheterization which revealed non-obstructive coronary arteries with severe non-ischemic cardiomyopathy. No other causative factor could be identified causing this cardiomyopathy. Her medications were reviewed and Psychiatry was consulted to evaluate for clozapine as a cause of non-ischemic cardiomyopathy. Clozapine was gradually tapered and then discontinued after discussion with psychiatry. The patient was placed on guideline-directed medical therapy. The patient reported improvement in her shortness of breath, chest pain and orthopnea at a 3-month cardiology follow-up. Repeat echocardiogram revealed EF of 45 to 50% with borderline normal LV function. This case is unique as it outlines clozapine as a rare cause of non-ischemic cardiomyopathy, as discontinuation of the drug showed improvement in symptoms and heart function.

CASE STUDY: INCIDENTAL FINDING OF MULTIPLE MYELOMA IN PATIENT WITH BACK PAIN

Rubina Baig, MD; Mahmoud Kassir, MD; Wesley Eichorn, DO

Family and Community Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Multiple Myeloma is characterized by the abnormal proliferation of plasma cells in the bone marrow. This often results in skeletal destruction due to osteolytic lesions, leading to osteopenia and/or pathologic fractures. Multiple Myeloma may present in many different ways, including renal failure, anemia, hypercalcemia or just bone pain. We present the case of a 59 year-old woman who presented to the Emergency Department for back pain after a non-traumatic ground-level fall, and was found to have Multiple Myeloma.

Case History: Upon arrival to the Emergency Department, the patient was found to be hypertensive. She was also found to have an age-indeterminate vertebral compression fracture as well as new onset renal failure. Initially, renal failure was attributed to progressive hypertensive disease. However, considering the simultaneous bone fracture and anemia - workup was continued. Peripheral blood smear showed Rouleaux formation. Protein Electrophoresis confirmed IgA lambda monoclonal gammopathy. Skeletal survey discovered multiple skull lytic lesions. Diagnosis of Multiple Myeloma was confirmed, and the patient was promptly started on hemodialysis and chemotherapy.

Discussion: Multiple Myeloma accounts for about 10 percent of all hematologic malignancies. This case illustrates the importance of keeping high suspicion for Multiple Myeloma, even when the clinical picture is easily explained by other chronic and common disease processes. A clinical picture involving acute onset renal failure, anemia and back pain should warrant immediate workup for Multiple Myeloma.

**CLINICAL OUTCOMES IN DIABETIC PATIENTS WITH AMBULATORY CARE
PHARMACIST INTERVENTION: AMBULATORY CARE AND THE PHARMACIST'S
ROLE IN DIABETES MANAGEMENT**

Elizabeth Graham; Jessica Procriv, PharmD; Dean Van Loo, PharmD

Pharmacy, Ferris State University; Pharmacy, Bronson Methodist Hospital; Pharmacy, Ferris State University

Objective: The objective of this study is to determine the effect of pharmacist intervention on patient-centered outcomes in diabetes management.

Research Design: This study will be a single-centered retrospective chart review of diabetic patients seen by a physician at least twice between 1/1/2018 – 8/1/2018 and also seen by an ambulatory care pharmacist at least twice between 1/1/2019 – 8/1/2019. This study will encompass 15 different Bronson practice sites across three counties in the state of Michigan.

Outcomes: The primary outcome for this study will be change in HbA1c during 1/1/2019 – 8/1/2019 when compared with baseline lowering between 1/1/2018 – 8/1/2018. Secondary outcomes include blood pressure lowering, number and type of pharmacist interventions, medication changes (increased/decrease dose, medication added/deleted), whether the pharmacist was the only member of the care management team involved, and whether the patient was put on a statin, aspirin, or ACE/ARB therapy.

Preliminary Data: Data review is currently taking place, but preliminary results in the primary outcome are as follows:

- Of the 250 patients pulled, 47 met inclusion criteria.
 - During the physician baseline period (1/1/2018 – 8/1/2018)
 - Initial A1c: 9.56
 - Final A1c: 9.64
 - 18 patient's A1c decreased
 - 26 patient's A1c increased
 - 4 patients had no change
 - During the pharmacist intervention period (1/1/2019 – 8/1/2019)
 - Initial A1c: 9.85
 - Final A1c: 8.85
 - 32 patient's A1c decreased
 - 15 patient's A1c increased
 - 1 patient had no change

Further data review regarding analysis of primary outcome data and secondary outcomes is pending.

DETERMINING DRUG-SEEKING BEHAVIOR IN THE EMERGENCY DEPARTMENT: PROVIDER PERSPECTIVES

Joshua White, BS; Natasha Trainer, BS; Parker Crutchfield, PhD; Duncan Vos, MS

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
Medical Ethics, Humanities, and Law, Western Michigan University Homer Stryker M.D. School of Medicine;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Background: With the growing opioid epidemic, Emergency Department (ED) providers are faced with the challenge of treating their patients' pain while also preventing abuse from "drug-seeking patients." Prior research has attempted to characterize these patients, who may demonstrate certain "drug-seeking behaviors." However, less is known about the thought process that goes into decision making on the part of the ED provider. This project aims to identify and quantify the criteria that ED providers use to determine which patients are likely to be drug-seeking.

Methods: This was an electronic survey administered to ED providers working in Southwest Michigan. Respondents were asked to complete a free-response section in which they wrote their top "drug-seeking criteria," and a section with unique patient scenarios/characteristics that they had to rank in accordance to its significance.

Results: Approximately 33 surveys were completed. The most common free-text criteria were behavioral, including Exaggerated or inconsistent, requests narcotic pain medications by name, and reports allergies to non-narcotic pain meds. For the section of ranking scenarios, the most significant criteria were similar behaviors, including Patient has a known history of prescription drug abuse, Patient requests pain medication by IV, and Patient reports and unusually large number of medication allergies. Patient demographics, such as age or race, were not seen as important.

Conclusion: This study identified the criteria that ED providers use to determine which patients are drug-seeking. Many of these criteria related to certain behaviors demonstrated by the patient and were consistent with established literature on drug-seeking.

PULMONARY EMBOLISM: A RARE COMPLICATION OF MYCOPLASMA PNEUMONIAE

Khadijah Hussain, BS; Prasanth Pillai, DO; Mariam Ischander, MD

MD Class of 2022, Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Mycoplasma pneumoniae is a common cause of community-acquired pneumonia in children. Pulmonary embolism is a rare complication of Mycoplasma pneumoniae and has been cited in the literature in very few cases.

Case Description: A 16-year-old female with developmental delay and morbid obesity presented to our hospital with dyspnea, hypoxia, fevers, and malaise. She had congestion and a non-productive cough with pleuritic chest pain the week prior. Her medications included oral contraceptive pills. Diminished lung sounds were noted on examination and she was admitted to the hospital for acute hypoxic respiratory failure (SpO₂ <88%). Chest x-ray showed left lower lobe pneumonia so she was treated with amoxicillin-clavulanic acid and ceftriaxone. Ultrasound was obtained due to calf pain and showed DVT of the right peroneal veins. CT angiography of the chest demonstrated bilateral segmental pulmonary embolism and bilateral lower lobe pneumonia. The patient was discharged on enoxaparin four days later on room air but dry cough persisted and she was readmitted two days later with hypoxia (SpO₂ <88%). Nasopharyngeal swab was positive for Mycoplasma pneumoniae on admission and zithromycin was started. The following day, anti-cardiolipin and anti-β₂ glycoprotein antibodies were negative. The patient was discharged home on room air two days later.

Discussion: The mechanism by which mycoplasma infections cause thrombosis likely involves hypercoagulability resulting from cold agglutinin-induced hemolysis and formation of autoantibodies. Pulmonary embolism should be considered in cases of unexplained respiratory symptoms following mycoplasma infection in pediatric populations. Failure to recognize the diagnosis risks poor outcomes and high mortality.

VIRTUAL REALITY USE FOR SYMPTOM MANAGEMENT IN PALLIATIVE CARE: A PILOT STUDY TO ASSESS USER PERCEPTIONS

Tracy Johnson, BA; Laura Bauler, PhD; Duncan Vos, MS; Alan Hifko, MD; Mohammad Ahmed, BS;
Paras Garg, MS; Michael Raphelson, MD

MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine;
MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine;
Family and Community Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

In the past two decades, virtual reality (VR) technology has found use in a variety of clinical settings including pain management, physical medicine and rehabilitation, psychiatry, and neurology. However, little is known about the utility of VR in the palliative care setting. Moreover, previous investigations have not explored user perceptions of the VR experience in this population. Understanding user perceptions of the VR intervention will be critical for the development and delivery of effective VR therapies. To examine the utility of VR for palliative care patients, a pilot study of VR use was conducted with 12 adult patients diagnosed with life-limiting illness who were residents at a free-standing hospice facility. The intervention consisted of a one-time 30-minute VR experience. User perceptions were assessed through both quantitative and qualitative means, including participant responses to open-ended questions after the VR intervention. Acute changes in symptom burden were assessed using the revised Edmonton Symptom Assessment Scale (ESAS-r). Participants found the VR experience to be both enjoyable and useful, and the intervention was well-tolerated overall. This study provides support for VR as a promising new therapeutic modality for patients undergoing palliative care.

BRAT 1 MUTATION: RAPID WHOLE GENOME SEQUENCING AS AN EARLY DIAGNOSTIC TOOL IN A NEWBORN WITH ANTIEPILEPTIC RESISTANT SEIZURES

Estefani Hee Chung, MD; Julia Frueh, MD; Angela Lai, MD; Andrea Scheurer, MD

Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Neonatology, Bronson Methodist Hospital; Neonatology, Bronson Methodist Hospital

Pathogenic alteration in BRCA1[breast cancer 1]-associated ataxia-telangiectasia mutated activator 1 (BRAT1) is associated with Rigidity and Multifocal Seizure Syndrome - Lethal Neonatal (RMFSL). We conducted a literature review using PubMed as a search engine using the terms BRAT1 mutation and found that since 2012, twenty-six patients with BRAT1 mutations have been reported, all with a spectrum of neurodevelopmental and phenotypic anomalies. The most common variable amongst these patients is anti-epileptic resistant seizures. Over the years, the prognosis of this condition has been variable; seventeen patients including ours, presented on the first day of life with intractable seizures and early death before the age of one while others had delayed presentation with a longer life span. We describe a firstborn Caucasian male born to non-consanguineous parents that presented with intractable seizures and multiple phenotypic anomalies at birth with death in the second month of life due to cardiorespiratory failure. Rapid whole genome sequencing (rWGS) collected in the second week of life identified compound heterozygous variants in the BRAT1 gene. Early diagnosis allowed for informed decision-making and avoidance of prolonged hospital admission to allow for palliative care at home. rWGS has become more cost effective with improved time-to-result making genetic testing a more feasible diagnostic tool. In previous studies, it is unclear when genetic testing was completed, however, many of these patients underwent multiple invasive procedures. We suggest that pediatric providers consider RMSFL on their list of differentials for a neonate with multi-drug resistant seizures and that rWGS be done more readily.

ACUTE EXPOSURE AND SUBSEQUENT DEATH VIA INTRACORPOREAL CONCEALMENT OF METHAMPHETAMINE IN TWO UNRELATED CASES

Ernie Morton, MS; Elizabeth Douglas, MD; Prentiss Jones Jr., PhD

MD Class of 2022, Pathology, Biomedical Sciences; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction:

We present two unique and unrelated cases in which the subjects attempted to conceal methamphetamine from law enforcement by swallowing plastic baggies containing the illicit substance. Unlike many cases of drug overdose, each subject received medical care prior to death. The antemortem care and documentation of events allowed for the construction of a timeline that demonstrated the signs and symptoms of a methamphetamine overdose and allowed for a direct comparison of the two cases. Well-described timelines of drug exposures resulting in death are rare in the literature.

Case Descriptions:

In the first case, drug ingestion was suspected but not verified until postmortem toxicology results were obtained. A blood sample taken 15 hours after the patient was pronounced dead, demonstrated the presence of amphetamine and methamphetamine with concentrations of .48 mg/L and 62 mg/L, respectively. These concentrations are some of the highest ever recorded in the literature. In the second case, a man reported to the hospital shortly after swallowing a bag containing drugs. While the patient received care, he ultimately perished. Upon his arrival to the hospital a blood sample was taken and demonstrated amphetamine levels of 0.24 mg/L and methamphetamine levels of 8.3 mg/L. Twenty-three hours after he was pronounced dead, a peripheral blood sample demonstrated amphetamine levels of 0.25 mg/L and methamphetamine levels of 9.6 mg/L.

Discussion:

Despite the similarities of the drug, method of delivery, physical decline, and time between deaths in these 2 cases, the difference in postmortem concentrations is markedly apparent. This report explores the plausible mechanisms likely to have contributed to such a vast difference in drug concentrations.

UNINTENTIONAL DROWNING WITH THE CONTRIBUTING FACTOR OF CARBON MONOXIDE INTOXICATION

Raymond Bayer, BS; Joseph Prahlow, MD

MD Class of 2022, Pathology; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: There are approximately 4,200 cases of drowning in the United States every year. Commonly identified risk factors for drowning include male sex, alcohol use, and lack of lifejacket. In this case report we will examine a less commonly identified risk factor: carbon monoxide exposure.

Case Report: A 19-year-old female drowned after entering a lake from a boat on which she had been riding. Prior to entering the water, she had reported a cramp and had been riding on the boat at low speed for two hours. Autopsy revealed muddy water in the mouth, nose, and upper airways, muddy fluid in the trachea and bronchi, and focal hemorrhages in the lungs bilaterally. In addition, bright red lividity and musculature were noted. Toxicology testing revealed an alcohol level of 71 mg/dl and carboxyhemoglobin level of 46.2%. The cause of death was drowning with a contributory factor of carbon monoxide intoxication.

Discussion: Carbon monoxide levels on idling and stationary boats frequently exceed 1,000 ppm in the rear deck area, enough to cause loss of consciousness within 2 hours of exposure. The ability of carbon monoxide intoxication to produce loss of consciousness makes it especially dangerous to persons on or near recreational boats. This case serves as a public health warning on the dangers of carbon monoxide emission from boats, and its potential role in contributing to drowning deaths.

"DIABETIC NEPHROPATHY AND END STAGE RENAL DISEASE IN A 28-YEAR-OLD, OR IS IT?"

Zainab Mahmood; Jayne Barr, MD

MD Class of 2021, Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Systemic Lupus Erythematosus (SLE) is an auto-immune disease associated with damage to multiple organ systems. Concomitant chronic inflammatory conditions can worsen disease prognosis. The addition of psycho-social barriers makes diagnosis and treatment more difficult, and as such, this case will emphasize the importance of holistic patient care.

Case Description: We present a case of a 28-year-old Hispanic female with end-stage renal disease on hemodialysis for 2 years, Type 1 diabetes mellitus, hypothyroidism secondary to Hashimoto's, and four miscarriages who was admitted to the ICU with pneumonia. A detailed history revealed sun-sensitivity and a recent bout of arthritis. Considering her unstable condition, multiple auto-immune conditions, and rapidly progressing renal disease, work-up for other underlying diseases was prompted. Lab tests included elevated ANA and positive anti-body titers. Follow-up with out-patient Rheumatology led to a diagnosis of SLE with overlap syndrome.

Discussion/Conclusion: SLE is prevalent in the Hispanic population and presents as a more severe disease process. It is ranked as the fifth and sixth leading cause of death among ages 15-24 and 25-34, respectively. When a Hispanic female patient presents with history of multiple auto-immune conditions and miscarriages, clinicians should have a high suspicion for other underlying processes. This case report highlights the importance of bridging psycho-social and language barriers to healthcare many marginalized communities face. It also highlights the benefit of a timely work-up and of valuing race/ethnicity as specific risk factors that all clinicians must consider.

BILATERAL FACIAL NERVE PALSY IN A PREGNANT ACUTE HIV PATIENT

Neil Hughes, MD; Muhammad Ebad Rehman, MD; Michael Baumgartner, MD; Thomas Melgar, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Bilateral facial nerve palsy (BFNP) is a rare disorder that is responsible for 0.3 - 2.0% of facial nerve palsies. In a ten-year study, numerous causes of BFNP were reported including Lyme disease, Guillain-Barre syndrome, sarcoidosis, and AIDS. The risk of facial nerve palsy for pregnant women is 3.3 times that for nonpregnant women. We present a case of BFNP in pregnancy with acute HIV infection.

Case: A 42-year old G7P5015 female at 37 weeks gestation presented with BFNP. Three months earlier, she had negative HIV screen. She also had a diffuse rash 1 month prior to presentation that resolved with diphenhydramine treatment. Five days prior to admission, she noticed numbness and weakness extending from her forehead to upper lip bilaterally. Examination on presentation was consistent with term pregnancy and bilateral CN VII deficits. Workup including MRI of the brain, lumbar puncture, myasthenia gravis panel, Lyme antibodies, syphilis screen, serum ACE levels, routine hematology and chemistry labs were all normal. HIV screening returned positive with a confirmatory 129,455 copies/ml. One week after discharge, labor was induced resulting in the birth of a healthy newborn. Patient was started on emtricitabine, tenofovir and raltegravir, resulting in complete recovery of BFNP in 1 month.

Discussion: BFNP is a rare disorder but it should be considered in pregnant women with facial weakness. Acute HIV infection in pregnancy can also increase the risk of it. Delivery of the fetus and timely antiretroviral therapy can lead to complete neurological recovery.

A QUALITY IMPROVEMENT PROJECT: UTILITY AND USABILITY OF A DIABETES MEDICATION POSTER IN AN INTERNAL MEDICINE/MEDICINE-PEDIATRIC CLINIC

Wasif Shamsi, MD; Nirmal Muthukumarasamy, MD; Loren Weber, DO; Russell Van Maele, DO; Emilee SurVance, DO; Kevin Kavanaugh, MD; Tracey Mersfelder, PharmD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine; Pharmacy Practice, Ferris State University

Introduction: Type-2 diabetes and related complications are a common disease state seen in primary care. The available therapies have increased exponentially. This can be difficult for a busy primary clinician to know and utilize available options efficiently.

Objective: The objective was to determine whether creating a quick reference diabetes medication poster based on costs, classification, and clinical outcomes/contraindications/cautions for use in an internal medicine/medicine-pediatric clinic improves resident and faculty knowledge, comfort, and awareness of those medications.

Methods: This quality improvement prospective study was designed to evaluate the utility of a diabetes medication poster in the clinic over a two-month period. A pre- and post-survey was electronically sent to 65 residents and faculty to assess their level of confidence and knowledge of diabetes medication treatment before and after the poster was distributed. This project was classified as non-research by the Institutional Review Board.

Results: There were 40 physicians that responded to the pre-survey. The survey revealed >90% agreed or strongly agreed that the poster would decrease risk of adverse reactions, help control cost, and give confidence to providers while discussing and prescribing diabetic medications.

Conclusion: There are a myriad of tools that can be utilized to help navigate complex diseases, such as diabetes. Posters, such as the one utilized in this project, have rarely been evaluated. Based on initial results, physicians viewed the diabetes medication poster as favorable. The poster was placed in the clinic for a period of two months and a post-survey will be conducted.

TUMEFACTIVE DEMYELINATION: MULTIPLE SCLEROSIS PRESENTING AS A SINGLE RING-ENHANCING LESION

Eric Edewaard, MD; Vishal Deepak, MD; Raymond Bayer, BS; Laura Bauler, PhD; Prashant Patel, DO

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Tumefactive demyelination refers to demyelinating central nervous system (CNS) lesions greater than 2 cm, often with ring enhancement and surrounding edema. They can mimic solid malignancy of the brain, presenting a diagnostic challenge for clinicians.

Case: A 57-year-old woman with history of tobacco use, migraine, and a transient ischemic attack presented with 1 week of focal neurologic symptoms. She began to notice paresthesia of her left foot which progressed up her leg and involved her left arm. She also had waxing-and-waning weakness in her left upper and lower extremities which worsened over several days. Vital signs were stable. Physical exam demonstrated diffuse hyperreflexia, 1/5 left leg weakness and 4/5 left arm weakness with globally decreased sensation to light touch on the left. Magnetic resonance imaging of the brain showed a 2.5 cm right parietal white matter lesion with partial ring enhancement, without mass effect. Cerebrospinal fluid contained oligoclonal bands and elevated myelin basic protein. As imaging was nondiagnostic and the patient had no history of demyelinating disease, brain biopsy was performed and histopathology confirmed tumefactive demyelination. The patient began high dose systemic steroids, with significant improvement in her strength.

Discussion: Tumefactive demyelinating lesions must be considered in the evaluation of CNS lesions. They share characteristics with abscesses and malignancies including primary CNS lymphoma and high-grade glioma. When past medical history and lumbar puncture are nondiagnostic, brain biopsy is important in providing histo-pathologic diagnosis prior to initiating appropriate treatment.

5-FLUORACIL CAUSING ACUTE CORONARY THROMBOSIS

Ricardo de Castro, MD; Michelle Helbig, MD; Mike Francisco, PA; Mridul Parmar, MD;
Mohammad Omaira, MD; William Nichols, DO

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Hematology/Oncology, Bronson Methodist Hospital; Critical care, Bronson Methodist Hospital

Introduction: 5-Fluorouracil (5-FU) is considered to be the backbone of colorectal cancer (CRC) systemic therapy since the great majority of recommended regimens include its administration. However, there are a few reports showing direct cardiac toxicity of the drug due to direct heart injury or less common coronary thrombosis. We report a patient with known stable CAD and new episode of chest pain after 5-FU injection for CRC treatment.

Case description: This is a 51-year-old man with a past medical history significant for CAD with previous coronary bypass surgery and CRC in chemotherapy with 5-FU who presented at emergency department with chest discomfort. He had his outpatient chemotherapy and minutes after the infusion of the drug patient developed anterior chest pain, sharp, associated with nausea and vomiting. Initial troponins were positive, but ECG did not show any signs of acute ischemia. Because of hypoxia and low blood pressure, patient was intubated and sent to intensive care unit. Echocardiogram showed reduced ejection fraction with wall motion abnormalities. Patient performed a left heart catheterization which showed an acute occluded saphenous graft to marginal branch of circumflex artery. A drug-eluting stent was placed and after 7 days of recovery patient was discharged home.

Conclusion/ Discussion: Chemotherapy toxicity with 5-FU is a rare phenomenon with sparse cases described in the literature. It is more common in patients with previous coronary artery disease and it seems to be more dangerous when the medication is given in a bolus regimen instead of continuous infusion.

BROKEN BONES AND AN ADRENAL MASS

Khadijah Hussain, BS; Graham McLaren, MD; Saad Shebrain, MD

MD Class of 2022, Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Delay in diagnosis of a functional adrenal mass is associated with significant morbidity and potential mortality. With nonspecific nature of clinical symptoms, a high index of suspicion and biochemical confirmation are critical for an accurate diagnosis.

Case Description: A 37-year-old male presented with severe chronic lower back pain. Over the previous two years he had undergone sporadic and incomplete workup. Twenty-four months previous, a CT abdomen and pelvis showed right renal stones and a 3.5 cm left adrenal incidentaloma. Dexamethasone suppression test at that time revealed elevated morning serum cortisol (18.4 mcg/dL) and undetectable ACTH levels. Over the last 18 months, before presentation, he developed hypertension, diabetes and marked abdominal striae. Twelve months previous, he suffered a cervical spine fracture that required decompression and fusion. Follow-up MRI demonstrated multiple thoracic spine fractures in various stages of healing and re-demonstrated the left adrenal mass. Bone DEXA scan Z-score was -2.3. Biochemical testing showed markedly elevated 24-hour urine cortisol (257mcg), with normal metanephrines and VMA. Plasma levels of aldosterone, renin, catecholamines, metanephrines, and normetanephrines were within normal limits. Findings were consistent with primary hypercortisolism. The patient underwent an uneventful laparoscopic adrenalectomy. Pathology confirmed a functional adrenocortical adenoma. Postoperatively, he completed a 10-day hydrocortisone taper. Three months postoperatively, the patient continued to do well and was able to return to work.

Discussion/Conclusion: Delay in diagnosis of a functional adrenal mass is associated with significant comorbid conditions. Adrenal incidentalomas should undergo appropriate, prompt and complete biochemical testing to evaluate for functionality or malignancy.

TOWARD STANDARDIZATION OF HOSPITALIZATION FOR ADULTS WITH DECOMPENSATED DISORDERED EATING: A CASE SERIES AND LESSONS LEARNED

Maria Demma Cabral, MD; Nic Helmstetter, MD; Anya Ring, DO

Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Medicine Pediatrics, Western Michigan University Homer Stryker M.D. School of Medicine

Anorexia nervosa (AN) is an eating disorder (ED) commonly diagnosed in adolescence with health consequences such as malnutrition, bradycardia, refeeding syndrome, and death. Published clinical practice guidelines (CPG) are available to determine need for medical inpatient stabilization. We describe our experience with 3 adult patients admitted to the adult academic service using the modified CPG adapted from pediatrics as there is no such existing protocol for adults in our institution. All 3 patients were women with median age of 20 years and BMI < 18.5. All met at least one criterion for hospital admission: all had unstable vital signs, electrolyte imbalances, and failed outpatient management. Physicians, nurses, dietitians, and social workers were educated and involved as part of the multidisciplinary team, which is standard of care. No inpatient psychology was involved. The starting caloric intake was 1200-1500 calories, adjusted accordingly to a discharge caloric goal of 2100-2400 calories. None required enteral feeding with a nasogastric tube. Average % increase of ideal body weight was 2.4% (1.6 kg). The average length of stay was 7.3 days. The most decompensated patient stayed the longest and was transferred to a residential treatment facility for higher level of care after medical stabilization. The other two patients were discharged home. Effective and safe hospitalization of patients with ED requires close interdisciplinary collaboration given the stigma surrounding this diagnosis and the knowledge gap in most adult physicians. Our experience can help create the first CPG for the institution in providing care for adults with ED.

THE PHANTOM OF LACTIC ACIDOSIS DUE TO METFORMIN IN A PATIENT WITH HEART FAILURE

Ricardo de Castro, MD; Neiberg Lima, MD; Mridul Parmar, MD;
Vishal Deepak, MD; William Nichols, DO; Susan Bannon, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Metformin has long been the cornerstone of therapy for glycemic control in patients with type 2 diabetes worldwide. Historically, Metformin use has been contraindicated in patients with heart failure (HF) owing to concerns of lactic acidosis, even though recent data suggest a benefit of its use in this subset of patients.

Case presentation: Patient is a 64-year-old man with diabetes, non-ischemic heart failure, and hypertension who presented to the emergency department with progressive shortness of breath. On the morning of his admission, he developed mild difficulty breathing which was worse over the course of the day. Denied chest pain, nausea, vomiting. At ED he was normotensive with normal vital signs. Initial laboratory exams showed creatinine 2.75 mg/dl (from previous 0.96 mg/dl), arterial blood gas with pH 7.15, bicarbonate 15 mmol/L and lactic acid 14.5 mmol/L. He was admitted to the ICU, intubated and started on norepinephrine and continuous renal replacement therapy (CRRT). Lactic acid cleared slowly, and patient was extubated in his 3rd admission day. CRRT was discontinued and patient was discharged home in his 7th hospital day asymptomatic.

Discussion: Metformin is currently recommended as the preferred initial pharmacotherapy in patients with type 2 DM in the absence of contraindications. Even though there is an FDA warning about Metformin and heart failure, recent publications showed that Metformin is effective, safe, and generally well-tolerated in patients with heart failure. Nevertheless, lactic acidosis is a possible complication of this drug especially in patients with kidney dysfunction.

HYPERGLYCEMIA DURING REFEEDING SYNDROME IN SEVERE ANOREXIA NERVOSA: A CASE REPORT

Maria Demma Cabral, MD; Ethel Clemente, MD; Corey Lager, MD; Nital Murthi, MD; Cheryl Roberts, RD

Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Bronson Diabetes and Endocrinology Center, Bronson Methodist Hospital;
Other, Western Michigan University Homer Stryker M.D. School of Medicine

Hypoglycemia, or low blood glucose (BG), is a known complication of anorexia nervosa (AN) due to caloric deprivation. Less commonly, hyperglycemia in AN may occur in the setting of refeeding syndrome (RFS), a life-threatening event due to metabolic derangements particularly from low phosphorus. We describe a case of a 21-year-old female struggling with severe AN, purging type, whose body mass index was < 15.5 kg/m². Close outpatient monitoring for complications of malnutrition was warranted with weekly weight checks and blood and urine tests. After a month of intermittent, asymptomatic hyperglycemia (BG range: 100-182 mg/dL) with normal hemoglobin A1c (HbA1c 5.3%), new-onset glucosuria occurred with maximum BG of 249 mg/dL. Coincidentally, she had gained four pounds in one week from increased nutritional intake. Phosphorus (1.6 mg/dL) and potassium (2.4 mmol/L) levels were low. She was hospitalized overnight for medical stabilization and monitoring of RFS. She received intravenous fluids with electrolyte corrections. Intermittent, asymptomatic hyperglycemia without glucosuria persisted after hospitalization with eventual spontaneous resolution. Subsequent oral glucose tolerance test revealed impaired glucose tolerance. Hyperglycemia in RFS is postulated to occur from rapid conversion of a catabolic to an anabolic state leading to impaired glucose metabolism despite insulin release. Likewise, the increased glucose load from refeeding can also induce a stress response, leading to increased cortisol levels, further contributing to hyperglycemia. Our case provides important learning points in recognizing hyperglycemia as a manifestation of RFS. Understanding the pathophysiology of RFS helps dictate safe refeeding management in malnourished patients, particularly in severe AN.

IMPROVING DOCUMENTATION OF LONG-ACTING, REVERSIBLE CONTRACEPTIVE MEDICATION AND PROCEDURE COUNSELING

Andrew Luciano, MD; Alison Radigan, MD; Rebecca Kaminski, DO; William Scott Humphrey, MD

Family and Community Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Long-acting reversible contraceptives (LARCs) provide benefits to the individual and society. Almost half of pregnancies in the United States are unintended. LARCs allow women to prevent unintended pregnancy with relatively little risk, while often having desirable side effects. Evidence suggests that patients desire more information regarding LARCs. LARCs are unique among contraceptives in that they have both medication and procedural risks and benefits. These must be presented to the patient and documented prior to insertion in order to facilitate informed consent. Currently, at the WMed Family Medicine Residency Clinic, there is no standardized process for LARC counseling, and the procedure consent form used is nonspecific. Therefore, any details regarding risks, benefits, and alternatives discussed with the patient must be documented within the provider's note. We believe that our clinic could improve documentation and systemize the process of LARC counseling. An internal chart audit revealed that 50% of charts reviewed did not include documentation of discussion regarding LARC risks and benefits. This is important both for patient autonomy as well as a medicolegal standpoint. We created a LARC specific medication and procedure consent form detailing risks and benefits of each type of LARC, and a dedicated smart phrase to be used in the chart. Clinic providers were given an electronic presentation on these new tools. Following a three-month period of use, we will compare the presence and adequacy of documentation for LARC insertions prior to and following the intervention. We expect to see a significant increase in documentation of patient counseling.

RETINAL HEMORRHAGES IN A 6-MONTH-OLD CHILD RELATED TO DISSEMINATED INTRAVASCULAR COAGULATION

Maria Magidenko, BA; Amanda Fisher-Hubbard, MD; Joseph Prahlow, MD; Theodore Brown, MD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Pathology, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Retinal hemorrhages (RH) are seen in 50-100% of fatal cases of abusive head trauma (AHT) in young children. However, other causes of RH must be excluded. We present the case of an unresponsive infant who was resuscitated and was noted, on clinical exam, to have RH, raising the concern of AHT. A subsequent death investigation confirmed that the hemorrhages were due to disseminated intravascular coagulation (DIC).

Case Report: A 6-month-old child was found unresponsive in an adult bed, where he had been sleeping next to his father. Following prolonged (> 2 hours) cardiopulmonary resuscitation, he was eventually resuscitated. Ophthalmologic examination revealed retinal hemorrhages, raising the concern of possible AHT. The child died 8.5 hours after hospital admission. Except for focal subscalpular hemorrhage, there was no trauma noted at medicolegal autopsy. The brain had early hypoxic-ischemic changes, and the eyes had RH, but no grossly-evident perioptic nerve hemorrhage. The cause of death was certified as sudden unexplained infant death with a contributing factor of an unsafe sleep environment. A review of hospital clinical laboratory values indicated that the infant had DIC, which likely contributed to the RH.

Discussion: Children with AHT often have a triad of extensive RH with subdural hemorrhage and encephalopathy. In our case, extensive medical intervention and clinical laboratory findings consistent with DIC likely explain the child's RH. This case serves to inform physicians about the importance of considering DIC as a potential cause of RH, and to remember that RH is not always indicative of AHT.

NOVEL MIDDLE EAR MALFORMATION CAUSING CONGENITAL HEARING LOSS: A CASE REPORT AND LITERATURE REVIEW

Aaron Zebolsky, MS; Corbin Sullivan, MD

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
ENT, Head & Neck Specialists, Bronson Methodist Hospital

Introduction: Congenital malformations of the middle ear are rare causes of conductive hearing loss. The ossicular chain comprised of the malleus, incus, and stapes is formed from the first and second pharyngeal arches early in development. Most malformations involve fixation of two or more ossicles, preventing adequate sound transmission. Functional ossiculoplasty has been well-described for common deformities, but there is a paucity of literature describing surgical techniques for other rare malformations.

Presentation case: We describe the case of an 8-year-old boy presenting with a lifelong history of unilateral hearing loss. On surgical exploration, the neck, crura, and base of the stapes bone were molded into a concentric ring with no footplate and only a loose fibrous connection to the cochlea. Furthermore, the region of the oval window was thick and immobile. A stapedectomy was performed as well as laser debridement of the oval window niche and placement of a bucket-handle prosthetic.

Discussion: Recent literature reviews propose distinct classes of congenital middle ear malformations in attempt to guide surgical management. These classes are based largely on incudostapedial joint fixation and stapes suprastructure. However, not every patient fits clearly into these classes. Concomitant involvement of the cochlear oval window has not been reported as in our patient here.

Conclusion: Rare middle ear malformations may be difficult to classify. An example is described here, with a mobile ring-shaped stapes and concomitant involvement of the oval window. Further research is needed to classify and guide management in these unique situations.

UNUSUAL CASE OF SPLENIC RUPTURE FROM UNDIAGNOSED HYPERCOAGULABILITY DISORDER

Allison Zheng, BS; Elizabeth Douglas, MD

MD Class of 2022, Pathology; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Hypercoagulability is the predisposition of the body to create clots, or the inability of the body to remove normal clots. Hypercoagulability disorders often have multifactorial origins, requiring a genetic component with an environmental risk factor such as oral contraceptives or surgery for the disease to become symptomatic. Clinically, hypercoagulability diseases may present with pulmonary emboli or deep vein thrombosis and can sometimes be fatal. The aim of this report is to illustrate an acute, fatal outcome of hypercoagulability disorders.

Case Description: A 25-year-old Caucasian male collapses and becomes unresponsive after complaining of back and left arm pain. He had previously complained of shortness of breath, fatigue, nosebleeds, hemoptysis, hematemesis and unintended weight loss. Lifesaving measures were taken by paramedics and at the ER until a cardiac ultrasound showed no cardiac activity, and he was pronounced dead. At autopsy, 1200 mL free blood and 500 cc clotted blood was found in the abdomen. Cause of death was ruled as hemoperitoneum due to splenic rupture from splenic vein thrombosis. Postmortem genetic testing found homozygous mutations in factor XIII and plasminogen activator inhibitor-1.

Discussion/Conclusions: Hypercoagulability disorders rarely lead to catastrophic hemoperitoneum. However, because of the possibility of asymptomatic, systemic effects, they can go undiagnosed until they present acutely, with potentially fatal results. As genetic testing is increasingly used to determine underlying risk factors, it is necessary to consider situations where living relatives provide consent an adult decedent.

AWARENESS AND ACCESSIBILITY OF CONTRACEPTION

David Lee, MD; Abigail Cheng, BS; Alexis Jones, BA; Emma Swayze, MS; Kathryn Jones, MS;
Monica Ellis, BS; Gisella Newbery, BA; Arushi Tripathy, BS; Erica Myrick, MS; Debra Taubel, MD;
Kelsy Schultz, BA; Alyssa Woodwyk, MS, CAPM

Beaumont Health; MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine; Other, Western Michigan University
Homer Stryker M.D. School of Medicine; Medicine Obstetrics and Gynecology, Western Michigan University Homer Stryker
M.D. School of Medicine; MD Class of 2022, Western Michigan University Homer Stryker MD School of Medicine;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Our study sought to assess community member attitudes toward newly-acquired immediate postpartum long-acting reversible contraception (IPLARC) benefits and determine whether a lack of knowledge about contraception may be impacting their attitudes. Prior literature has extensively detailed contraceptive methods, impacts contraception has on at-risk populations, and inquiries regarding implementation of IPLARCs prior to inclusion under insurance benefits. Recently, studies from South Carolina and Georgia published proposals for implementation from provider and institutional perspectives, though no assessment of patient knowledge was conducted.

Methods: An electronic 8-question survey was administered to Western Michigan University School of Medicine (WMed) clinic visitors and data was recorded via REDCap database. Individuals ≥ 18 and < 60 years of age and were English-speaking were included. This study was exempted by the WMed Institutional Review Board.

Results: 107 submissions were completed. 100% self-reported familiarity with and ability to explain to a friend ≥ 1 forms of contraception. 97.2% reported experience using ≥ 1 forms of contraception, with 42.06% either previously or currently using a LARC. However, only 22.43% responded they were interested in IPLARCs if they got pregnant, 63.55% said they were not interested, and 14.02% were uncertain as they had never been pregnant.

Conclusion: Respondents were generally knowledgeable about and experienced with contraception and their low receptiveness towards IPLARCs unlikely stems from ignorance regarding contraception. Additional factors including health literacy, psychosocial factors, and prior experiences with contraception likely also impacted their attitudes. These should be further explored to best position patients to make informed decisions regarding their reproductive health.

A LITERATURE REVIEW ON THE ASSOCIATION BETWEEN VITAMIN D DEFICIENCY AND MULTIPLE SCLEROSIS

Mariyam Sheidu, BS; Maria Demma Cabral, MD

MD Class of 2020, Pediatric and Adolescent Medicine; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Multiple sclerosis or MS is an autoimmune disease defined by axonal demyelination of nerves in the brain and spinal cord. While the etiology of multiple sclerosis (MS) is still largely unknown, it is known that a risk factor for multiple sclerosis is decreased sun exposure [1-3]. Since decreased sun exposure is a risk factor for vitamin D deficiency, we would like to explore if vitamin D deficiency could be a potential mechanism for MS pathogenesis, because vitamin D has a vast array of biochemical effects on the body beyond calcium and phosphate homeostasis.

Objective: The goal of this literature review is to examine whether an association exists between vitamin D deficiency and MS in the current literature.

Materials and Methods: Observational studies and randomized control trials in PubMed from the years 2011 to 2019. We used MESH terms "vitamin D deficiency" and "multiple sclerosis."

Results: Studies reveal that vitamin D deficiency is associated with increased disability in MS, but not necessarily an increase in oxidative products [15,16]. Results from randomized control trials suggest that high dose vitamin D3 supplementation does not stop disease progress, but does reduce the number of T2 lesions on MRI [18].

Conclusion: Vitamin D deficiency plays a role in multiple sclerosis development, but there is still some controversy regarding its use as a treatment option to prevent MS onset or halt MS progression. Nevertheless, there was an overwhelming majority of literature that supported that vitamin D is an important factor in MS pathogenesis.

INDUCED METHEMOGLOBINEMIA CAUSED BY BENZOCAINE SPRAY

Ricardo de Castro, MD; Neiberg Lima, MD; Mridul Parmar, MD; Vishal Deepak, MD;
William Nichols, DO; Susan Bannon, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Sudden onset of hypoxia and dyspnea in a hospital setting requires prompt evaluation and treatment. When these symptoms are followed by cyanosis, methemoglobinemia should be on the differential as it requires special management. The prompt suspicion and treatment of this condition is crucial for patient recovery.

Case presentation: Patient is a 68-year-old man with COPD, OSA, and CAD who was admitted to the hospital for an episode of dyspnea after an elective septoplasty cauterization with inferior turbinate tonsillectomy and uvulopalatopharyngoplasty to treat OSA. He presented with new-onset dyspnea, followed by cyanosis, and severe hypoxia not resolved after 100% oxygen administration. Troponin and ECG were normal. A methemoglobin level was obtained and was 24.8%. He was given methylene blue and his symptoms, including his cyanosis, subsided less than 10 minutes after the initial dose. Talking with the patient after the event, he revealed to us that he was using the 20% benzocaine spray (Hurricane) for throat pain at least 20 times a day in the hospital even though it was prescribed to be used only three times daily as needed. Patient was discharged home the next day with no sequelae, asymptomatic.

Discussion: Methemoglobinemia can be either inherited or acquired. Inherited methemoglobinemia is a rare disorder. A wide variety of agents are known to induce methemoglobinemia, including benzocaine. In patients with multiple comorbidities, especially lung and heart disorders, the diagnosis is a challenge. Cyanosis not reverted after 100% oxygen is an important clue to define the disease.

STATIN-ASSOCIATED NECROTIZING AUTOIMMUNE MYOPATHY

Ricardo de Castro, MD; Abbas Jowkar, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Neurology, Bronson Methodist Hospital

Introduction: Cardiovascular disease causes significant mortality in the United States and statins are important drugs in its prevention. They are generally safe and tolerated but may rarely cause toxic myopathy which improves on discontinuation of the drug. In very rare cases, 2-3 per 100,000 people, develop an autoimmune necrotizing myopathy.

Case description: A 67-year-old woman with diabetes, hyperlipidemia, hypertension developed proximal upper and lower muscle weakness and was found to have an elevated CPK in the rhabdomyolysis range. As she was on atorvastatin it was felt she may have developed statin-induced toxic myopathy and the drug was discontinued. Her weakness continued to worsen resulting in her falls and difficulties to walk. Her CPK levels, 5 months later, were still elevated in 4000s. EMG of her proximal muscles demonstrated myopathic process with marked membrane instability characteristic of inflammatory myopathy. She tested positive for autoantibodies against 3-hydroxy-3-methylglutaryl coenzyme A reductase. Subsequent muscle biopsy showed evidence of scattered muscle necrosis with sparse inflammatory response. She was treated with intravenous immunoglobulin (IVIG) and prednisone with taper and addition of a second-line immunosuppressive agent. Her symptoms improved markedly and her CPK levels declined in the lower 1000s.

Discussion: Autoimmune HMGR myopathy caused by statins is very rare and challenging to treat. Early diagnosis is important because delays in treatment can cause irreversible muscle damage with function loss.

SECONDARY ORGANIZING PNEUMONIA IN A 5-YEAR-OLD PATIENT WITH DOWN SYNDROME AND T CELL DEFICIENCY

Minh Nguyen, DO; Roua Azmeh, MD; Mariam Ischander, MD

Internal Medicine, Pediatric and Adolescent Medicine Western Michigan University Homer Stryker M.D. School of Medicine

Post-infectious (secondary) organizing pneumonia (OP) is a rare phenomenon with nonspecific clinical findings, and variable radiographic patterns. In this abstract, we describe a case of post-infectious organizing pneumonia secondary to rhino/enterovirus infection in a 5-year-old Down syndrome (DS) female patient with T cell Immune deficiency and chronic pulmonary aspiration. Our patient is a 5-year-old female with DS and chronic pulmonary aspiration. She presented with shortness of breath and was found to have Rhino/enterovirus. A chest X-Ray (CXR) discovered bibasilar pulmonary opacities, suspicious for a community acquired pneumonia. She was started on amoxicillin and discharged in a stable condition. Three days later, patient was readmitted due to hypoxia in the clinic. A repeat CXR showed a secondary organizing pneumonia. A computed tomography of the chest found bilateral patchy ground-glass opacification lesions. Patient improved with an oral steroid. The classic radiologic features of OP are focal consolidation and ground glass opacities. The histologic pattern is defined by the presence of buds of granulation tissue. Biopsy is the gold standard for confirmation, but not required. Our patient's radiographic findings were consistent with post-infectious OP and her improvement with corticosteroid persuaded against a biopsy. In addition, DS patients have high rates of infections in the respiratory tract, attributed to their defective immune systems. In our patient, immunologic workup revealed low total lymphocyte count (CD45+) and T lymphocytes (CD3 and CD4). In this report, we highlight a rare pediatric case of post-infectious OP and a possible contributory role of immune dysregulation and chronic pulmonary aspiration.

AROUND THE WORLD: A SHORT CASE SERIES OF ATYPICAL INTRACRANIAL BULLET TRACKS

Keenan Boulnemour, BS; Joseph Prahlow, MD

MD Class of 2022, Pathology; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Perforating gunshot wounds (GSWs) of the head occur when a bullet travels all the way through the head, whereas penetrating GSWs occur when a bullet does not exit. In such scenarios, the bullet pathway is typically linear, in a straight line. We present two cases where, upon perforating the cranium, projectiles traveled along the inside curvature of the cranial vault, coming to rest on the inner opposite side of the vault, without having traversed the brain.

Case Descriptions: Case 1: A 19-year-old sustained multiple lethal GSWs. Imaging revealed a bullet within the right cranium. At autopsy, the GSW entered the left temporal region and traveled around the anterior inner table of the skull, stopping within the superficial right occipital lobe. Case 2: A 42-year-old was found dead from a suicidal gunshot wound of his submental chin. Imaging revealed a bullet within the right cranium. Autopsy revealed the bullet entered the cranial vault via the left anterior cranial fossa, and then traveled along the inner contour of the skull before stopping within the right superficial parietal lobe.

Discussion: Although most GSW projectiles travel along a relatively straight pathway within the body, including the brain, the presented cases demonstrate that bullets may travel in an arc-like trajectory along the inner contour of the skull and be recovered on the opposite side of the brain. Such a trajectory might help to explain a clinical scenario where neurologic deficits are not as pronounced as one might expect.

BRUGADA SYNDROME MIMICKING ACUTE CORONARY INFARCT

Ricardo de Castro, MD; Neiberg Lima, MD; Stela Sampaio, MD; Susan Bannon, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Hospital de Messejana Brazil

Introduction: ST changes and chest pain are a scary and deadly combination. Most of the time they require urgent heart catheterization. However, Brugada syndrome can present with similar features and involves a different approach. We present a patient with typical chest pain and ECG showing possible STEMI who was diagnosed with Brugada syndrome.

Case description: Patient is a 46-year-old man with hypertension and smoking, who presented at emergency department complaining of anterior chest pain, sharp, radiating to left arm associated with dizziness and palpitations. His wife told that two weeks prior, she found him lying on the floor drooling, confused and with noisy breathing. At emergency department his blood pressure was 154 over 94 mmHg, oxygen saturation 98%. Troponin was negative. Initial ECG showed ST elevation in leads V1 to V3. Echocardiogram did not show wall motion abnormalities or decreased ejection fraction. Exercise stress test negative for ischemia and coronary tomography was normal. Electrophysiology exam negative for ventricular tachycardia or ventricular fibrillation. A final diagnosis of Brugada syndrome was made and patient had an implanted defibrillator placed.

Conclusion/ Discussion: Brugada syndrome is an autosomal dominant channelopathy responsible for 4-12% of all sudden cardiac deaths in the world. The most common mutation occurs in the gene SCN5A and family members screening is mandatory. There are three types of Brugada ECG, but only type I is considered diagnostic. Treatment consists in the implant of a cardiac defibrillator, even though novel therapies involving ablation are emerging.

METHEMOGLOBINEMIA AND VAGINAL BENZOCAINE.

Ricardo de Castro, MD; Neiberg Lima, MD; Marcos Madeiro, MD; Susan Bannon, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Methemoglobinemia can be either acquired or inherited. Most of the cases in the literature are acquired and associated with drugs especially dapsone and benzocaine. The prompt recognition of this condition is imperative in patient treatment and recovery. Symptoms can be indolent or develop within hours and treatment consist of methylene blue intravenous.

Case presentation: Patient is a 59-year-old woman with hypertension and recent shoulder surgery was found down at home. According to her husband, she was feeling lightheadedness and diaphoresis for the past 3 days before her admission with a dry cough but no fevers or chills. At her presentation, patient cyanotic and oxygen saturation at 75% not increased with 100% oxygen. The husband referred that patient uses vaginal benzocaine for itching. At the emergency department, her initial labs did not show abnormalities, chest x-ray was normal. Arterial blood gas was performed showing 35% of methemoglobin. Prompt treatment with methylene blue was initiated and patient did recover within hours. She was discharged home asymptomatic.

Discussion: Acquired methemoglobinemia is a rare condition but commonly associated with topic anesthetics like benzocaine. This medication is an over the counter formulation and can be easily found in groceries. The differential diagnosis is broad and clinicians should be suspicious of this condition whenever they find a combination of cyanosis not reverted with 100% oxygen and exposure to drugs such as dapsone or benzocaine. Treatment with methylene blue is the first choice and should be initiated as soon as possible.

LAPAROSCOPIC RESECTION OF A PHEOCHROMOCYTOMA (PARAGANGLIOMA) OF THE ORGAN OF ZUCKERKANDL IN A PEDIATRIC PATIENT

Katherine Kramme, DO; Robin Fountain, MD; Michael Leinwand, MD

Surgery, Western Michigan University Homer Stryker M.D. School of Medicine;
Pediatric Cardiology, Bronson Methodist Hospital; Pediatric Surgery, Bronson Methodist Hospital

Introduction: Pheochromocytoma is a rare neuroendocrine tumor that secretes catecholamines. While classically located in the adrenal gland, a small percentage of these tumors arise along the parasympathetic chain. The majority of cases are seen among adults age 20-50 years old. Surgical resection, most often via an open approach, is standard of care.

Case Discussion: We present an interesting case of a 12-year-old female diagnosed with a functional pheochromocytoma of the Organ of Zuckerkandl. Presenting symptoms included headaches, tachycardia, and hypertension. Following preoperative optimization of blood pressure, she underwent successful tumor resection via a minimally invasive laparoscopic approach. She was discharged home the following day off blood pressure medications with normal vital signs and resolution of symptoms. She has done well through follow up.

Conclusion: This case demonstrates the successful laparoscopic resection of a pheochromocytoma localized to the Organ of Zuckerkandl in a pediatric patient.

CASE SERIES OF EASTERN EQUINE ENCEPHALITIS VIRUS IN WESTERN MICHIGAN

Adam Ladzinski, DO; Matthew Rumschlag, MS; Aditya Mehta, MD; Eric Edewaard, MD;
Larry Morgan, DO; Brett Jagger, MD PhD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; MD Class of 2020, Western Michigan University Homer Stryker M.D. School of Medicine; Neurology, Borgess Medical Center;
Other, Western Michigan University Homer Stryker M.D. School of Medicine

Eastern Equine Encephalitis Virus (EEEV) is a mosquito-borne alphavirus responsible for unpredictable outbreaks of severe neurologic disease in humans. While the vast majority of human EEEV infections are either asymptomatic or clinically indistinct, a minority of patients develop neuroinvasive disease, which is a devastating illness with a mortality of approximately 30%; no treatments are known to be effective. Neuroinvasive EEEV infection is relatively rare in the United States, with an annual average nationwide case incidence of 9 between 2003 and 2016. However, 2019 was an exceptionally active year for human EEEV disease, with 38 nationwide confirmed cases, including 10 in Michigan. Here, we report the clinical characteristics of a series of 7 cases of confirmed neuroinvasive human EEEV disease who presented to Southwest Michigan hospitals. Patients presented with one or more symptoms suggestive of encephalitis, usually confusion and/or seizure, and the diagnosis of neuroinvasive EEEV was confirmed by cerebrospinal fluid testing for EEEV antibodies or genomic material. The demographic profile of EEEV patients was notable for a strong male predominance, with nearly all patients being men over 60 years of age. Neuroimaging findings were remarkable for brainstem MRI abnormalities in a subset of cases, a pattern that has not previously been reported. Mortality in this case series was >50%, higher than previously reported series, and most survivors experienced significant, persistent sequelae. These data highlight the need for further research into EEEV diagnostics and treatments as well as public health interventions to reduce the impact of EEEV disease.

LANGERHANS CELL HISTIOCYTOSIS (LCH) OF GI TRACT IN A 6-MONTH-OLD FEMALE

Megan Potilechio, DO; Anya Ring, DO

Family and Community Medicine, Internal Medicine; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Langerhans cell histiocytosis (LCH) is a rare hematologic disorder involving a proliferation of myeloid progenitor cells resembling dendritic immune Langerhans cells. The disease has a wide variety of clinical presentations with various local and systemic involvements. We present a case of a 6-month-old diagnosed with LCH presenting with GI tract involvement.

Case History: The patient is a 6-month-old female with severe malnutrition, lifelong feeding intolerance and recurrent bloody stools who presented with two days of bilious emesis and increasing feeding intolerance. Laboratory workup notable for hyponatremia, elevated LFTs, severe hypoalbuminemia, normocytic anemia, and leukocytosis with elevated inflammatory markers. Imaging demonstrated hepatomegaly with parenchymal edema and steatosis. A narrow proximal small bowel was seen on small bowel follow-through. EGD was significant for diffuse ulceration of the duodenum and congested mucosa in the stomach and rectum. Biopsy confirmed LCH in the stomach and recto-sigmoid colon. Bone marrow biopsy was positive for BRAF by PCR. After diagnosis, patient was started on monotherapy with cytarabine for treatment of systemic LCH.

Discussion/Conclusions: LCH is a rare condition, and clinical presentation is highly variable. Involvement of GI tract is uncommon and is often indicative of systemic disease, which requires more aggressive treatment. As in this patient, LCH can mimic milk protein allergy, but it does not improve with dietary modifications or age. Although rare, LCH should be considered in infants with hematochezia and failure to thrive in the presence of feeding intolerance.

PROPHYLAXIS THERAPY USING ADJUNCTIVE AZITHROMYCIN WITH STANDARD CEPHALOSPORIN VS. CEPHALOSPORIN ALONE FOR CESAREAN DELIVERY AT BRONSON HOSPITAL

Dean Van Loo, PharmD; Sylvia Wasson

Pharmacy, Ferris State University

Background: As a result of an increase in surgical procedures, there is also a rise in complications leading to morbidity and mortality. One of the leading indications for surgery is cesarean delivery. Cesarean delivery often leads to post-delivery infections. It is common practice to use a cephalosporin as prophylaxis treatment to reduce the rate of infections. Azithromycin as adjunct therapy to cephalosporin is showing promise in the reduction of post-cesarean infections. This study examines the further reduction impact of infection within a 6-week post-cesarean period.

Methods: This is an on-going retrospective, cohort study being conducted at Bronson Methodist Hospital including 100 patients with > 24 weeks gestation, aged 21 years or older, who have undergone urgent or emergent cesarean delivery for a singleton pregnancy receiving adjunctive azithromycin 500 mg IV and a standard cephalosporin vs. a standard cephalosporin alone between March 1, 2017 and May 1, 2019.

Preliminary Results: For this study, 60 patient charts were reviewed of which 29 were eliminated. The primary outcome occurred in 3 of 16 (18.8%) patients who received adjunctive azithromycin and 1 of 15 (6.7%) patients who received cephalosporin alone. These results equate to a confidence interval of -0.1 - 0.39 for the azithromycin + cephalosporin group and 0.07 - 0.21 in the cephalosporin alone group.

Conclusion: Currently, the prophylaxis adjunctive use of azithromycin + cephalosporin shows no significant difference from cephalosporin alone for urgent or emergent cesarean delivery at Bronson Methodist. However, with additional data collection, there may be a more convincing yield.

EVALUATION OF PROPHYLACTIC AMIODARONE USE IN CORONARY ARTERY BYPASS GRAFT PATIENTS

Catherine Wilson; Julie Schmidt, PharmD; Dean Van Loo, PharmD

Ferris State University; Pharmacy, Bronson Methodist Hospital; Ferris State University

Background: Atrial fibrillation is a common arrhythmia experienced after coronary artery bypass grafting (CABG) and has been associated with longer hospital stays and complications. Amiodarone is considered to be a drug of choice for atrial fibrillation prophylaxis. This study aims to assess the difference in outcomes when CABG patients are given prophylactic amiodarone as recommended on Bronson Methodist Hospital's order set(s) as opposed to when patients are given an amiodarone regimen that differs from the order set(s) in place.

Methods: This study is an IRB approved, single-center, retrospective chart review including adult patients who received amiodarone for prophylaxis of atrial fibrillation and were admitted to Bronson Methodist Hospital in Kalamazoo, MI for CABG between January 2013 and June 30, 2019. The primary outcome is determining a difference in atrial fibrillation occurrence.

Results: A total of 100 patients were included in the final analysis with 50% having amiodarone regimens in concordance with the order set(s). The average length of stay was 8.6 days, and 68% of the patients included had a history of taking a beta-adrenergic blocking or calcium-channel blocking agent. 24% of these patients experienced perioperative atrial fibrillation, 83% of patients in this group were not given the recommended amiodarone regimen.

Conclusions: Results of this study allow Bronson Methodist Hospital to assess how well their CABG patients are being managed for the prevention of atrial fibrillation and guide future decisions regarding the CABG order set(s). We found that often adverse event endpoints were associated with non-conformity to the order set(s).

OPIOID SYSTEM IMPLICATED IN TREATMENT OF DEPRESSION

Jay Patel, MD; Bruce Ruekberg, MD; Kathleen Gross, MD

Psychiatry; Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Many substances with antidepressant effects exist worldwide. Since introduction of prescription antidepressants in the 1950s, research has focused on the monoamine and glutamate neurotransmitter systems. Recent developments suggest that the opioid system may play a role in the pathogenesis and treatment of depression. This case highlights a substance that activates both the opioid and monoamine systems to treat depression.

Case Presentation: A 33 year-old-male with history of depression presented to an outpatient psychiatric clinic for re-evaluation of his depression. He reported multiple ineffective antidepressant trials. He had learned of a medication, tianeptine, marketed to treat depression in Europe. Although not FDA approved in the USA, he was able to obtain the medicine through unregulated channels as a supplement/research chemical. In taking this substance, he found improvement in his symptoms, but as time progressed, he found himself developing a tolerance to tianeptine, needing higher and higher dose to maintain euthymia. After his initial depression resolved, his attempts to discontinue tianeptine resulted in withdrawal symptoms similar to opioid withdrawal. Consequently, he presented to us in search of alternative treatment for his depression.

Discussion: Abuse potential and other risks exist in using agents such as tianeptine long term for depression, however this raises the question of the role of the opioid system in treating depression. Similarly, ketamine trials have shown reduced effectiveness with naltrexone blockade of opioid receptors versus no blockade. Antidepressants acting on the opioid system, without producing tolerance and dependence, represent a novel target for future research efforts.

EMOTIONAL LABILITY IN AN ATYPICAL ACUTE LYMPHOBLASTIC LEUKEMIA PATIENT WITH METHOTREXATE-INDUCED LEUKOENCEPHALOPATHY

Keenan Boulnemour, BS; Laura Bauler, PhD; Alyssa Erskine, DO; Mark Schauer, MD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Biomedical Sciences, Western Michigan University Homer Stryker M.D. School of Medicine;
Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: The manifestation of intrathecal (IT) methotrexate toxicity in patients with acute lymphoblastic leukemia (ALL) has been well documented in young patients. Adults with B-cell ALL is uncommon but there are recorded cases. Managing adverse effects is therefore an underrepresented part of the present literature.

Case Description: We present a case with a triad of unique events: A 26-year-old patient with B-cell predominant ALL, the unique symptom of emotional lability in addition to common symptoms of methotrexate-induced encephalopathy, and a unique oral treatment for leucovorin-refractory neurotoxicity. Upon hospital admission for slurred speech and emotional outbursts followed by stroke-like symptoms, a full workup revealed central nervous system (CNS) toxicity following the patient's tenth cycle of chemotherapy. An initial leucovorin rescue did not resolve the patient's neurological symptoms within 24 hours, necessitating dextromethorphan-guaifenesin administration to limit the methotrexate toxicity. The patient displayed steady improvement over the following 4 days. The slurred speech, stroke like symptoms and imaging findings enabled prompt identification of methotrexate-induced leukoencephalopathy.

Discussion/Conclusions: Emotional lability is symptom of methotrexate-induced CNS toxicity that is rarely documented by published cases. However, display of extreme emotional outbursts may provide an early indication of methotrexate induced encephalopathy. The triad of unique events in this case suggests that patients with atypical demographics for a disease may present with unique symptoms that do not respond to standard treatment measures.

A TALE OF TWO MALIGNANCIES - COINCIDENCE OR UNIFYING PATHOGENESIS

Katelyn King, BS; Lucas Rich, BS; April Korneli, DO; Prashant Patel, DO

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Renal cell carcinoma accounts for nearly 3% of adult malignancies. Even less common is the neoplastic plasma cell dyscrasia, multiple myeloma, accounting for 1% of adult malignancies. Although exceedingly rare to co-exist, population-based literature demonstrates a non-random association between the malignancies. We present such a case of a patient presenting with a solid renal tumor in addition to a hematologic malignancy. A 58-year-old male with no significant past medical history presented to the emergency department with subacute low back pain and diffuse bone pain. His vital signs were stable. Physical exam was remarkable for conjunctival pallor, hepatomegaly to 3-4 cm below the costal margin, and tenderness over T9 spinous process. Initial labwork revealed several typical findings of multiple myeloma including hypercalcemia, acute kidney injury, and anemia. An abdominal computed tomography with contrast revealed a heterogenous enhancing renal mass, highly suspicious for renal cell carcinoma. The pathogenic role of interleukin-6 in multiple myeloma is well understood, however the association of renal cell carcinoma and multiple myeloma is only documented in case series reports. A proposed pathogenesis links the production of interleukin-6 from renal cell carcinoma to the malignant transformation of plasma cells, resulting in multiple myeloma. The temporal relationship between these two malignancies in our patient is uncertain, although their co-occurrence further supports a theory of an underlying paraneoplastic inflammatory syndrome driving the carcinogenesis. Our patient can be added to the unique cohort of individuals that present with coexistence of these rare malignancies and may guide approaches to novel therapeutic interventions.

EAR SWELLING AND AN UNUSUAL DIAGNOSIS OF CUTANEOUS LEISHMANIASIS

Ricardo de Castro, MD; Neiberg Lima, MD; Adam Ladzinski, DO; Davi Leitao, MD; Benjamin Avner, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Rheumatology, Borgess Medical Center

Introduction: Leishmaniasis is recognized as an endemic human disease in tropical countries but is uncommon in the United States. Its manifestations are broad and mimic inflammatory processes and neoplastic diseases. Whereas in endemic areas the diagnosis may be simple, it could be a real challenge in places with a low incidence of this disease.

Case presentation: Patient is a 51-year-old woman with diabetes complaining of ear pain and redness. Her symptoms started one month after a trip to Mexico. She noticed a small nodule in her ear which became swollen and red within weeks. An initial diagnosis of cellulitis was given, and she started on antibiotics. As the lesion was progressing, her antibiotics were switched, and drainage was attempted. However, no significant improvement was seen, and prednisone was added for possible chondritis. A biopsy was performed with suspicion of possible skin cancer. Pathology reported a granulomatous inflammation process with parasitized histiocytes. Further investigation showed the presence of Leishmaniasis. Patient started on appropriate treatment with good recovery.

Discussion: Infection with protozoan parasites of the genus *Leishmania* leads to a wide variety of clinical disease syndromes. Cutaneous leishmaniasis (CL) includes different presentations with the most common being typical chronic, ulcerative lesion. Usually, it starts with a slowly progressing, nonhealing skin ulcer. The differential is broad including inflammatory and neoplastic diseases. Most CL resolves over time without specific treatment, but often patients seek medical care because of the location of disease, cosmetic concerns or secondary bacterial infection.

GENERAL VS LOCAL AND REGIONAL ANESTHESIA FOR RECURRENT GROIN HERNIAS: AN OUTCOME STUDY FROM AMERICAN COLLEGE OF SURGEON-NSQIP DATABASE

Kendall Smith, BA; Kent Grosh, MD; Vinayak Dewoolkar, MD; John Collins, MD; Saad Shebrain, MBBCh, MMM

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Surgery, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: There is little data about the benefits of local/regional anesthesia (LRA) compared to general anesthesia (GA) in patients with recurrent groin (inguinal-Femoral) hernias. We hypothesize that patients with recurrent hernias who undergo repair under LRA will have better outcome.

Methods and Procedures: Using 2017-ACS-NSQIP database, patients who underwent open repair of recurrent groin hernias were identified and divided into 2 groups. Outcomes (30-day mortality, complications, readmission rates, operative time, ORT (minutes) and total hospital length of stay (LOS, days) were compared.

Results: A total of 2169 patients were identified. Group A 1847 patients (85.2%) under GA, and group B 322 patients (14.8%) under LRA. Overall, no difference in demographic and comorbidities between the two groups. However, group B has higher COPD (6.8% vs. 3.2%, $p=0.002$), and were older (68 ± 15.2 vs. 62 ± 15.3 , $p < 0.001$). Complications, and readmission rates were similar in both groups. Operative time (min), LOS (days), were higher in Group A (74 ± 43 vs 60 ± 30.5 , $p < 0.001$, 0.65 ± 2.5 vs 0.27 ± 1.13 , $p < 0.001$). Emergency surgery was higher in group A (6.9% vs 2.2, $p=0.001$). Group A were healthier, with ASA (I,II) score (60.9% vs. 54.8%, $p=0.04$). No differences in 30-day mortality between the two groups.

Conclusion: Although, patients undergoing repair of recurrent groin hernia under LRA are older, and have higher ASA class, they experienced shorter operative time, and LOS compared to GA group. No difference in complication & readmission rates and 30-day mortality between the two groups was noted.

SPONTANEOUS SPLENIC RUPTURE DUE TO INFECTIOUS MONONUCLEOSIS

Megan Burke, MD; Mekala Neelakantan, BS; Karan Pandher, BS; Dilip Patel, MD

Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
Chicago Medical School at Rosalind Franklin University

Introduction: Infectious mononucleosis, often caused by the Epstein Barr Virus, is a diagnosis that frequently occurs in the adolescent population. Following is a case description of an adolescent who presented with a non-traumatic splenic rupture after being diagnosed with infectious mononucleosis. The patient was ultimately treated with a splenic artery coil embolization.

Case Presentation: An adolescent female with flu-like symptoms and recently diagnosed EBV mononucleosis, presented with syncope, hypotension, tachycardia and acute abdominal pain. Physical examination revealed tachycardia, tachypnea, and significant abdominal guarding and tenderness. Ultrasound imaging showed free fluid in the abdomen, with CT demonstrating a splenic rupture and associated subcapsular hematoma. Subsequently, CT angiography was utilized to identify and embolize the splenic artery in a non-operative fashion, as well as identify collateral splenic arterial circulation. The patient remained hemodynamically stable during this time and tolerated the procedure well, with no other complications during the rest of the hospital course.

Discussion: Splenic rupture is a significant and dangerous complication of infectious mononucleosis. While the mechanism remains elusive, it is important for clinicians to be aware of this possible sequela and take necessary precautions for avoidance. The rupture is often caused by trauma, but can also be prompted in cases of increased intra-abdominal pressure or continued expansions of a subcapsular hematoma. As such, at-risk patients should avoid significant physical activity with close imaging follow-up. Hemodynamic stability is an important factor in determining the treatment for a splenic rupture, with possibilities including endovascular techniques versus splenectomy.

FACTORS ASSOCIATED WITH READMISSION FOLLOWING SHOULDER ARTHROPLASTY

Emma Swayze, MS; Christine Bowman, MD; Mark Sytsma, MD

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
Orthopaedic Surgery, Western Michigan University Homer Stryker M.D. School of Medicine;
Orthopaedic Surgery, Bronson Methodist Hospital

Background: Shoulder arthroplasty is a common, reliable treatment for multiple shoulder pathologies, including osteoarthritis, rotator cuff arthropathy, and proximal humerus fractures. There has been growing interest in identifying and mitigating risk factors associated with readmission following arthroplasty procedures. Currently, there is a paucity of data regarding readmissions after shoulder arthroplasties.

Purpose: To identify factors associated with 30- and 90-day readmission rates following shoulder arthroplasty procedures.

Methods: A retrospective review was conducted querying the electronic medical record at a single institution for shoulder arthroplasty procedures performed from July 2012 - June 2017. Patients 18 years and older with at least 90 days of follow-up were included in the study. Factors related to patient demographics, the surgical encounter, and post-operative readmissions were recorded. Logistic regression analysis was used to identify whether each factor was associated with 30-day and 90-day readmission.

Results: A total of 505 patients were included in the study. There was a 4.17% and 3.56% readmission rate within 30 and between 30-90 days, respectively. Patient age, length of stay, presence of congestive heart failure, and lack of peripheral nerve block were significant predictors of 30-day readmission. Length of stay, presence of coronary artery disease, diagnosis of proximal humerus fracture, and discharge to a skilled nursing facility were significant predictors of 90-day readmission.

Conclusions: Age, length of stay, cardiac co-morbidities, lack of peripheral nerve block, and discharge to a skilled nursing facility are significant predictors of readmission following shoulder arthroplasty procedures. Level of Evidence: Level III retrospective study.

GROWING TERATOMA SYNDROME: AN EXTREMELY RARE FINDING IN TESTICULAR CANCER

Jack Stover, BA; Kevin Herzog, MD; Kirk Payne, MD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Pathology, Bronson Methodist Hospital; Hematology and Oncology, Borgess Medical Center

Introduction: Growing teratoma syndrome is a rare syndrome that affects patients with non-seminomatous germ-cell tumors (NSGCTs). It is characterized by recurrent growing masses that appear during or after chemotherapy in the presence of normal levels of tumor markers.

Case History: 23- year-old male presents with nausea, vomiting, and abdominal distention. Patient reports onset of abdominal pain and enlarging left testicular mass 5 months prior to presentation. Physical examination on admission reveals a protuberant abdomen tender to palpation and a 19 cm left testicular mass. Laboratory testing showed an elevated BHCG of <1 IU/mL, elevated LDH of 339 mg/L, and an alpha fetoprotein of 3232 ng/mL. CT scan of the abdomen shows massive iliac and retroperitoneal adenopathy. Left orchiectomy shows non-seminomatous germ cell tumor with 70% teratoma and 30% embryonal cell features. Two weeks following hospital discharge, patient begins the first of three cycles of BEP chemotherapy. All tumor markers normalize after cycle 2. Follow-up CT scan post-chemotherapy shows a marked increase in the size of previously visualized abdominal masses in the setting of normal tumor markers worrisome for growing teratoma. Patient is referred to Indiana University where he undergoes surgical resection of all masses in a 12-hour operation.

Discussion: Detection of increased tumor growth on CT scan following chemotherapy for non-seminomatous germ cell tumor in the setting of normal tumor markers suggests the diagnosis of growing teratoma syndrome which may be cured with an extensive and highly specialized surgical procedure.

COMPARISON OF PRE-HOSPITAL ROSC RATES FOR MANUAL-ONLY VS MECHANICAL-ASSISTED CPR USING THE LUCAS-2: A RETROSPECTIVE STUDY

Raphael Szymanski, BS; Joshua Mastenbrook, MD; Duncan Vos, MS; Kristina Le, BS;
Ronald Slagell, EMT-P; Cheryl Dickson, MD

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
Emergency Medicine, Western Michigan University Homer Stryker M.D. School of Medicine; Other, Western Michigan
University Homer Stryker M.D. School of Medicine; LifeCare Ambulance;
Pediatric and Adolescent Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Annually, more than 350,000 out-of-hospital cardiac arrests (OHCAs) occur in the US. CPR has been shown to improve survival. Mechanical CPR (mxCPR) devices have been introduced to improve CPR quality. The American Heart Association states mxCPR can be considered in specific settings. Existing studies involve multi-jurisdictional populations and have yielded mixed results. We focused our study on a single fire department jurisdiction encompassing a large midwestern city served by a single ambulance provider and hypothesized that within this setting, the implementation of a LUCAS-2 mxCPR device would increase the pre-hospital ROSC rate as compared with manual CPR (mCPR).

Methods: Retrospectively, nine years of adult non-traumatic OHCA data were extracted from the ambulance provider ePCR. Chi-square analysis compared ROSC rates before and after LUCAS-2 implementation. Logistic regression assessed the impact of Utstein variables on ROSC.

Results: From initially 857 OHCAs, 264 (74 pre-LUCAS) met inclusion criteria. ROSC rates were 29.7% (22/74) and 29.5% (56/190), respectively, for mCPR and mxCPR ($p=0.9673$). Logistic regression revealed ROSC was significantly associated with a witnessed arrest (OR 3.1; 95% CI 1.9-5.1; $p<0.0001$), and an initially shockable rhythm (OR 2.8; 95% CI 1.5-5.2; $p<0.0013$).

Conclusions: There is no significant difference in non-traumatic adult OHCA ROSC rates among patients receiving mxCPR vs mCPR. Systems with limited personnel might consider augmenting their resuscitations with a mxCPR device, although cost and system design factors should be considered. Secondary analyses suggest that OHCA patients with a witnessed arrest or an initially shockable rhythm, have a higher likelihood of attaining ROSC.

TENSION HEMOPNEUMOTHORAX IN THE SETTING OF MECHANICAL CPR DURING PREHOSPITAL CARDIAC ARREST: A CASE REPORT

Dustin Rowland, MS; Nicholas Vryhof, MD; David Overton, MD; Joshua Mastenbrook, MD

MD Class of 2023, Western Michigan University Homer Stryker M.D. School of Medicine;
Emergency Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: There are reported complications associated with automated mechanical CPR (AM-CPR); their incidence remains poorly characterized. We present a case of a previously unreported complication, tension hemopneumothorax.

Case Description: A 67-year-old woman with a history of COPD and CABG was observed to be slumped behind the wheel of an ice cream truck that drifted off the road at low speed and was stopped by a wooden fence, resulting in only minor paint scratches. Patient was found to be in cardiac arrest. Manual CPR was initiated. No signs of trauma were noted. Bilateral breath sounds were present. After 13 minutes of manual CPR, firefighters applied their Defibtech Lifeline ARM AM-CPR device to patient. During resuscitation, the device had to be readjusted twice due to rightward piston migration off the sternum. Five minutes later, patient had absent right-sided breath sounds and ventilations were more difficult. Needle decompression was performed with audible release of air. A chest tube was then placed and roughly 400 mL of blood were immediately returned. Within 2 minutes, ROSC was achieved and patient was transported. Chest CT showed emphysematous lungs, bilateral rib fractures, and a small right-sided pneumothorax. Patient's condition worsened and she died 48 hours later.

Discussion/Conclusion: Migration of AM-CPR device pistons may contribute to the development of iatrogenic injuries such as hemopneumothoraces. We recommend application of inked stickers to the piston head of AM-CPR devices in order to provide an objective visual marker for tracking, correcting, and reporting piston migration.

DOES COLONOSCOPY NEED TO BE DONE NOW?: QUANTITATING THE VALUE OF CLINICAL HISTORY IN DIAGNOSING DIVERTICULAR HEMORRHAGE

Fariah Ahmad, MD; Iftiker Ahmad, MD; Barbara Pawlaczyk, MD

Department of Internal Medicine, Genesys Regional Medical Center
Department of Gastroenterology, Sparrow Hospital, Lansing, Michigan.

Background: Unlike high-risk acute lower gastrointestinal bleeds (LGB), in lower-risk patients, benefits of inpatient endoscopy over clinical history in diagnosing diverticular hemorrhage is undefined. This study investigated if a characteristic clinical history has similar efficacy as inpatient endoscopy in diagnosing diverticular hemorrhage in patients without high-risk features.

Methods: Data was extracted for 120 consecutive adult cases presenting from 2003 to 2019 to a community hospital with acute LGB without high-risk features. The presence of a positive history, defined as “painless bright red blood per rectum with diverticular disease history,” was evaluated. Primary outcome was endoscopically diagnosed diverticular hemorrhage. Chi-squared analysis and diagnostic performance analysis were obtained.

Results: 116 cases were included, mean age 67.7. Four cases lacked endoscopic reports. Endoscopically diagnosed diverticular hemorrhage prevalence was 24.2% (28/116). A positive history was significantly associated with endoscopically diagnosed diverticular hemorrhage, χ^2 (1, N=116) = 32.330, $p < 0.000$; $\phi = 0.528$, $p < 0.000$. The positive history sensitivity was 57.1% (95% CI: 34.6% to 79.5%), specificity of 92% (95% CI 85.1% to 98.9%), and a positive likelihood ratio of 7.14. Positive and negative predictive value were 70.8% (95% CI: 46.6% to 92.5%) and 87% (95% CI: 78.8% to 94.5%), respectively.

Conclusion: A significant predictive relationship exists between a characteristic diverticular disease clinical history and endoscopically diagnosed diverticular hemorrhage. These results suggest diagnosing diverticular hemorrhage among populations without high-risk features can possibly be made by clinical history alone.

A NOVEL USE OF STAGED TRANSCATHETER AORTIC AND MITRAL VALUE-IN-VALVE IN A HIGH RISK PATIENT

Lucy Wan, BS; Christopher Rogers, DO, FACAL, FACC; Joel Reinoehl, MD, FACC

MD Class of 2021, Western Michigan University Homer Stryker M.D. School of Medicine;
Cardiology, Bronson Methodist Hospital

The transcatheter valve replacement (TVR) procedures have increasingly become a suitable alternative to open heart surgery for high risk surgical patients. While the transcatheter aortic valve replacement (TAVR) procedures are commonly used and accepted as an alternative to traditional surgical replacement, the transcatheter mitral valve replacement (TMVR) procedures are a relatively recent development. Currently, the TMVR procedure is becoming more commonly used as an alternative to traditional surgical valve replacement for mitral valve disease and dysfunction. The use of TMVR in the setting of prosthetic valve dysfunction is less common than TAVR, but has had positive results in patients with severe primary mitral regurgitation (1). VIV transcatheter valve replacement (TVR) procedures are slightly different to the native TVR procedures due to the possible complicated interactions between the prosthetic valve compared to a native valve. We discuss an 87-year-old female who underwent combined TVAR followed by TMVR for severe prosthetic aortic and mitral dysfunction. Conclusion: To our knowledge, this is the one of few cases of where a staged procedure of TAVR, followed by TMVR was used in the setting of severe prosthetic valve dysfunction.

PROPHYLACTIC ENOXAPARIN ADJUSTED BY ANTI-FACTOR XA PEAK LEVELS IN SURGICAL ONCOLOGY PATIENTS.

Katherine Kramme, MD; Paya Sarraf, MS; Gitonga Munene, MD

Surgery, MD Class of 2021, Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Background: Studies among populations at high risk of venous thromboembolism (VTE) have demonstrated that recommended doses for enoxaparin thromboprophylaxis are associated with high incidence of subprophylactic anti-factor Xa levels. This study examines the efficacy and safety of dose-adjusted enoxaparin guided by anti-Xa levels.

Study Design: Patients undergoing abdominal cancer operations had dose adjustments based on peak anti-Xa levels to attain a target of >0.20 IU/mL were compared with a historic cohort of patients receiving recommended thromboprophylaxis. Incidence of in-hospital VTE and bleeding after changes in enoxaparin dosing were monitored.

Results: The study population comprised 197 patients-64 patients in the prospective group and 133 patients in the control group. Baseline characteristics were similar between the intervention and control groups, with the exception of the Caprini score (8.09 vs 7.26; $p = 0.013$). In the intervention group, 50 of 64 patients (78.1%) had subprophylactic peak anti-Xa levels. The VTE rates were lower in the intervention than the control group (0% vs 8.27%; $p = 0.018$). There were no differences in bleeding events (3.12% vs 1.50%; $p = 0.597$), postoperative RBC transfusions (17.2% vs 23.3%; $p = 0.426$), or mean Hgb on discharge (9.58 vs 9.37g/dL; $p = 0.414$). Anti-Xa levels correlated positively with age (65.7 vs 58.2 years; $p = 0.022$) and negatively with operating room time (203 vs 281 minutes; $p = 0.032$) and BMI (25.3 vs 29.2 kg/m²; $p = 0.037$).

Conclusions: Thromboprophylactic enoxaparin 40 mg daily is often associated with subprophylactic peak anti-Xa levels. Dose adjustment based on anti-Xa levels increased the daily enoxaparin dose, resulting in a lower rate of in-hospital bleeding.

ROBOTIC-ASSISTED LAPAROSCOPIC SURGERY AS THERAPEUTIC APPROACH FOR SEVERE INGUINODYNIA AFTER LAPAROSCOPIC INGUINAL HERNIA REPAIR

Ayman Shehadeh, BS; Cole Kircher, DO; Saad Shebrain, MD

MD Class of 2023, Surgery; Western Michigan University Homer Stryker M.D. School of Medicine

Background: Post-operative inguinodynia is a common complication of inguinal hernia repair. Few patients may experience severe disabling inguinodynia that impacts their quality of life, and invasive intervention to relieve the pain becomes necessary.

Method/Case: A 44-year-old healthy male developed symptomatic bilateral inguinal hernias. He underwent a laparoscopic bilateral totally extraperitoneal (TEP) inguinal hernia repair with mesh. Titanium helicoidal tacks were used for mesh fixation. Postoperatively, the patient experienced progressive severe (scored as 10/10) bilateral lower abdominal pain, for at least 5 months, described as worse than the hernia pain. Pain medications were unsuccessful. CT abdomen & pelvis demonstrates no evidence of hernia recurrence. Iliohypogastric/ilioinguinal nerve block was effective in reducing pain. However, the pain recurred within a few days. The locations of titanium tacks were identified on CT scan. Exam findings matched the distribution of tacks in lower abdomen. The patient underwent Robotic-assisted diagnostic laparoscopy to evaluate hernia repair and identify culprit tacks. Six titanium tacks along the lower posterior aspect of transversus and rectus abdominis muscles and Cooper's ligament were unscrewed and removed uneventfully using a robotic system. The patient experienced immediate and significant post-operative pain relief and returned to work with light-duty, within 1 week. In a two-month follow-up, the patient is pain-free and has returned to full capacity at work.

Result/Conclusion: Severe inguinodynia can be debilitating after inguinal hernia repair. Meticulous surgical technique with appropriate use of tacks could significantly decrease the risk of inguinodynia. Robotic surgery provides a safe and effective approach to removing non-absorbable tacks.

HYPERTROPHIC CARDIOMYOPATHY CAUSING SUDDEN CARDIAC DEATH IN ADOLESCENT ATHLETES

Matthew Sierra, BS; Jeffrey Jentzen, MD PhD; Theodore Brown, MD

MD Class of 2022, Western Michigan University Homer Stryker M.D. School of Medicine;
Department of Pathology, University of Michigan Medical School;
Pathology, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Hypertrophic cardiomyopathy (HCM), which can be inherited, poses a significant risk of sudden cardiac death (SCD) in young athletes. When a death is caused by HCM in an adolescent, the pathologist should bring awareness of the death by communicating with the surviving family and working with the child death review team.

Case Histories: A 16-year-old male suffered a sudden cardiac arrest at a wrestling tournament. He was transported to the hospital where he was placed on extracorporeal membrane oxygenation (ECMO). He was ultimately pronounced dead in the hospital. The autopsy was most significant for HCM, which included cardiomegaly (1000 grams), asymmetrical left ventricular hypertrophy, and subendocardial fibrosis of the aortic outflow tract. A 15-year-old male collapsed while playing basketball during tryouts. He was transported to the hospital and subsequently went into cardiac arrest. He died three hours after admission. The autopsy was most significant for HCM, which included cardiomegaly (460 grams) and fibrosis of the aortic outflow tract.

Discussion: In young athletes, HCM is the most common cause of sudden natural death and can present without symptoms. Pathologists can serve an important role in preventing future HCM deaths. When an individual dies of HCM at any age, the pathologist should contact the family to inform them of the genetic risk factors of HCM. Additionally, including a comment in the autopsy report that recommends the family seek medical screening is advised. Finally, pathologists are encouraged to be active participants in child death review teams to prevent future HCM deaths.

HOSPITAL ADMISSIONS AND TRENDS FOR TUBERCULOUS PERITONITIS IN THE UNITED STATES: RESULTS FROM THE NATIONAL INPATIENT SAMPLE (NIS) DATABASE

Eric Sieloff, MD; Adam Ladzinski, DO; Neiberg Lima, MD; Duncan Vos, MS; Thomas Melgar, MD

Internal Medicine, Western Michigan University Homer Stryker M.D. School of Medicine;
Other, Western Michigan University Homer Stryker M.D. School of Medicine; Medicine Pediatrics,
Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Tuberculosis (TB) is an uncommon diagnosis in the United States. The HIV epidemic led to a resurgence in all forms of TB including TB peritonitis (TBP). TBP often goes unrecognized given its low prevalence leading to delay diagnosis. A national epidemiological database study was performed to investigate healthcare trends and establish risk factors for TBP in the United States.

Methods: The National Inpatient Sample (NIS) database was used to extract data from 2002-2014 for patients with at least one code for tuberculous peritonitis using ICD-9 codes. We compiled codes for known TB risk factors combined into single composite indicators.

Results: Between 2002-2014 there were 5,878 weighted TBP discharges. The median age was 45.0 years old, with a hospital length of stay of 7.8 days. The median total hospitalization charge at discharge was \$40,602. Most discharges were male (54.35%), Hispanic (27.15%), in the first quartile of income by zip code (30.15%) with private payer insurance (27.23%). There was a total of 230 deaths associated with TBP (3.91%). Statistically significant co-occurrences associated with TBP vs without TBP included HIV (17.42% vs 0.63%), chronic kidney disease (CKD) (12.14% vs 8.08%), alcohol abuse (7.69% vs 3.97%), liver cirrhosis (8.09% vs 1.27%) and liver cirrhosis sequelae (4.58% vs 0.69%), organ transplant (2.74% vs 0.83%), rheumatoid arthritis (2.67% vs 1.13%) and hematological malignancy (2.04% vs 1.23%).

Conclusion: Though TBP has a low prevalence in the United States, physicians should be wary of this diagnosis in at-risk patients with HIV, CKD, alcohol abuse and liver cirrhosis.

A 34-YEAR-OLD RECOVERING ALCOHOLIC WITH ACUTE LIVER FAILURE

Sravani Alluri, MD; William Humphrey, MD; Dalal Kassir, MD; Megan Potilechio, DO;
Laura Marsh, DO; Susan Jevort-Eichorn, DO; Kristi Van Der Kolk, MD

Family and Community Medicine, Western Michigan University Homer Stryker M.D. School of Medicine

Introduction: Acute liver failure is a rare condition characterized by rapidly deteriorating liver function, altered mentation, and coagulopathy in individuals without pre-existing liver disease. The most common causes include drug-induced liver injury, viral hepatitis, autoimmune liver disease and shock. We present a case of a 34-year-old woman who developed acute liver failure during treatment for alcohol addiction with disulfiram.

Case History: The patient presented to the emergency department with four days of fatigue, nausea, vomiting, and upper abdominal pain. She had recently undergone inpatient treatment for alcohol withdrawal and was started on disulfiram at discharge. Two weeks into sobriety, she presented with the above symptoms and appeared mildly icteric. She was found to have AST 11,806, ALT 6,625, as well as, hyperbilirubinemia, and elevated INR. Abdominal ultrasound with doppler demonstrated normal hepatobiliary architecture with patent hepatic vasculature. Disulfiram was held and patient was started on supportive treatment. Workup for autoimmune, acute viral illness, Wilsons disease, and hemochromatosis was negative. The patient had steady decrease in transaminases and improvement in coagulopathy. Disulfiram was discontinued. The patient's liver function gradually improved, returning to normal within six weeks.

Discussion: Few etiologies can raise liver enzymes into 10,000s. This pattern of liver injury and rapid improvement with discontinuation of disulfiram and supportive care suggests drug induced liver injury. Only a handful of cases of disulfiram toxicity have been reported and we suggest this as the likely culprit in this case.

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