

TABLE OF CONTENTS

	Page
INTRODUCTION.....	2
RADISSON CONFERENCE CENTER FLOOR PLANS	4
SCHEDULE.....	5
KEYNOTE SPEAKER.....	6
ORAL PRESENTATIONS	12
AWARD WINNING PRESENTATIONS	53
POSTER PRESENTATIONS.....	60
INDEX.....	246

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

CME CREDIT

The evaluation of this activity will be done electronically through the WMed CME website:
<http://med.wmich.edu/education/continuing-medical-education>

Click on 'Evaluation Forms' from the left menu.

After completion of the form, print or save a copy for your files.

The CME Activity Code is available by handout at the Check-in table.

Western Michigan University Homer Stryker M.D. School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Western Michigan University Homer Stryker M.D. School of Medicine designates this live activity for a maximum of 5.0 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Western Michigan University Homer Stryker M.D. School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (AACME). The Michigan Board of Nursing accepts continuing education credits from the ACCME.

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 34th anniversary of Research Day represents a set of firsts in the growth of Western Michigan University Homer Stryker M.D. School of Medicine (WMed) and Research Day, as we not only look forward to holding the conference at a new venue located in the Radisson in downtown Kalamazoo, but for the first time we are also excited to include presentations from our WMed medical students. We look forward to the continued participation by our students, residents, faculty, and community in future years as we continue expansion of our research, clinical, educational, and service activities across the medical school and throughout the community.

The commitment and participation of WMed faculty and the Kalamazoo scientific community in Research Day continues, as represented by the large increase in number of submissions received for this year's event. Over 230 abstracts were submitted for consideration this year, an increase of over 100 abstract submissions in comparison with last year's event. As a result, there will be more oral presentations and significantly more posters than in previous years. The increased submission volume also meant that oral sessions could not accommodate all of the quality submissions, although each of these authors was provided an option to present their work in the poster session.

We also wish to acknowledge the participation of a group of faculty and thank them for volunteering their time and expertise to review the submissions. A panel of over 30 judges participated in the reviews. Each judge typically reviewed approximately 30 submissions, which were assigned based upon area of expertise. The judges' evaluations were critical in determining the award winning presentations and posters, as well as those selected for presentation in the oral sessions. Awards will be presented today to the best research studies in each of six submission categories, as well as the top-scoring posters, to recognize the excellence of research, education, and scholarship.

The continuous support and collaborative efforts of faculty and staff involved in the planning and implementation of this year's Research Day are greatly appreciated.

On behalf of Western Michigan University Homer Stryker M.D. School of Medicine, we welcome you and hope you enjoy this rewarding day.



Dale D. Vandré
Associate Dean for Research
Chair, 2016 Kalamazoo Community Medical and Health Sciences Research Day

We wish to thank the following WMed professionals who dedicated their time to participate as abstract scoring judges and/or session moderators for today's event.

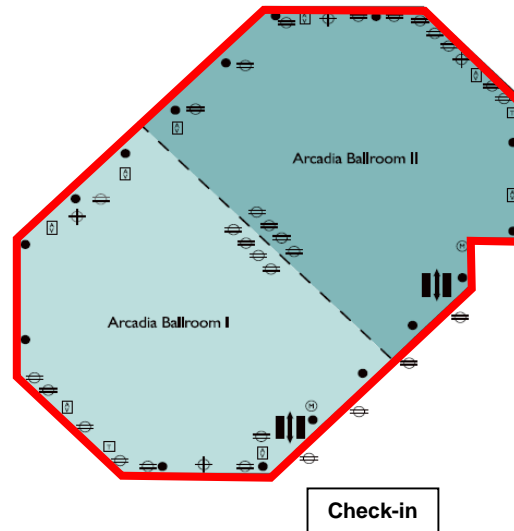
Syed Alam, MD	Arthur Feinberg, MD	Gitonga Munene, MD
Fritz Allhoff, MD	Rolbert Fischre, MD	Ahsan Nazeer, MD
Hakima Bachimi-Aqel, MD	Tyler Gibb, JD, PhD	Earl Norman, MD
Robert Baker, MD	Jeffrey Greene, PhD	David Overton, MD
Joanne Baker, DO	Vishal Gupta, MD	Dilip Patel, MD
Susan Bannon, MD	David Hartman, MD	Elizabeth Brooke Pope, PhD
Daniel Barnas, MD	Kristen Hatten, PhD	Jerry Pratt, MD
Tim Bauler, PhD	James R. Jastifer, MD	Kelly Quesnelle, PhD
Craig Beam, PhD	Jagadeesh Kalavakunta, MD	Dale Rowe, MD
Tom Blok, MD	Keith Kenter, MD	Steven Rudich, MD
Karen Bovid, MD	Wendy Lackey, PhD	Sharma Saith, MD
Joseph Calles, MD	Mark Loehrke, MD	Carrie Sandborn, DO
Sreenivasa Chandana, MD	Larry Lutwick, MD	Robert Satonik, MD
Joseph Chess, MD	Jessica McCoy, MD	Mark Schauer, MD
Jim DeMoss, DO	Vicki McKinney, PhD	Saad Shebrain, MD
Bonny Dickinson, PhD	Thomas A. Melgar, MD	Shama Tareen, MD
Martin Draznin, MD	Tracey Mersfelder, PharmD	Dale Vandr�, PhD
Glenn Dregansky, DO	Lisa Miller, MD	Perry Westerman, MD
Glenn Ekblad, DO	Manoj Mithal, PhD	Allan Wilke, MD
Christian Ertl, MD	Nathan Mollberg, DO	Jeffrey Wilt, MD

RADISSON CONFERENCE CENTER FLOOR PLANS

Lobby Level

Check-in and Sessions

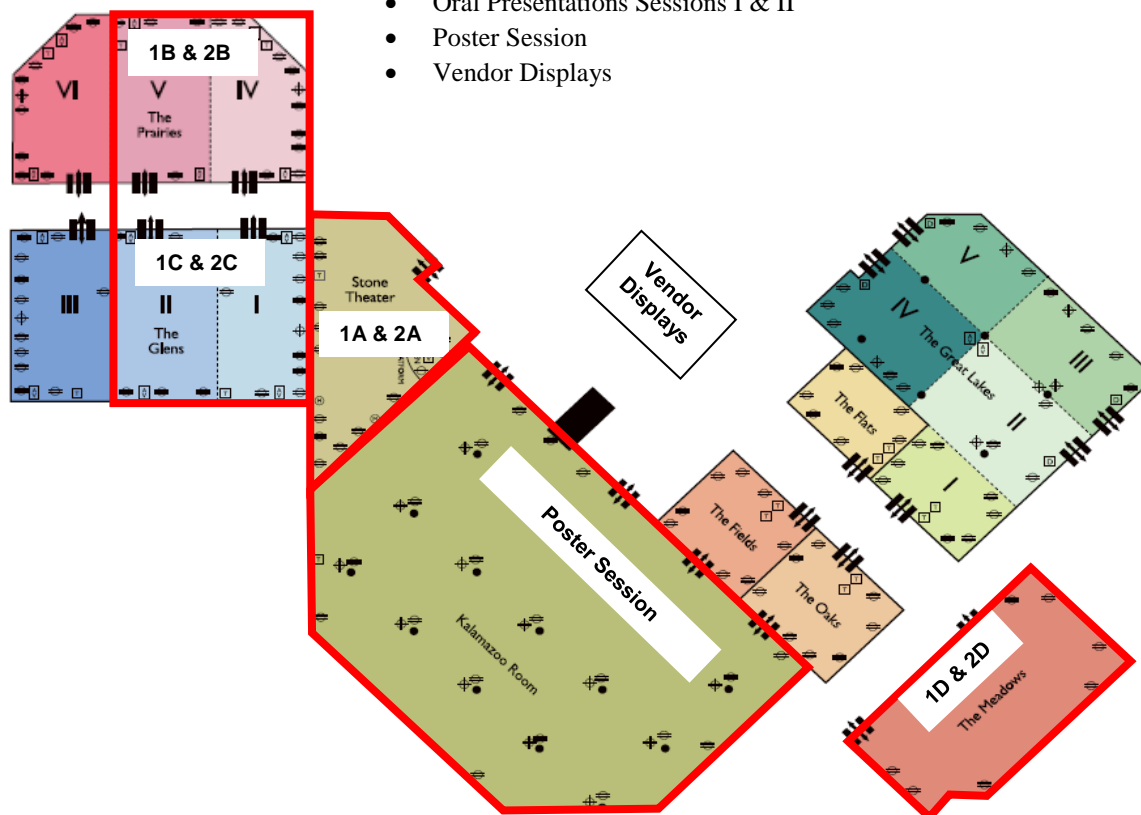
- Keynote Speaker with Lunch
- Afternoon Oral Presentations and Awards



Lower Level

Sessions

- Oral Presentations Sessions I & II
- Poster Session
- Vendor Displays



SCHEDULE

8:00 – 8:30 am	Check-in Refreshments available	Lobby Level
8:30 – 9:45 am	Oral Presentation Session 1 Session 1A Session 1B Session 1C Session 1D	Stone Theatre The Prairies IV & V The Glens I & II The Meadows
9:50 – 10:50 am	Poster Presentations	Kalamazoo Room
	Vendor Display Tables	Lower Level Area
11:00 am – 12:15 pm	Oral Presentation Session 2 Session 2A Session 2B Session 2C Session 2D	Stone Theatre The Prairies IV & V The Glens I & II The Meadows
12:15 – 12:25 pm	Break Restrooms, pick up boxed lunch, find seat	
12:30 – 1:40 pm	Lunch / Keynote Speaker	Arcadia Ballroom I & II
1:45 – 3:15 pm	Oral Presentation Session 3 1:45-2:00 pm Community Research 2:00-2:15 pm Educational Research 2:15-2:30 pm Quality Improvement Research 2:30-2:45 pm Medical Humanities Research 2:45-3:00 pm Basic Science Research 3:00-3:15 pm Clinical Research	Arcadia Ballroom I & II
3:15 – 3:30 pm	Award Presentation	Arcadia Ballroom I & II
3:30 pm	Farewell	Arcadia Ballroom I & II

KEYNOTE SPEAKER

The Dr. Robert P. Carter Research Lecture

This is the eighth 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.



Patrick Schlievert, PhD

Chair and Department Executive Office, Professor of
Microbiology and Internal Medicine, University of
Iowa Carver College of Medicine

presents

Staphylococcus aureus Can Cause Diabetes Mellitus Type II

Dr. Patrick M. Schlievert is Professor and Department Executive Officer of the Department of Microbiology, University of Iowa Carver College of Medicine. He is also Co-founder and Chief Scientific Officer of Hennepin Life Sciences.

Dr. Schlievert and his clinical colleagues have described the causes of 29 newly recognized infections caused by *Staphylococcus aureus* and *Streptococcus pyogenes*. These include the first description, in 1981 in the *Journal of Infectious Diseases*, of toxic shock syndrome toxin, the major cause of the tampon-associated toxic shock syndrome in collaboration with the Centers for Disease Control and Prevention (CDC). In 1987, Drs. Larry Cone and Schlievert provided the first description of streptococcal toxic shock syndrome (also known as the “flesh-eating streptococcal disease”) and its cause in the *New England Journal of Medicine*. Most recently, he and his colleagues have proposed that *S. aureus* and its superantigens are important causes/contributors to development of diabetes mellitus type II.

Dr. Schlievert has focused attention on development of dual-acting anti-infectives, including glycerol monolaurate (GML). GML is generally recognized as safe compound that is both broadly antimicrobial and anti-inflammatory, thus the name dualacting. The CDC has noted that infections constitute the greatest healthcare costs in the United States. Through the University of Iowa and Hennepin Life Sciences, it is Dr. Schlievert's hope that GML, as a dual-acting anti-infective, can significantly reduce these infections.

In addition to Dr. Schlievert's scientific accomplishments, he has trained large numbers of new scientists and physicians. He has received multiple teaching awards for his teaching of graduate and medical students, including being recognized the 2016 American Society for Microbiology Graduate and Medical Teacher of the Year.

ORAL PRESENTATIONS

SESSION 1A		STONE THEATRE
Moderator:	Karen Bovid, MD; Orthopaedic Surgery	
8:30-8:45 am	Minimalist Running: A Primer for the Running Athlete's Medical Team. Andrew G. Geeslin, MD; James R. Jastifer, MD; Peter A. Gustafson, PhD	
8:45-9:00 am	Fibrolamellar HCC - A Case Series. Jairo A. Espinosa, MD; Gitonga Munene, MD, FACS; Yirong Zhu; Alex Merlo, MD; Mohamed Arafeh, MD; Marc T. Downing, MD	
9:00-9:15 am	Combined Pediatric Orthopaedic Surgery and General Surgery Reconstruction of a Pediatric Amputated Limb. Nicholas Miladore, MD; Karen Bovid, MD; Audrey F. Hand, MD; Christian Ertl, MD	
9:15-9:30 am	Results of the Gravity Stress Examination in the Normal Patient Population. Matthew Jaykel, MD; James R. Jastifer, MD	
9:30-9:45 am	Gastrocnemius Contracture in Patients with and without Foot Pathology. Jessica Marston, MD; James R. Jastifer, MD	
SESSION 1B		THE PRAIRIES IV & V
Moderator:	Mark Schauer, MD; Medicine	
8:30-8:45 am	Point-of-Care Ultrasound Education in Internal Medicine, Pediatric, and Medicine-Pediatrics Residency Programs: Preliminary Nationwide Survey Data. Matthew T. Siuba, DO; Michael S. Wagner, MD; Thomas A. Melgar, MD	
8:45-9:00 am	Computer Simulations of Influence of Deformable Blockages on Fluids in an Elastic Blood Vessel. Dewei Qi; Tai-hsien WU	
9:00-9:15 am	Julius Hess: The Father of American Neonatology. Alissa Welsh, MD; Luis H. Toledo-Pereyra, MD	
9:15-9:30 am	A Historical Review of Anterior Cruciate Ligament Reconstruction: A Century of Evolution. Andrew G. Geeslin, MD; Quinter Burnett, MD; Luis H. Toledo-Pereyra, MD, PhD	
9:30-9:45 am	Innovations in Anatomy Education: Reciprocal Peer-Teaching (RPT) at Western Michigan University Homer Stryker M.D. School of Medicine (WMed). Wendy Lackey-Cornelison, PhD	

ORAL PRESENTATIONS (cont.)

SESSION 1C

THE GLENS I & II

Moderator: Susan Bannon, MD; Medicine

- 8:30-8:45 am **Non-Staphylococcal Tricuspid Valve Endocarditis in a Non-Injection Drug User: A Rare Entity.** Larry Lutwick, MD; Eric Yoder, DO
- 8:45-9:00 am **Neurosarcoidosis: A Rare Cause of Isolated Myelopathy.** Sandra Koehn, DO; Sara Lang
- 9:00-9:15 am **Post Viral Transient Synovitis in a Three Week Old Infant.** Theotonius J. Gomes, DO; Ryan F. Halas, DO; Megan Sikkema, DO
- 9:15-9:30 am **A Case of Severe Necrotizing Pancreatitis Infected with the “Nightmare Bacteria” – Carbapenem Resistant Enterobacteriaceae.** Monoj Kumar Konda, MD; Karthik Kailasam, MD; Jason Lam, DO
- 9:30-9:45 am **Acute Infectious Purpura Fulminans Related to Pasteurella Multocida Sepsis.** Monoj Kumar Konda, MD; Stephanie Chang, Mathew Zaccheo, DO

SESSION 1D

THE MEADOWS

Moderator: Earl Norman, MD; Surgery

- 8:30-8:45 am **Why Patients Miss Scheduled Appointments in the Orthopedic Clinic.** Matthew Jaykel, MD; Karen Bovid, MD; Michael Fonger, PA-C; Satya Dalavayi
- 8:45-9:00 am **Identifiable Markers for Low-Income Children, 0-5, Who Fall Through Medical or Community Service Gaps.** Catherine L. Kothari, PhD; Cheryl A. Dickson, MD; Colleen MacCallum, Amy Curtis, PhD; Craig Beam, PhD
- 9:00-9:15 am **Case Management Program Shows Marginal Clinical Significance in Outcomes for Patients with Type-2 Diabetes Mellitus at Family Health Center.** Heather I-Hsuan Chen, Patricia J. Choi, Nicole C. Foley, Alan J. Hifko, Sheila Sullivan; Alyssa Woodwyk, Catherine L. Kothari, PhD
- 9:15-9:30 am **Mortality in Adult and Pediatric Cystic Fibrosis (CF) Patients Requiring Endotracheal Intubation: A Nationwide Cohort Study.** Matthew T. Siuba, DO; Amy Attaway, MD; Susan Bannon, MD; Frank Jacono, MD; Steven Strausbaugh, MD; Elliott Dasenbrook, MD
- 9:30-9:45 am **A Quality Improvement Project to Assess and Treat Cystic Fibrosis (GF) Patients with Inadequate Vitamin D Levels in Kalamazoo, Michigan.** M. Myrtha Gregoire-Bottex, MD; Sally Bonnema; Polly Hollenbeck; Nichole Sackett; Niecia Anjorin

ORAL PRESENTATIONS (cont.)

SESSION 2A		STONE THEATRE
Moderator:	Joseph Chess, MD; Orthopaedic Surgery	
11:00-11:15 am	Partial Tears of the Distal Biceps Brachii Tendon: A Systematic Review of Surgical Outcomes. Michael A. Behun; Jeffrey C. King, MD; Andrew G. Geeslin, MD; Emma C. O'Hagan	
11:15-11:30 am	Outcome of Glenoid Labral Repairs in Competitive Swimmers. Keith Kenter, MD; Douglas Hollern, MD; John Divine, MD	
11:30-11:45 am	The Ankle and Subtalar Joint Functional Unit, Rationale for the Development of a Ball and Socket Ankle Joint; A Computational Study. Tyler Snoap, MD; James R. Jastifer, MD; Peter A. Gustafson, PhD; Aaron Labomascus	
11:45 am-12:00 pm	Current Concepts Review of Biologic Treatments for Sports Injuries: Basic Science, Clinical Applications, and FDA Regulation. Andrew G. Geeslin, MD; Robert F. LaPrade, MD, PhD	
12:00-12:15 pm	Prospective Study of Arthroscopic Biceps Tendon Tenodesis with Associated Rotator Cuff Repair: Preliminary Results. Andrew G. Geeslin, MD; Tyler Snoap, MD; Christopher W. Uggen, MD	
SESSION 2B		THE PRAIRIES IV & V
Moderator:	Shama Tareen, MD; Psychiatry	
11:00-11:15 am	Innovative WMed-Community Partnership Revitalizes Kalamazoo Fetal Infant Mortality Review. Deb Lenz; Catherine L. Kothari, PhD; Yamini Kuchipudi, MD; Cheryl A. Dickson, MD; Jen Brenton; Grace Lubwama, PhD	
11:15-11:30 am	The Interplay of Race, Socioeconomic Status and Neighborhood Upon Birth Outcomes. Catherine L. Kothari, PhD; Rajib Paul, PhD; Ben Dormitorio; Fernando Ospina; Arthur James; Deb Lenz; Kathleen M. Baker, PhD; Amy Curtis, PhD; James Wiley, PhD	
11:30-11:45 am	Mapping Core Transmission Area of Single and Repeating Chlamydia and Gonorrhea Cases for Planning STI Interventions in an Urban-Rural County (2012-2014). Claudio Owusu, Kathleen M. Baker, PhD; Yasaman Back; Rajib Paul, PhD; Elizabeth MacQuillan; Amy Curtis, PhD	
11:45 am-12:00 pm	A Nasal Intermittent Positive Pressure Ventilation Device for Treatment of Neonatal Respiratory Distress in Low Resources Settings. Nickolas D. Habben; Peter A. Gustafson, PhD; Stephen John, Joseph D. Barnett, Hoa T. Le	
12:00-12:15 pm	Narrative Analysis of Fetal Infant Mortality Review (FIMR) Summaries. Yamini Kuchipudi, MD; Catherine L. Kothari, PhD; Amy Damashek, PhD; Camryn Romph, Terra Bautista	

ORAL PRESENTATIONS (cont.)

SESSION 2C

THE GLENS I & II

Moderator:	Joanne Baker, DO; Medicine
11:00-11:15 am	TB or not TB: Pulmonary Infection with an Unusual Organism: Mycobacterium Celatum. Larry Lutwick, MD; Pimpawan Boapimp, MD
11:15-11:30 am	AKT: A Therapeutic Target in Hepatic Ischemia-Reperfusion Injury. Stephen Covington; Luis H. Toledo-Pereyra, MD, PhD
11:30-11:45 am	Mononuclear Phagocytic Infiltration and Inflammation in the Brain in Response to Oral Salmonella Infection. Tim Bauler, PhD
11:45 am-12:00 pm	Decreased TNF-α Levels in Preconditioned Rat Livers Following Ischemic Injury. H. Arad Abadi; Luis H. Toledo-Pereyra MD, PhD; Tarannom Shoghi
12:00-12:15 pm	Evaluation of MTOT Modulators in Kidney Cell Lines. Eric Edeward; Gregory Vanden Heuvel, PhD; Angela Brightell-Conrad, William McDonald, Jerry Colca, PhD; Rolf Kletzien, PhD

SESSION 2D

THE MEADOWS

Moderator:	David Overton, MD; Emergency Medicine
11:00-11:15 am	Analysis of Prehospital Opioid-Related Cardiac Arrests in a Statewide EMS Information System and the Potential Preventative Value of Non-Paramedic First Responder Naloxone. Kevin Patel, DO; William Fales, MD
11:15-11:30 am	A Challenging Percutaneous Intervention of an Unprotected Left Main Coronary Artery. Monoj Kumar Konda, MD; Vishal Gupta, MD, MPH
11:30-11:45 am	Increased Lung Weights in Drug Overdoses. Heather I. Chen; Joyce deJong, DO
11:45 am-12:00 pm	Restrictive Cardiomyopathy Misdiagnosed as Asthma. Christopher J. Schmehil, MD
12:00-12:15 pm	Rapid Response to Propranolol in a Stridorous Patient with Extensive Infantile Hemangiomas. Devika Malhotra, MD; Ryan F. Halas, DO; Robin Fountain, MD

ORAL PRESENTATIONS (cont.)

The following presentations represent the top-scoring abstracts in each of the six topic areas.
Together with Dean Jenson, we congratulate all of the authors on their fine work.

SESSION 3

ARCADIA BALLROOM

Moderator: Dale Vandr , PhD; Biomedical Sciences

- | | |
|--------------|--|
| 1:45-2:00 pm | Pre-Gravid Overweight and Risk of Low Birthweight, Preterm Birth, and Stillbirth Among Kalamazoo County Mothers. Elizabeth MacQuillan; Amy Curtis, PhD |
| 2:00-2:15 pm | Domestic Violence Training Improves Trauma-Related Competencies Among Mental Health and Social Service Providers. Eleanor Yu; Julie Helmer; Sherry Brockway; Catherine L. Kothari, PhD |
| 2:15-2:30 pm | Improving the Quality of Prenatal Care Provided at the WMed Family Medicine Clinic. Susan Jever, DO; Kanika Jaggi, MD; Lauren Piper, DO; Allan Wilke, MD |
| 2:30-2:45 pm | A Historical Consideration of the Role of Whole Organ Pancreas Transplantation Following 50 Years of Clinical and Experimental Use. Peter White; Luis H. Toledo-Pereyra, MD, PhD |
| 2:45-3:00 pm | Stress Concentrations at Coracoclavicular Ligament Reconstruction Tunnels: A Biomechanical and Finite Element Evaluation of Clavicle Fracture Risk. Peter A. Gustafson, PhD; Mark Omwansa; Mark Sytsma, MD; Andrew G. Geeslin, MD |
| 3:00-3:15 pm | Experimental Virotherapy of Human Melanoma Tumors in Nude Mice with 15L-knock-out Tanapoxvirus. Tiantian Zhang, Karim Essani, Yogesh R. Suryawansh, Dennis H. Kordish, Helene M. Woyczesczyk; David Jeng, PhD |

Oral Presentations

MINIMALIST RUNNING: A PRIMER FOR THE RUNNING ATHLETE'S MEDICAL TEAM

Andrew G. Geeslin, MD; James R. Jastifer, MD; Peter A. Gustafson, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics;
Western Michigan University, Department of Mechanical and Aeronautical Engineering

INTRODUCTION: Running continues to grow in popularity as a means of exercise, entertainment, and social engagement. In fact, over 8,000 runners participated in the 2015 Borgess Run event in Kalamazoo, MI. However, it has been estimated that up to 80% of runners sustain an injury annually. Interest in minimalist running style and footwear, as a potential means of minimizing injury, has increased in recent years and is a common concern of patients who participate in running related activities. It is important for the clinician to recognize the difference between foot strike patterns and footwear styles, and their impact on running biomechanics.

PURPOSE: The purpose of this investigation was to summarize available evidence on running footwear and biomechanics for the running athlete's medical team. Key concepts are reviewed concerning running biomechanics and the impact of minimalist running on these parameters, injuries, and metabolic efficiency.

MATERIALS & METHODS: A comprehensive search of PubMed was performed to identify primary sources for key investigations on running biomechanics. Biomechanical and computational studies, as well as high quality observational and epidemiological studies were included.

RESULTS: "Modern running shoes" allowing for a rear foot strike (RFS) consist of an elevated padded heel and motion control and are a relatively recent phenomenon compared to the evolutionary history of running. Recently, the minimalist running movement has supported a return toward running flats and even barefoot running. Elite runners more commonly run with a forefoot strike (FFS), decreased step distance, and increased stride frequency compared to amateur runners. There is evidence that minimalist running results in decreased patellofemoral joint stress compared to shod running. Foot strike patterns (specifically RFS) have been correlated with injury including stress fracture and exertional compartment syndrome. There is conflicting evidence on running economy with different shoe types and running styles. Biomechanical evidence supports modern running shoes for RFS and using FFS during barefoot running and when donning minimalist shoes.

CONCLUSION: It is well documented that runners sustain a high injury rate. It is important to consider the goals of individual runners when discussing footwear and prevention/management of injuries. Biomechanical evidence supports "modern" shoes for RFS runners and a FFS when donning "minimalist" shoes and barefoot running. Epidemiological studies controlled for running distance, body habitus and mechanics, objective definition of injury, and detailed footwear description are necessary to evaluate optimal running footwear.

FIBROLAMELLAR HCC - A CASE SERIES

Jairo A. Espinosa, MD; Gitonga Munene, MD, FACS; Yirong Zhu; Alex Merlo, MD;
Mohamed Arafeh, MD; Marc T. Downing, MD

WMU Homer Stryker M.D. School of Medicine, Department of General Surgery; WMU Homer Stryker M.D. School of Medicine, Department of General Surgery; Michigan State University Osteopathic School of Medicine, Medical Student; WMU Homer Stryker M.D. School of Medicine, Department of General Surgery; WMU Homer Stryker M.D. School of Medicine, Department of General Surgery; Bronson Pediatric Surgery

INTRODUCTION: Fibrolamellar hepatocellular carcinoma is a rare variant of liver cancer that represents only 1-2% of all primary HCC. FL-HCC predominantly affects young adults with no previous history of chronic liver disease, and has a more favorable prognosis compared to conventional HCC. We present two cases of FL-HCC, one of particular interest with tumor thrombus obstructing the common bile duct.

CASE PRESENTATIONS:

CASE 1: Involved a 27-year-old male who presented to his primary care physician for health maintenance visit.

Review of systems revealed abdominal pain and lab evaluations found elevated ALP, AST, ALT, and direct bilirubin. CA 19-9 and Vitamin B12 binding capacity were elevated. CEA, neurotensin and AFP were not elevated. CT evaluation revealed bile duct dilatation, a liver heterogeneous mass with central microcystic calcification and adenopathy in the porta hepatis. A formal right hepatectomy with perihepatic lymph node dissection and cholecystectomy were performed. An intra-operative cholangiogram revealed ductal blockage proximally at the bifurcation of the common bile duct, which led to a CBD exploration and thrombectomy. The 15.0 x 11.0 x 10.5 cm tumor was resected with negative margins with a final pathology of fibrolamellar hepatocellular carcinoma. Metastases were identified from the common bile duct, periportal, pericaval, and hepatic artery celiac access lymph nodes.

CASE 2: Involved a 14-year-old male that presented with a one-month history of abdominal pain and a longer history of fatigue and headaches. Work-up revealed a 10 x 8 x 5 cm heterogeneous mass in the right lobe of the liver (segments 7 and 8) with necrosis and hemorrhage within tumor, via MRI. In addition, patient had an elevated PT, PTT, and CRP with beta-hcg and AFP levels within normal limits prior to surgery. Patient underwent a formal right hepatectomy, cholecystectomy, and perihepatic lymphadenectomy. The 13.5 cm tumor was resected with negative margins with a final pathology of fibrolamellar hepatocellular carcinoma. 2/10 lymph nodes were positive for FL-HCC.

CONCLUSION: Surgical resection of FL-HCC with adequate lymph node dissection is associated with increased survival, and due to its rarity, no effective systemic treatment has been established. Hence, making surgical intervention the treatment of choice and preferred treatment modality. In addition, FL-HCC can present with an obstructing thrombus. Making intra-operative cholangiogram an essential part of the surgical procedure in these patients.

COMBINED PEDIATRIC ORTHOPAEDIC SURGERY AND GENERAL SURGERY RECONSTRUCTION OF A PEDIATRIC AMPUTATED LIMB

Nicholas Miladore, MD; Karen Bovid, MD; Audrey F. Hand, MD; Christian Ertl, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine; Department of General Surgery; WMU Homer Stryker M.D. School of Medicine; Department of General Surgery

INTRODUCTION: A stable, pain-free, well-aligned limb with good soft tissue coverage is required for optimal prosthetic fit and function after amputation. This is challenging to maintain following amputations in children. In pediatric transtibial amputation the most common complication is bony overgrowth. Progressive angular deformity is less frequent, and amendable to surgical correction when greater than 5 degrees. Osteomyoplastic reconstruction, also known as the Ertl procedure, can be performed safely in children and was utilized in combination with a tibial osteotomy for complications of a curative transtibial amputation for fibrosarcoma.

CASE REPORT: A 13 year old male presented with a history of periosteal fibrosarcoma of his right foot for which he underwent a transtibial amputation at age 2. He subsequently developed difficulty with prosthesis fit and persistent pain despite multiple prosthetic adjustments and surgical revisions at another institution. Radiographs demonstrated tibial over growth and significant procurvatum. The patient underwent tibial osteotomy for correction of deformity and osteomyoplastic revision amputation with neuroma excision.

DISCUSSION: A rare complication after transtibial amputation in skeletally immature children is varus angular deformity. This may lead to pain, gait abnormalities, and compromise prosthetic fit. A previous study suggested correction of malalignment improved prosthesis fitting. Proposed mechanisms for differential growth are the Heuter-Volkman principle, which entails eccentric loading of the physis, and injury that occurs to the physis. In patients requiring transtibial amputation, the Ertl procedure can provide improved functional outcomes and is a safe procedure. Osteomyoplastic reconstruction involves using the distal aspect of the fibula and its surrounding periosteum as a bony bridge between the tibia and the fibula enveloped in soft tissue and muscle. This allows for an improved loading surface for the prosthesis. Specifically, this has been shown in a pediatric population to be a feasible option in transtibial amputations with a low rate of reoperation for stump overgrowth and improved functionality with higher scores on the PEQ 'Ambulation' scale.

CONCLUSION: Our case demonstrates a rare post-operative complication, pathognomonic imaging findings, and describes a technique for surgical reconstruction. It demonstrates a multi-specialty approach to challenging pathology. Our outcome has proven successful in this patient with improved prosthesis fitting and decreased pain. In conclusion, the authors suggest that revision amputation with combination of tibial osteotomy and osteomyoplastic reconstruction is a feasible option for treating tibial overgrowth and angular deformity of the residual limb in an active pediatric population.

RESULTS OF THE GRAVITY STRESS EXAMINATION IN THE NORMAL PATIENT POPULATION

Matthew Jaykel, MD; James R. Jastifer, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics

BACKGROUND: In ankle fractures, the results of a gravity stress radiographic examination are clinically used to determine if a patient requires surgical or nonsurgical treatment. To our knowledge, the results of a gravity stress examination have never been reported in the normal patient population and thus it is unknown if surgery is recommended to patients who may in fact be within the range of the normal population. The purpose of this study is to report the results of a gravity stress exam in patients without ankle trauma or pathology. Our hypothesis is that the radiographic parameters of a gravity stress exam are no different than those of a weight-bearing ankle mortise radiograph in the same patient.

MATERIALS & METHODS: Institutional review board approval was obtained. Fifty patients were prospectively enrolled in the study. Included patients had no history of ankle pain or trauma. On all patients, complete ankle radiographs were obtained including weight-bearing AP, lateral, mortise radiographs, and a nonweight-bearing gravity stress exam was performed. On the gravity stress and ankle mortise radiographs, ankle alignment was measured including the talocrural angle, medial clear space, and talar tilt angle. On the AP view, the tibia-fibula clear space, tibia-fibula overlap, and medial clear space was measured.

RESULTS: The mean medial clear space in the gravity stress view was 3.0 mm (range, 2.1 mm to 4.0 mm). The standard deviation was 0.50 mm. This compared to a mean medial clear space of 3.0 mm, and 2.9 mm in the AP and mortise and groups respectively. In the normal patient population, we found no statistically significant difference in medial clear space widening between the gravity stress exam and the AP and mortise radiographic views. The maximum medial clear space on the gravity stress exam in this population was 4.0 mm.

CONCLUSION: This study showed that a mean of 3.0 mm of medial clear space to be normal on the gravity stress exam. Additionally, no patients in the current patient population had medial clear space widening with gravity stress to more than a total of 4.0 mm which would support this value as a threshold in the clinical setting of an ankle fracture to define an unstable injury. Based on these two findings, we support the clinical practice of stabilizing fractures with widening on the gravity stress radiograph because it does represent ankle instability compared to the current study group.

GASTROCNEMIUS CONTRACTURE IN PATIENTS WITH AND WITHOUT FOOT PATHOLOGY

Jessica Marston, MD; James R. Jastifer, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics

INTRODUCTION: Several studies report performing a recession of the gastrocnemius muscle as surgical treatment for foot and ankle pain related to an isolated gastrocnemius contracture. None of these studies report ankle range of motion utilizing a validated measurement device or report a control group. All previous studies reporting measurements using a validated device have been small in number. The purpose of the current study is to report ankle dorsiflexion in foot and ankle patients as well as a control group utilizing a validated measurement instrument. Our hypothesis was that patients presenting with foot or ankle pain would have similar measured ankle range of motion to controls.

MATERIALS & METHODS: Institutional review board approval was obtained and a prospective case-control study was performed. We build and utilized a previously validated device to measure ankle range motion and isolated gastrocnemius contracture in 61 patients presenting with foot or ankle pain as well as 50 controls. For each patient, the measurements were repeated three times with the knee extended to isolate the effect of the gastrocnemius muscle. We additionally performed a clinical examination and goniometer measurement of ankle range of motion. Patient history and demographics were also obtained.

RESULTS: The foot and ankle pain group had a mean dorsiflexion of 11.6 degrees compared to a mean of 16.6 degrees in the control group with the knee extended ($p < .0001$). No patients in either group had less than 15 degrees of motion with the knee flexed. The device was used three times on each patient with no significant difference between measurements ($p > .05$). The difference in dorsiflexion was significantly less utilizing a goniometer than using the validated device which may be due to measurement technique and external landmarks ($p > .05$).

CONCLUSION: Patients with foot and ankle pain had less ankle dorsiflexion than the control group with the knee extended. This is the first, and largest, study utilizing a validated measurement device as well as a control group. Clinically, this study supports the notion that an isolated gastrocnemius contracture is associated with foot and ankle pain and may be considered in the surgical treatment of these conditions.

POINT-OF-CARE ULTRASOUND EDUCATION IN INTERNAL MEDICINE, PEDIATRIC, AND MEDICINE-PEDIATRICS RESIDENCY PROGRAMS: PRELIMINARY NATIONWIDE SURVEY DATA

Matthew T. Siuba, DO; Michael S. Wagner, MD; Thomas A. Melgar, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; University of South Carolina,
Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine,
Department of Medicine-Pediatrics

INTRODUCTION: Point-of-Care Ultrasound (POCUS) is gaining increased attention and utilization as a tool for physicians not only to safely perform procedures, but also to aid in physical assessment and diagnosis. POCUS education is already well-established as required curriculum in emergency medicine residencies and in family medicine programs for obstetric evaluation. However, little is known about POCUS education in internal medicine (IM), pediatrics (PD), and medicine-pediatric (MP) residency programs. This study was conducted to assess the presence and content of ultrasound education in these programs by way of an online survey instrument.

MATERIALS & METHODS: In late January 2016 a 15-item online survey was distributed via email to all 685 program directors of IM (407), PD (199), and MP residency programs (79). The survey instrument was developed by the authors. Questions were aimed at assessing what POCUS curriculum (if any) exists at each program, amount and content of training (and by whom), and what barriers to training are present. Results after three weeks of survey circulation were collected and analyzed.

RESULTS: 61 responses were collected ($61/685 = 8.9\%$ response rate), of which 36 IM, 13 MP, and 12 PD programs responded (8.9%, 16.5%, and 6% of total programs, respectively). The percentage of responders from each specialty was roughly proportional to the percentage of total programs. 21 total programs (34.4%) offer required or optional formal POCUS curricula, 10% offered no training, and 53% offered training only for procedures or in other departments. MP programs were most likely to offer formal curricula (46.2%) and PD programs were least likely (16.7%). Most common reasons for lack of curricula included lack of qualified instructors (78.4%), necessary technology (46.0%), and absence of standards by governing medical societies (46.0%). Of 19 respondents to the question, 15 (79%) make clinical decisions based on POCUS interpretation without radiologist involvement.

CONCLUSION: POCUS training is only offered in a minority of internal medicine, pediatric, and medicine-pediatrics residency programs in this preliminary sample. As ultrasound technology becomes more affordable and accessible to generalists, medical education programs may need to adapt to meet the needs of trainees in this emerging area of interest.

COMPUTER SIMULATIONS OF INFLUENCE OF DEFORMABLE BLOCKAGES ON FLUIDS IN AN ELASTIC BLOOD VESSEL

Dewei Qi; Tai-hsien WU

Western Michigan University, Department of Chemical and Paper Engineering

Last decade, cardiovascular diseases were major causes of death for both males and females in the world. Since experimental studies are relatively difficult, computational fluid dynamics (CFD) for modeling cardiovascular system becomes a new and popular field.

In this work, a lattice-Boltzmann lattice-spring method is utilized to simulate the deformation of blockages and fluid properties in an elastic blood vessel for the first time. In this method, the lattice Boltzmann method is used to capture fluid behavior, and the lattice spring model is employed to mimic the deformation of the blood vessel and blockages while the immersed-boundary method is applied to deal with the fluid-solid interaction. A validation for the present method is carried out by comparing the simulation results with a theoretical prediction for a deformation of the pulmonary blood vessel in a steady flow.

Subsequently, the method is applied to study the relationship between the fluid properties and the deformation of blockages.

It is found that the top and bottom blockages are rotated in two opposite directions and expanded to the vessel central area so that the left gap between two blockages is asymmetrically larger than the right gap. The inclined or rotation angle and expansion increase as the thickness increases. As a result, the minimum gap between the top and bottom blockages, fluid velocity and flow rate decrease as the thickness increases while the pressure drop in the blockage areas increases, indicating that the deformation increases the resistant of fluid flowing.

JULIUS HESS: THE FATHER OF AMERICAN NEONATOLOGY

Alissa Welsh, MD; Luis H. Toledo-Pereyra, MD

WMU Homer Stryker M.D. School of Medicine, Pediatrics; WMU Homer Stryker M.D. School of Medicine,
Program in Medical Ethics, Humanities, and Law

INTRODUCTION: Little has been written of the profound contributions of Julius Hess (1876-1955) to the field of Neonatology. His pioneering care for premature and diseased newborns, lead to a new era of specialization and molded present-day culture and practice in the field of neonatology.

RATIONALE: Dr Hess greatly shaped the field we now call neonatology. He established the need for specialized care for premature and congenitally diseased infants, and created the first American, permanent, comprehensive premature infant station (NICU) with specially trained medical personnel. He was the first premature infant-focused researcher in the U.S. and created both medical and government policies, which helped to decrease infant morbidity and mortality.

HISTORICAL SOURCES: Primary sources included: The University of Chicago Library's "Julius Hays Hess Papers 1943-1958" containing his original research, correspondence, ledgers, photographs, drafts, books and artifacts. His original publications in medical journals and books. Textbooks that his works were cited in, such as Nelson's "Textbook of Pediatrics", formerly Griffith's, "The Diseases of Infants and Children". Secondary sources were obtained via PubMed, Access Pediatrics, Google Scholar, and websites, such as U.S News and World Report, CHOP's NICU website and a google search for current medical schools that use Case Based Learning (CBL) teaching techniques.

CONTRIBUTIONS OF HESS: Hess published the first U.S. book to focus on premature and congenitally diseased infants, and was the original U.S. neonatal focused researcher. His documented findings and publications on decreasing infant morbidity and mortality enabled him to develop the permanent comprehensive premature infant station, which today's top NICU's are designed to mimic. His involvement in public health education regarding infant care, and role in political policymaking, allowed him to spear-head the first comprehensive government policy regarding newborn health. He chaired the Department of Pediatrics at the University of Illinois, where he was an exceptional teacher. He taught using patient cases, similar to what is now known as the "case-based-learning" style and educated a new generation of newborn-focused pediatricians. Julius Hess was able to change public opinion, government policies and the culture of pediatric medicine, which helped pave the way for neonatology specialization after his death.

CONCLUSION: Due to the pioneering efforts of Dr Julius Hess regarding the care of premature and diseased infants, he should be considered the "father of American Neonatology" as indicated by his accomplishments in promoting the health of newborns the United States.

A HISTORICAL REVIEW OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A CENTURY OF EVOLUTION

Andrew G. Geeslin, MD; Quinter Burnett, MD; Luis H. Toledo-Pereyra, MD, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Bronson Sports Medicine Specialists; WMU Homer Stryker M.D. School of Medicine, Program in Medical Ethics, Humanities, and Law

INTRODUCTION: Over 100,000 anterior cruciate ligament (ACL) reconstructions are performed annually in the United States. The ACL remains the most commonly studied ligament and a query of PubMed reveals over 6,000 articles with “anterior cruciate ligament” in the title. Technological advancements, including the development of the arthroscope, advanced imaging techniques, and ACL anatomy and biomechanics investigations have led to significant advancements in the care of patients with ACL tears.

RATIONALE: The intent of this investigation is to provide a historical overview of the evolution of modern ACL injury treatment. A thorough understanding of this evolution and the supporting laboratory and clinical studies is important for the treating surgeon.

MATERIALS & METHODS: A comprehensive search of PubMed was performed to identify primary sources for categorization of key events in the evolution of ACL reconstruction. Foundational laboratory and clinical studies, technological milestones, and the latest cutting-edge research and surgical techniques were included.

RESULTS: The first reported surgical repair of ACL deficient knees was performed by Robson in 1895 and the earliest documented reconstruction was performed by Hey Groves in 1917. Arthroscopic assisted ACL reconstruction was popularized in the 1980s as surgeons became more familiar with arthroscopic surgery. An evolution in the understanding and treatment of ACL injuries has occurred over the last century with a trend toward restoration of anatomy with less invasive techniques. Over that time, several key themes and controversies of surgical treatment emerged: direct repair versus reconstruction of the torn ligament; open approaches and arthroscopic-assisted techniques; extra-articular and intra-articular reconstruction techniques; multiple graft options including autografts, allografts, and synthetic ligaments; and various drilling techniques and bundle configurations. Most investigators have reached consensus on ACL anatomy and biomechanics. Current controversies include single versus double-bundle reconstruction, optimal graft choice, incorporation of concomitant extra-articular reconstructions, and a return to ligament repair in select patient groups.

CONCLUSION: Significant advancements in the diagnosis and treatment of ACL injuries have occurred over the last century, especially over the last three decades. Investigators have placed a heightened focus on restoration of anatomy in order to restore function to the ACL deficient knee. Technological advancements have played a major role in this evolution, and have led to decreased surgical morbidity, faster rehabilitation and recovery, and more consistently reproducible outcomes.

INNOVATIONS IN ANATOMY EDUCATION: RECIPROCAL PEER-TEACHING (RPT) AT WESTERN MICHIGAN UNIVERSITY HOMER STRYKER M.D. SCHOOL OF MEDICINE (WMED)

Wendy Lackey-Cornelison, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences

INTRODUCTION: Teaching is a critical skill for physicians and is a requirement for graduation from the Western Michigan University Homer Stryker M.D. School of Medicine (WMed). During the Musculoskeletal and Dermatology (MSK/D) course students use the anatomic content of assigned body regions to fulfill the teaching skills requirement necessary for graduation.

RATIONALE: The goal of this presentation is to describe the RPT program at WMed and address the effectiveness and value of the RPT program with regard to student perceptions and retention of course content as demonstrated by practical and course summative exam scores. The value of the WMed RPT as it relates to promoting independent learning, collaboration skills, and integration of normal anatomic structure and clinical science will also be addressed.

MATERIALS & METHODS: Students perform two teaching activities during the (MSK/D) course. First, students act as in-lab instructors for the normal anatomy of an assigned region. Second, students work in their anatomy groups to develop a didactic Case-Based presentation describing their chosen pathology and the anatomy involved. To prepare for teaching sessions students: 1) receive instruction on educational theory and methodologies from the department of Medical Education, 2) plan and implement a mini-presentation for critique by faculty and peers and 3) are assessed on their regional anatomy knowledge prior to their assigned laboratory instruction.

RESULTS: The RPT program has been executed with the inaugural class (N=54). Early results are promising. The class mean on the practical examination was 87%. The class scored well on the summative exam questions covering anatomy lab content (class mean was 85%). Student feedback was also positive. The teaching component and clinical applications were cited as some of the “best aspects of the course” in course evaluations.

DISCUSSION: The RPT program is fairly unique compared to anatomy peer-teaching at other institutions since it involves more than laboratory instruction. The emphasis on clinical applications during laboratory and student presentations may aid long-term retention of gross anatomy and later recall in patient vignette-style questions.

CONCLUSION: 1) Students were able to lead a Case-Based Learning session effectively. 2) They performed well in laboratory instruction and demonstration. 3) The RPT program offered a valuable opportunity to integrate basic and clinical science information learned during the course. 4) Through the creation, implementation, and delivery of these teaching sessions, students enhanced their communication and collaboration skills. 5) Student led laboratory and Case-Based instruction enhanced retention of anatomy content for both the student teacher and learner.

NON-STAPHYLOCOCCAL TRICUSPID VALVE ENDOCARDITIS IN A NON-INJECTION DRUG USER: A RARE ENTITY

Larry Lutwick, MD; Eric Yoder, DO

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences;
Bronson Internal Medicine Hospital Specialists

INTRODUCTION: Isolated right-sided bacterial endocarditis (RSBE) is a well-defined clinical entity in the cohort of intravenous drug users or in those with a permanent pacemaker (PPM), automatic implantable cardioverter-defibrillator (AICD) or previously known right-sided valvular pathology. RSBE in non-high risk patients is an unusual clinical entity. We report a non-high risk woman with tricuspid valve endocarditis due to *Streptococcus gallolyticus*, previously known as *S. bovis* serotype I.

CASE REPORT: An 80 year old Caucasian native Michigan woman was admitted to a hospital following several days of fever and chills and 4 weeks of cough following a previous admission for rectal bleeding in the setting of known inflammatory bowel disease. Because of her cough, she had been treated with a number of oral antimicrobials without improvement. Upon admission, her T was 39.4 C, WBC 20.4, no cardiac murmur was appreciated and a chest x-ray revealed bilateral patchy infiltrates. She was begun on azithromycin and ceftriaxone for possible community acquired pneumonia. Initial blood cultures grew an alpha-hemolytic streptococcus identified as *S. gallolyticus*. Over 4 days, she became afebrile with a normal WBC and follow up blood cultures on antimicrobials were negative. An echocardiogram revealed a 1.35 X 1.65 cm vegetation on the tricuspid valve. She denied injection drug use or having a PPM or AICD. Her antimicrobial therapy was narrowed to iv ceftriaxone and she completed a 4 week treatment course and had negative blood cultures in follow up.

DISCUSSION: Isolated RSBE in individuals without IVDU is an uncommon clinical entity. In reviews, non-IVDUs with RSBE often had indwelling right sided catheters or wires or known anatomic valvular disease and *Staphylococcus aureus* was the most common microorganism. The entity in the absence of IVDU and other risk factors is rarely described but is usually *S. aureus*-related. As with all cases of RSBE with risk factors or not, most cases present, as in this case, with fever and respiratory symptoms compatible with multiple pulmonary emboli which can be septic or bland.

S. gallolyticus can be a cause of bacterial endocarditis and, as with its nomenclature predecessor, may predict underlying colonic disease either malignant or otherwise. In this case, the patient had known inflammatory bowel disease from which the bacterium had likely silently seeded.

CONCLUSION: We present a case of *S. gallolyticus* tricuspid valve endocarditis in a woman without IVDU, previous cardiac pathology or indwelling wires or catheters, a rare entity.

NEUROSARCOIDOSIS: A RARE CAUSE OF ISOLATED MYELOPATHY

Sandra Koehn, DO; Sara Lang

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Michigan State University
College of Osteopathic Medicine, Medical Student Class of 2017

INTRODUCTION: Sarcoidosis is an autoimmune granulomatous disease that can affect any organ system. Although a common disease, only 5-25% of cases show neurologic involvement, and even more rare is spinal cord involvement, which occurs in less than 1%. Here we present a rare manifestation of sarcoidosis in a previously healthy gentleman and discussion on how to diagnostically approach such cases.

CASE: A 44 year-old African American male with no medical history presents with paraplegia and incontinence over two weeks. Three months prior, he experienced bilateral leg weakness which resolved with steroids. MRI spine at his initial presentation demonstrated intramedullary cord enhancements at C6/C7 and T3/T4 with surrounding edema and a right hilar mass. Repeat MRI on his second presentation showed extensive transverse myelitis from C3-T8 and an enlarged right hilar lymphadenopathy. Physical exam was significant for 0/5 strength in bilateral lower extremities, hyperreflexia, sustained myoclonus and loss of sensation. CSF findings were consistent with an inflammatory process. Otherwise, labs were unremarkable. Neurology was consulted and suspected neuromyelitis optica, though sarcoidosis was considered. Visual evoked potentials were normal. Eventually, excisional biopsy of the enlarged hilar node revealed non-caseating granulomas consistent with sarcoidosis. The patient was treated with SoluMedrol and plasmapheresis with minimal improvement. He is currently following with rheumatology and neurology.

DISCUSSION: The majority of patients with neurosarcoidosis progress to complete paraplegia within 18 months. The earlier corticosteroid therapy is begun, the better the outcome. However, making a definitive diagnosis when there is isolated CNS disease is challenging. MRI and CSF studies detect CNS inflammation with high sensitivity, but lack specificity, making the diagnosis of isolated neurosarcoidosis difficult. However, Wang et. al. describe hilar and/or mediastinal lymphadenopathy in 80% of such cases with findings consistent with sarcoidosis on biopsy. Therefore, chest CT should be obtained in patients with isolated myelopathy of unknown origin looking for lymphadenopathy that biopsied may lead to a definitive diagnosis. Once diagnosed, prompt treatment with high-dose corticosteroids should be started. Due to the rapid and progressive nature of neurosarcoidosis, the challenge in obtaining a tissue diagnosis, and given that lymphadenopathy is present in the majority of cases, we recommend a low threshold to image the chest. This is especially true in previously healthy patients with subacute neurologic findings of unknown etiology to allow for the best chance of diagnosis and starting therapy as soon as possible.

POST VIRAL TRANSIENT SYNOVITIS IN A THREE WEEK OLD INFANT

Theotonius J. Gomes, DO; Ryan F. Halas, DO; Megan Sikkema, DO

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Medicine-Pediatrics; Bronson Pediatric Referral Service and Bronson Rambling Road Pediatrics

OBJECTIVE 1: Differentiate transient synovitis from septic arthritis

OBJECTIVE 2: Recognize transient synovitis can present atypically in very young infants

CASE: A three week old male presents with his left leg held in flexion and 1-2 weeks of inability to extend the left leg with increased distress on movement. The patient had cough and congestion over the same time period but remained afebrile (TMax 99.9F). He also had a coincident candidal diaper rash. He was otherwise well with no previous history of trauma. Birth history was unremarkable. On physical exam the patient was a well-appearing infant with left hip held in full flexion with increased warmth to touch. The hip joint was resistant to movement and immediately followed by crying on repeated evaluations. Mild excoriation with dermatitis was present along the inguinal folds. Initial CBC, CMP, CRP and blood culture were normal. Hip x-ray did not reveal any acute pathology. Hip ultrasound showed small hypoechoic joint effusions bilaterally. MRI showed left hip effusion with synovitis and periarticular inflammation concerning for septic joint and surrounding myositis without osteomyelitis. Aspiration of the effusion was not possible given its size and a watchful waiting approach was employed. A nasal swab was positive for coronavirus. The patient remained afebrile without antibiotics and clinically improved without significant intervention suggesting transient synovitis as the underlying etiology.

DISCUSSION: Transient Synovitis (TS) is the most common cause of acute hip pain in children between the ages of 4-10 years old and reported in infants as young as 3 months old. Incidence is twice as common in males. Unilateral hip or groin pain with or without limping and a lack of fever is suggestive of TS. History of recent upper respiratory infections, pharyngitis or otitis media are common preceding TS, but trauma and drug reactions, including from vaccines, have also been implicated. Work up aims to exclude other causes of acute joint inflammation and includes CBC, ESR, CRP, procalcitonin, blood culture and hip radiographs. Joint aspiration is the gold standard to rule out septic arthritis. In our case we report TS in a 3 week old infant significantly outside the typical age range of 4-10 years old. Although it is reported that children outside the typical age range are unlikely to have TS, given our patient's clinical improvement without intervention in the setting of a coronavirus infection suggests TS as the most likely diagnosis.

A CASE OF SEVERE NECROTIZING PANCREATITIS INFECTED WITH THE “NIGHTMARE BACTERIA”- CARBAPENEM RESISTANT ENTEROBACTERIACEAE.

Monoj Kumar Konda, MD; Karthik Kailasam, MD; Jason Lam, DO

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine; Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine; Department of Medicine-Pediatrics

INTRODUCTION: Acute pancreatitis carries a mortality of 3% which rises to 17% in cases of necrotizing pancreatitis and it is even higher when it becomes infected. Infection with carbapenemase producing organisms carries a high mortality rate (50-75% depending on the strain and sensitivities) by itself. It was first described in 2009 in India and was identified in almost every state in United States by 2015. We report a case of acute NP infected with this resistant organism.

CASE: A 53-year-old man presented to ED with acute onset severe, sharp, epigastric pain associated with nausea and vomiting. Physical exam was significant for epigastric tenderness. A CT scan confirmed acute pancreatitis with 5 mm gall stone and he underwent endoscopic retrograde cholangiopancreatography (ERCP) with difficult biliary stenting. Post-procedurally the patient became agitated and confused with abdominal distension requiring endotracheal intubation, transfer to intensive care unit (ICU). A follow up CT scan was obtained in a week due to persistent increased abdominal pressures and failure to wean ventilator support and it showed worsening hemorrhagic pancreatitis. He continued to worsen with septic shock and fevers and on Day 16 a repeat imaging showed severe necrotizing pancreatitis (NP). A percutaneous pancreatic drain was placed and cultures grew carbapenem resistant enterobacteriaceae - *Escherichia coli* (CRE), *Candida albicans*, *Candida glabrata*, *Bacteriodes fragilis* and *Enterococcus gallinarum*. The patient had a prolonged ICU stay (54 days) with multiple antibiotic treatments, multi-organ failure requiring tracheostomy, percutaneous gastro-jejunostomy tube, hemodialysis, and laproscopic necrosectomy. He was eventually discharged with three weeks of trimethoprim-sulfamethoxazole, fluconazole and meropenem.

DISCUSSION: Infected NP is seen in one-third patients developing NP and is most commonly due to gastrointestinal organisms i.e. *Escherichia coli*, *Pseudomonas*, *Klebsiella* and *Enterococcus*. Infection with *enterococcus* is usually associated with higher mortality in infected NP. A retrospective study reported an overall incidence of 4.3% for CRE related nosocomial infections. Occurrence of CRE in infected NP is not well-studied and the incidence is unknown. In general treatment with combination therapy is shown to have mortality benefit over monotherapy. Potential agents for combination therapy include a carbapenem, polymyxin, tigecycline, gentamycin, trimethoprim-sulfamethoxazole or ceftazidime-avibactam depending on sensitivities.

CONCLUSION: Infected NP carries high mortality rates and judicious use of antibiotics in the early phases of necrotizing pancreatitis is necessary to prevent development of resistant organisms. CRE infection in NP is a relatively new entity with unknown incidence and outcomes.

ACUTE INFECTIOUS PURPURA FULMINANS RELATED TO PASTEURELLA MULTOCIDA SEPSIS.

Monoj Kumar Konda, MD; Stephanie Chang, Mathew Zaccheo, DO

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; Bronson Adult Critical Care

INTRODUCTION: Several cutaneous findings may be associated with sepsis ranging from skin mottling to life threatening conditions such as purpura fulminans (PF) or necrotizing fasciitis. PF is a rare hemorrhagic disorder, characterized by disseminated intravascular coagulation (DIC) and peripheral gangrene. A mortality rate of 43% is reported with PF.

CASE: A 75-year-old female presented to ED with dyspnea and fevers. Past medical history included moderate mental retardation, hypertension, coronary artery disease and obesity. Initial vitals were RR 50/min, HR 140 beats/min, temperature at 101.2° F, O2 saturation 88% on room air. Laboratory tests showed leukocytosis, lactic acidosis and mild transaminitis. Urinalysis indicated urinary tract infection.

The patient soon developed septic shock with respiratory failure requiring intubation and mechanical ventilation and the infection progressed rapidly with worsening lactic acidosis, disseminated intravascular coagulation (DIC), renal failure and significant liver dysfunction. The patient also developed PF of bilateral upper and lower extremities along with gangrene of the tips of her fingers and toes. Blood cultures grew pan-sensitive *Pasteurella multocida*. We were also informed by the patient's nursing home that she had exposure to cats and had open wounds due to recent falls prior to admission. After a lengthy family meeting she was transitioned to comfort care and passed in few hours.

DISCUSSION: Acute infectious PF develops from an acute systemic inflammatory reaction to bacterial endotoxin. The dermatologic lesions begin with vascular leakage of red blood cells due to anticoagulant imbalances and progresses to hemorrhagic lesions with tissue necrosis. Patients often require amputation of gangrenous extremities and suffer significant morbidity. In our case PF developed 36 hours after admission. Several infectious causes for PF were reported including *Streptococcus pneumoniae*, *Neisseria meningitidis*, *Enterobacter cloacae*, *Staphylococcus aureus*, *Haemophilus influenzae* and *Plasmodium falciparum* malaria. But to the best of our knowledge there is only one case report of PF from *P. multocida* infection.

Cats are the most common reservoirs. Liver involvement is associated with refractory sepsis. *P. multocida* is typically susceptible to penicillin, however, penicillin resistant strains are reported mandating use of cephalosporin or fluoroquinolones. A definitive diagnosis is with blood cultures.

CONCLUSION: Overall, the prognosis for acute infectious PF is often poor. PF associated with *P. multocida* infections is very rare and this is only the second reported case in literature. With early identification of *P. multocida* infection it is possible to start appropriate early antibiotic therapy and prevent development of DIC.

WHY PATIENTS MISS SCHEDULED APPOINTMENTS IN THE ORTHOPEDIC CLINIC

Matthew Jaykel, MD; Karen Bovid, MD; Michael Fonger, PA-C; Satya Dalavayi

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

BACKGROUND: Nonattendance for scheduled medical appointments is an issue that permeates all medical subspecialties. Timely and consistent follow up is required to adequately treat a patient's medical condition. Published reports have documented factors that influence non-attendance in orthopedic trauma clinics. These reports however did not look at socioeconomic factors or patient specific barriers which may also play a significant role in nonattendance for clinic appointments.

PURPOSE: The purpose of our quality improvement project is to identify characteristics of patients who miss their scheduled orthopedic surgery clinic appointments in the Kalamazoo area. We then want to identify any barriers that keep patients from keeping their appointments. With this information identified, barriers can be addressed to help patients better attend their scheduled appointments.

MATERIALS & METHODS: The electronic health record for the WMU Homer Stryker M.D. School of Medicine Clinics was searched for the number of scheduled orthopedic surgery appointments no-show appointments, cancellations, bumped and re-scheduled appointments from July 2015 - January 2016. In statistical analyses, visits that resulted in a no-show, cancellation, or bump were considered "absent" while visits that resulted in attendance were considered "attended". Absent and attended groups were then compared based on the following independent factors: visit type (new or return visit), and patient characteristics including age, gender, race, insurance status, and distance lived from clinic. We also conducted a telephone survey asking what factors influenced patients' ability to attend appointments.

RESULTS: From July 2015 - January 2016 there were 2,343 appointments scheduled, of which 1,575 were attended. The remaining 768 visits resulted in an absence. There was a statistically significant difference between visits that resulted in absence and visits that resulted in attendance with respect to the patient's distance from clinic ($p=0.0003$), patient's insurance type ($p<0.0001$), season of the year ($p=0.0035$), and new vs. return visit type ($p<0.0001$). Age ($p=0.8988$), race ($p=0.0790$), and sex ($p=0.1642$) of patient were not found to be significantly associated with attendance. Response rate for the telephone survey was 28/154 (18%). Time off work/school, weather, transportation, lack of reminder, and schedule conflicts were cited as reasons for missed appointments.

CONCLUSION: This study found that distance from clinic, insurance type, season of the year, and visit type were statistically significant factors influencing attendance of scheduled orthopedic surgery clinic appointments. Based on these findings further efforts will be directed toward addressing barriers to improve attendance at scheduled appointments and support patient care.

IDENTIFIABLE MARKERS FOR LOW-INCOME CHILDREN, 0-5, WHO FALL THROUGH MEDICAL OR COMMUNITY SERVICE GAPS

Catherine L. Kothari, PhD; Cheryl A. Dickson, MD; Colleen MacCallum; Amy Curtis, PhD; Craig Beam, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics; Western Michigan University, Interdisciplinary Health Sciences; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics

INTRODUCTION: The social, demographic and environmental risk factors that predispose infants and children to developmental delay and disorders are often the same ones that allow them to escape early detection and service. There are well-developed medical, psychosocial and educational resources for families and children in Kalamazoo County, but no integrated system for coordinating these resources and anecdotal evidence that the highest need families are falling through the cracks.

PURPOSE: The current study took place as part of a larger project to tighten linkages between medical and community services for low-income children in Kalamazoo County. The goal of this analysis was to assess the volume and characteristics of children falling through the medical and community service gaps.

MATERIALS & METHODS: This was a cross-sectional study, integrating administrative record data collected from sixteen programs within eight local healthcare and community service providers in Kalamazoo County for the period of 1-1-2013 through 12-31-2014. The sample population was low income children (Medicaid insurance and/or <250% of federal poverty-level) ages 0-5. Data captured demographics (race, gender, age), emergency department (ED) visit frequency and reason, developmental screening and risk, community program enrollment and primary care provider type (clinic or private). Bivariable analysis was conducted using Pearson Chi Square, and multivariable analysis was completed using logistic regression. Statistical significance was two-sided and at the 95% confidence level.

RESULTS: Of the 10,570 study population, 8.1% (N=853) fell through the medical system gap (e.g., had no identified primary care provider), and 6.7% (N=704) fell through the community service gap (e.g., at risk for developmental delay but not enrolled in supportive community programming). There was no overlap between these two gap groups, and they had very different risk profiles. Predictors of medical gap included: being older, being White, not having excessive ED visits and not having a developmental delay risk (moderate model fit, ROC AUC =0.6667). Predictors of community service gap included: being younger, being Black, and having excessive ED visits (moderate model fit, ROC AUC =0.6454).

CONCLUSION: A substantial number of low-income infants, toddlers and preschoolers (n= 1,557, 14.7%) are unserved by either the medical or community service safety net. No-one was identified who fell through cracks in both systems, so outreach efforts to reach each group have a place to start from. Prevention efforts can use the predictive profiles above for targeting at-risk children who are getting missed within each system.

CASE MANAGEMENT PROGRAM SHOWS MARGINAL CLINICAL SIGNIFICANCE IN OUTCOMES FOR PATIENTS WITH TYPE-2 DIABETES MELLITUS AT FAMILY HEALTH CENTER

Heather I-Hsuan Chen; Patricia J. Choi; Nicole C. Foley; Alan J. Hifko; Sheila Sullivan; Alyssa Woodwyk; Catherine L. Kothari, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Students Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics

INTRODUCTION: Diabetes mellitus is a major health concern in the US affecting 29.1 million Americans and costing \$245 billion in direct medical costs and decreased productivity. Type 2 diabetics are at increased risk of developing comorbidities including hypertension, dyslipidemia, cardiovascular disease, nephropathy, retinopathy, and amputations.

The American Diabetes Association released updated guidelines for glycemic management in type 2 diabetics, emphasizing the importance of individualizing treatment centered on patient preferences, needs, and values. Based upon these guidelines, the Family Health Center (FHC) implemented a pilot case management (CM) program for type 2 diabetics with the primary endpoints of reducing glycated hemoglobin (HbA1C), systolic blood pressure (SBP), and diastolic blood pressure (DBP) values.

OBJECTIVE: The objective of this study was to evaluate the efficacy of this nurse-delivered CM program in improving the health outcomes of type 2 diabetics. Patients with poor diabetes management ($\text{HbA1C} > 9$) were enrolled in the CM program to receive individualized delivery of care.

MATERIALS & METHODS: A retrospective records review was conducted to assess if participants demonstrated improved health outcomes at the conclusion of the study period. Data was abstracted from FHC's electronic medical records. The records of 240 patients were individually reviewed to obtain the following parameters: age, gender, language, race, ethnicity, and zip code. The following laboratory values were recorded from every FHC visit during the study period: HbA1C, SBP, and DBP. The study period was individually defined per patient starting three months prior to CM enrollment and ending one year after CM enrollment.

RESULTS: The average change between the first and last SBP (-3.1 , $p < 0.05$) and DBP (-2.9 , $p < 0.005$) showed significant decrease. The average change between the first and last HbA1C measurements significantly decreased by -1.5 ($p < 0.005$). The number of contacts or the duration of enrollment had no significance ($p > 0.05$) on SBP, DBP, and HbA1C values. Demographic variables had no significant impact on health outcomes.

CONCLUSION: Participants in the CM program showed an improvement of 1.5% in HbA1C and an improvement of 3 mmHg in both SBP and DBP. The number of encounters with participants did not affect health outcomes. Demographic variables did not affect health outcomes implying that CM was delivered equally. To further increase the health benefits obtained by participants, improvements could be made to the CM program to strengthen encounter tracking and to increase the significance of each encounter.

MORTALITY IN ADULT AND PEDIATRIC CYSTIC FIBROSIS (CF) PATIENTS REQUIRING ENDOTRACHEAL INTUBATION: A NATIONWIDE COHORT STUDY

Matthew T. Siuba, DO; Amy Attaway, MD; Susan Bannon, MD; Frank Jacono, MD; Steven Strausbaugh, MD; Elliott Dasenbrook, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; Case Western Reserve/University Hospitals, Department of Pulmonary/Critical Care; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Case Western Reserve/University Hospitals, Department of Pulmonary, Critical Care and Sleep Medicine; Case Western Reserve/University Hospitals, Department of Pulmonary and Critical Care; Cleveland Clinic, Department of Pulmonary Medicine

INTRODUCTION: Traditionally there has been a restrictive approach to endotracheal intubation (ETI) of CF patients given lack of benefit. Debate still remains about the utility of intubation, as outcomes in this population have historically been poor. Previous studies, often single-center with small numbers of patients, have reported mortality rates from 45-75%. However, with the advent of more advanced ICU and CF treatment modalities, ICU survival in CF has increased overall. This study was conducted to assess the mortality rate of patients with CF in a large nationwide database.

MATERIALS & METHODS: We performed a cohort study using Healthcare Cost and Utilization Project's Nationwide Inpatient Sample (NIS) database and Kid's Inpatient Database (KID) between the years 2002 to 2012. Databases were queried for patients with the diagnostic code of "cystic fibrosis," and procedure code "endotracheal intubation and mechanical ventilation." Two cohorts were included, ages 18 and above, and ages 4-17. Neonatal, maternal, and lung transplant codes were excluded. Hospital mortality was calculated and trends were analyzed. The primary diagnostic code, if different from "cystic fibrosis," was queried as well.

RESULTS: Adult Cohort: 932 admissions meeting criteria were identified. Overall in-hospital mortality rate was 44.2% (408/924; 8 missing data). The mortality rate was 60.4% (32/53) in 2002 as compared with 46.0% (46/100) in 2012 ($P=0.0957$). The three most common primary diagnostic codes were "Cystic fibrosis," "Respiratory failure; insufficiency; arrest," and "Complication of device; implant or graft."

PEDIATRIC COHORT: 105 admissions meeting criteria were identified. Hospital mortality rate over the study period was 42.3% (44/104; 1 missing data). Sample size was small enough to preclude comparison of 2002 mortality with that of 2012. The three most common primary diagnostic codes were "Cystic fibrosis," "Pneumonia (except that caused by TB or STDs)" and "Complication of device; implant or graft."

CONCLUSION: To date, this is the largest study evaluating mortality rates in this population. Over 50% of CF patients who underwent ETI over the study period survived to hospital discharge. These findings may help intensivists weigh the risks and benefits of endotracheal intubation in this patient population.

A QUALITY IMPROVEMENT PROJECT TO ASSESS AND TREAT CYSTIC FIBROSIS (CF) PATIENTS WITH INADEQUATE VITAMIN D LEVELS IN KALAMAZOO, MICHIGAN

M. Myrtha Gregoire-Bottex, MD; Sally Bonnema; Polly Hollenbeck; Nichole Sackett; Niecia Anjorin

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Bronson Outpatient Nutrition Services; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Social Work

BACKGROUND: Vitamin D deficiency has a prevalence of up to 90% in patients with cystic fibrosis (CF) due to malabsorption, decreased UV light exposure, and poor intake. Deficiency causes poor bone health, reduced lung function and increased pulmonary exacerbations. In 2012, the CF foundation adopted new guidelines following evidence that prior recommendations were insufficient at maintaining normal serum 25-hydroxyvitamin D (25(OH)D) levels.

OBJECTIVE: At the initiation of this project, only 7.7% of CF patients treated at our center had a normal 25(OH)D when measured in the first quarter (Q1) of 2014 (13% Q1/Q2 2014). This was significantly reduced from Q1 2013. Therefore in June 2014, we began a process improvement to enhance monitoring, assessment, treatment of vitamin D deficiency or insufficiency in patients with CF attending the CF Clinic. The goal of our project was to have 75% of CF patients consistently maintain a normal 25(OH)D.

MATERIALS & METHODS: Our quality improvement intervention included: guidelines and literature review by the CF team, sessions on motivational interview, focus on adherence and proper medication administration, scheduling visits ahead of time, prepackaged medication (MedPack), 25(OH)D results and dose adjustment mailed to patients/parents. Data regarding 25(OH)D levels was abstracted from patient records between Q1 of 2013 to Q4 of 2015. SAS 9.4 was used for all analyses and graphic generation.

RESULTS: The Quality Improvement Intervention ran for 18 months and resulted in the proportion of patients with adequate 25(OH)D levels increasing from 7.7% (n=2) in Q1 of 2014(13% Q1/Q2 2014) to 60.7% (n=15) in Q1 of 2015 (64% Q1/Q2 2015). Although we did not reach our goal of 75% in Q1 of 2015, of all patients tested in Q4 of 2015 (n=8) 100.0% had a normal level. Children with deficient levels of 25(OH)D were only observed in Q4 2013 and Q1/Q2 2014. Of the patients with a normal level in 2013, n=16 only n=2 (12.5%) [95% CI: 0.0%, 28.7%] of these 16 children had maintained normal 25(OH)D levels at their Q1 2014 testing, confirming that 25(OH)D replenishment is transient.

CONCLUSION: Ongoing monitoring, data collection, teaching and process evaluation are important for continued improvement due to the many factors affecting 25(OH)D levels in patient with CF. The most important factors for our improvement was reduced staff turnover, follow up assigned to CF dietician, stricter monitoring, using higher Vitamin D3 doses and addressing adherence with MedPack and reminders.

REFERENCE:

Tangpricha et al. J Clin Endocrinol Metab, April 2012, 97(4):1082-1093

PARTIAL TEARS OF THE DISTAL BICEPS BRACHII TENDON: A SYSTEMATIC REVIEW OF SURGICAL OUTCOMES

Michael A. Behun; Jeffrey King, MD; Andrew G. Geeslin, MD; Emma C. O'Hagan

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; Bronson Hand & Elbow Surgery Specialists; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery;
WMU Homer Stryker M.D. School of Medicine, Medical Library

INTRODUCTION: Most literature regarding the distal biceps brachii tendon has focused on the benefits of surgical treatment of complete ruptures, however, the optimal treatment of partial tears is not well defined.

PURPOSE: Systematically review the literature regarding treatment outcomes of partial tears of the distal biceps brachii tendon.

MATERIALS & METHODS: A systematic review of the literature regarding treatment of partial tears of the distal biceps tendon was conducted using PubMed, Embase, and Cochrane. Inclusion criteria consisted of studies in the English language on the treatment of partial distal biceps tendon tears. Exclusion criteria consisted of (1) studies without outcome data, (2) studies that did not specify the degree of distal biceps tendon tear (i.e. complete rupture vs partial tear), and (3) studies without partial tear subgroup data. Two investigators independently reviewed the abstracts from all identified articles.

RESULTS: Only 5 patients that underwent successful nonsurgical treatment were identified; all were treated with different algorithms, and due to the small number, outcomes for nonsurgical treatment are not included in this review. Therefore, nineteen studies involving 86 partial tears that underwent surgical treatment are reported; at least 65 of these received a trial of nonsurgical treatment before surgery. Surgery resulted in 94% satisfactory clinical outcomes. Of the 16 studies (n = 83) that specified the presence or absence of surgical complications, lateral antebrachial cutaneous nerve paresthesia (17%), posterior interosseous nerve palsy (6%), elbow discomfort (2%), surgical revision (2%), and asymptomatic heterotopic ossification (1%) were reported.

DISCUSSION: The majority of partial tear outcomes reported in the literature were satisfactory regardless of the surgical technique used. Specifically, surgical repair yielded 81 (94%) satisfactory outcomes and 5 (6%) unsatisfactory outcomes. Unsatisfactory results were due to weak supination (2%), surgical revision (2%), and persistent LABCN paresthesia (1%) at final follow-up. With at least 76% of surgical patients receiving an unsuccessful nonsurgical trial prior to surgery, it might appear that conservative management is grossly ineffective. However, many of these studies were specifically reporting on surgical techniques, so unsuccessful conservative management was essentially a prerequisite to study inclusion. Therefore, the success rate of nonsurgical treatment cannot be discerned using these data.

CONCLUSION: Surgical treatment including tendon tear completion and anatomic repair to the radial tuberosity can yield satisfactory results and provides predictable outcomes. Further research is necessary to better define the optimal regimen and duration of nonsurgical treatment, as well as the indications for surgery.

OUTCOME OF GLENOID LABRAL REPAIRS IN COMPETITIVE SWIMMERS

Keith Kenter, MD; Douglas Hollern, MD; John Divine, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; University of Cincinnati
Medical School, Department of Orthopaedic Surgery and Sports Medicine; University of Cincinnati,
Department of Orthopaedic Surgery and Sports Medicine

INTRODUCTION: Glenoid labral tears are not an uncommon cause of pain and change in biomechanics in overhead athletes. Superior Labrum Anterior Posterior (SLAP) tears have classically been described and studied in baseball players. There is little literature regarding labral tear pathology in competitive swimmers.

PURPOSE: The purpose of this study is to describe the personality of glenoid labral tears and the outcome of surgical repair in competitive swimmers with shoulder pain.

MATERIALS & METHODS: We retrospectively reviewed 75 isolated SLAP glenoid labral repairs performed from 2009-2011 and identified 16 shoulders in 13 competitive swimmers. All shoulders failed at least 3 months of nonoperative management that included rest, swimming modification, physiotherapy, and corticosteroid injections. All swimmers were unable to participate in their swimming event preoperatively. Glenoid labral repairs were performed arthroscopically with standard suture anchor techniques and followed for a minimum of 36 months. Preoperative swimming personal best times and events were compared to these postoperative measurements. Subjective shoulder questionnaires (SANE, WOSI, DASH, ASES) were measured and compared to asymptomatic control shoulders.

RESULTS: All swimmers competed at the high school, competitive club, or collegiate level. All but one swimmer returned to the same or higher preoperative swimming level of competition and 85% were satisfied with their results. All subjective questionnaire score showed improvement and no significant difference from control asymptomatic group of shoulders. 77% (10 of 13) swimmers demonstrated improved time when compared to personal best time in the preoperative period. Postoperative personal best times were statistically significant than preoperative personal best times in 100 meter events only ($p=0.04$). Labral tear location was anterosuperior (12:30-3:30 o'clock) on the glenoid and did not involve the biceps anchor.

CONCLUSION: Repair of the glenoid labrum can lead to improved pain and function in competitive swimmers. Labral tear personality is located at the anterosuperior quadrant of the glenoid and does not involve the biceps anchor. Repair of the torn glenoid labrum in this region may secure the anterior glenohumeral ligament anchors. This stabilization may help in alleviating microinstability of the glenohumeral joint leading to better swimming biomechanics and less shoulder pain.

THE ANKLE AND SUBTALAR JOINT FUNCTIONAL UNIT, RATIONALE FOR THE DEVELOPMENT OF A BALL AND SOCKET ANKLE JOINT; A COMPUTATIONAL STUDY.

Tyler Snoap, MD; James R. Jastifer, MD; Peter A. Gustafson, PhD; Aaron Labomascus

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopaedics;
Western Michigan University, Department of Mechanical and Aeronautical Engineering;
Western Michigan University, Mechanical Engineering

INTRODUCTION: The ball and socket ankle joint, first described by Politzer in 1931, is a morphologically abnormal joint characterized by rounding of the articular surface of the talus. In the 1980's, several authors theorized the cause of this deformity, but only associations were made with little concrete evidence pointing to a single explanation. Since then, to our knowledge, nothing has been published on the pathophysiology of this deformity.

PURPOSE: The purpose of this study is to reexamine the mechanism of the ball and socket ankle deformity, utilizing current imaging and computational techniques.

MATERIALS & METHODS: We will present current progress of this ongoing work at research day. Herein, we describe our past activities and plan. First, we have performed a thorough review of the reported cases of ball and socket ankle as well as the published functional representations of the ankle and subtalar joint. We have identified the axis and range of motion of the ankle and subtalar joints. Our next step is to use computation tools to overlap them in three-dimensional space and create a "virtual map" of the combined 3D kinematics. We have already performed a three-dimensional digital reconstruction of a ball and socket ankle joint of an adult patient utilizing a CT scan of the foot and ankle. We will analyze this pathologic joint to determine its functional kinematics. Comparisons will be made between the ideal and pathologic ankle kinematic maps.

RESULTS: There is general consensus on the axes of motion and range of motion of the ankle and subtalar joints. We hypothesize that the ball and socket ankle will produce functionally similar kinematics to a healthy combination of ankle and subtalar joints. If true, this finding will add substantively to our understanding of the adaptivity of the foot and ankle complex to adverse conditions.

CONCLUSION: Our past unreported progress presents as a literature survey and theoretical description of the combined ankle and subtalar joint biomechanics. The computationally derived kinematic maps of healthy and pathologic joints will be completed prior to research day. The clinical relevance of this study is that young patients with a functional absence of the subtalar joint may be a risk of developing a ball and socket ankle deformity.

CURRENT CONCEPTS REVIEW OF BIOLOGIC TREATMENTS FOR SPORTS INJURIES: BASIC SCIENCE, CLINICAL APPLICATIONS, AND FDA REGULATION

Andrew G. Geeslin, MD; Robert F. LaPrade, MD, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery;
Steadman Philippon Research Institute, Sports Medicine

INTRODUCTION: Biologic therapies including platelet-rich plasma (PRP), mesenchymal stem cells (MSCs), growth factors, and scaffolds have recently received increased attention in the basic science and clinical literature. The aim of these therapies is to optimize clinical outcomes by improving musculoskeletal tissue healing, including tendons, ligaments, cartilage, and meniscus. However, despite considerable research effort, biologic approaches have not yet achieved a sufficient evidence base to warrant widespread clinical application.

PURPOSE: The purpose of this review is to update the medical community on this expanding field by summarizing the foundational in vitro, pre-clinical, and clinical studies. Established and emerging indications for biologics are reviewed. The existing regulatory environment governing the use of biologics is summarized.

MATERIALS & METHODS: A comprehensive search of PubMed was performed to identify primary sources for key studies on biologic therapies. Food and Drug Administration (FDA) regulations and draft guidance were reviewed at fda.gov. In vitro and pre-clinical studies were included for demonstration of therapeutic principles for biologic therapies. Clinical studies including high quality observational and randomized controlled trials were included.

RESULTS: PRP remains the most commonly used biologic augmentation for sports injury healing. MSCs have shown promise for improving healing in rotator cuff tears. However, the optimal MSC source as well as regulatory concerns regarding ex vivo cell culture expansion have limited integration into routine clinical practice. There are no commercially available isolated growth factors for clinical use in the United States. Scaffolds are being used at increasing rates with emergence of supporting clinical studies. Human Cells, Tissues, and Cellular and Tissue-Based Products (HCT/Ps) are divided into low risk and high risk products, primarily depending on the level of manipulation of the cells. Blood-based products, including PRP and bone marrow, are not currently regulated as HCT/P by the FDA. Implanted scaffolds are regulated under the existing FDA framework for medical devices.

CONCLUSION: Biologic therapies have great potential for treating musculoskeletal injuries, with several key basic science and clinical studies supporting their use. Many such therapies represent a new frontier in the field of sports medicine and orthopaedics and face an uncertain regulatory environment. Further research must be disease-driven based on the underlying pathologic processes rather than therapy-driven. A pyramid approach is recommended for further research in order to improve translation of in vitro and pre-clinical findings into clinical applications. Additionally, a robust registry system is recommended in order to closely track clinical outcomes and monitor for safety.

PROSPECTIVE STUDY OF ARTHROSCOPIC BICEPS TENDON TENODESIS WITH ASSOCIATED ROTATOR CUFF REPAIR: PRELIMINARY RESULTS

Andrew G. Geeslin, MD; Tyler Snoap, MD; Christopher W. Uggen, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery;
WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics

INTRODUCTION: Lesions of the long head of the biceps (LHB) tendon are common and frequently associated with rotator cuff pathology. Debate continues regarding tenotomy versus tenodesis, the two most common treatments for symptomatic LHB tendon lesions. Tenotomy has been associated with cosmetic deformity and cramping biceps pain whereas tenodesis has been associated with bicipital groove pain and possible implant related complications. The optimal technique for tenodesis remains controversial in the literature, including fixation method, location, and open versus arthroscopic.

PURPOSE: The purpose of this study was to prospectively evaluate a technique for arthroscopic tenodesis of the proximal LHB tendon combined with arthroscopic supraspinatus repair.

STUDY DESIGN: Prospective case series, Level IV

MATERIALS & METHODS: Patients with clinical and imaging findings consistent with a supraspinatus tendon tear and biceps tendon pathology were recruited for study enrollment in this IRB approved investigation. Consented subjects were ultimately included if they were found to have a repairable supraspinatus tendon tear with concomitant biceps tendon pathology at the time of arthroscopy. An arthroscopic biceps tenodesis was performed shuttling a single suture from a double-loaded anteriorly based anchor through the long head of the biceps and supraspinatus tendon. The supraspinatus tear was repaired with a simple suture configuration or horizontal mattress configuration and suture bridge construct if deemed necessary. Evaluation was performed pre-operatively at the time of study enrollment and post-operatively at five months and one-year follow-up. Subjective assessment tools included VAS, ASES score, and a Supplemental Proximal Biceps Questionnaire. Objective evaluation was performed using the ASES Shoulder Exam Physician Assessment Form and a Supplemental Biceps Examination.

RESULTS: Preliminary data with at least five months follow-up was available for 13 subjects. Prospective data collection is ongoing for the remaining subjects. The average age at the time of surgery was 64 years (range 53 to 74) and there were 10 males. Average follow-up was 11.3 months (range 5.4 to 15.8). ASES scores improved from pre-operative (average 49.9, range 20.0 to 81.7) to post-operative (average 84.5, range 43.3 to 100). Pre-operatively, all patients had either biceps groove pain, positive Speed's test, and/or positive Yergason's test; all resolved post-operatively.

CONCLUSION: Anchor tenodesis of the biceps tendon with associated rotator cuff repair was found to be safe and effective in this prospective series. This technique does not require an additional anchor or surgical approach and can be reliably and efficiently performed via a minimally invasive arthroscopic technique.

INNOVATIVE WMED-COMMUNITY PARTNERSHIP REVITALIZES KALAMAZOO FETAL INFANT MORTALITY REVIEW

Deb Lenz; Catherine L. Kothari, PhD; Yamini Kuchipudi, MD; Cheryl A. Dickson, MD; Jen Brenton;
Grace Lubwama, PhD

Kalamazoo County Health and Community Services, Maternal-Infant Services; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Health Equity and Community Affairs; YWCA Kalamazoo, Special Projects; YWCA Kalamazoo, CEO

INTRODUCTION: FIMR (Fetal Infant Mortality Review) is an evidence based community-level quality improvement process that brings together a multi-disciplinary team to review infant deaths, identify system gaps and produce recommendations. FIMR's face several challenges, including the collection of meaningful case information, establishing confidentiality, bringing relevant agencies to the table, compliance with rigorous national standards, and very limited funding. Together, these challenges brought Kalamazoo FIMR to a standstill in 2013, just as Black infant mortality was on the rise.

PURPOSE: The current study examines the effects of an innovative partnership between WMed and Kalamazoo County Health & Community Services (KCHCS) to reinstate Kalamazoo County FIMR.

MATERIALS & METHODS: After six months of planning by FIMR leads Cathy Kothari (WMed), Deb Lenz (KCHCS) and Grace Lubwama (YWCA) and consultations with state and national FIMR, a formal agreement was struck, leads were trained and a restructured Kalamazoo FIMR was piloted in September 2015. The restructured FIMR has two arms, a case review team (CRT) of front-line staff for in-depth analysis of system gaps that may have contributed to an infant's death, and a community action team (CAT) of agency decision-makers and community leaders who are charged with prioritizing CRT recommendations and putting them to action.

RESULTS: As of February 2016 five monthly CRT meetings have been hosted at WMed and six infant deaths reviewed. Meetings have been facilitated by the FIMR leads, pediatric resident Yamini Kuchipudi, MD and Cheryl A. Dickson, MD. Each meeting has drawn between 24-29 agency representatives (from public health, healthcare, mental health, early-childhood-intervention, social service, criminal justice and child-protection) as well as community-based advocates and faith community representatives. Data sharing procedures have been established with sixteen of these agencies, and a data collection team led by Cathy Kothari and including Yamini Kuchipudi and a team of five medical students. The first set of recommendations has been presented to FIMR-CAT and funding proposals submitted to add a community health worker for family interviews and grief support follow-up.

CONCLUSION: A WMed-KCHCH partnership has successfully reinstated a FIMR with strong interdisciplinary and community engagement, and fulfilling its mandate for producing actionable recommendations aimed at tightening intra and inter-agency procedures.

THE INTERPLAY OF RACE, SOCIOECONOMIC STATUS AND NEIGHBORHOOD UPON BIRTH OUTCOMES

Catherine L. Kothari, PhD; Rajib Paul, PhD; Ben Dormitorio; Fernando Ospina; Arthur James, MD; Deb Lenz; Kathleen M. Baker, PhD; Amy Curtis, PhD; James Wiley, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics; Western Michigan University, Department of Statistics; Western Michigan University, Department of Statistics; ERACCE; ERACCE; The Ohio State University Wexner Medical Center, Department of Obstetrics; Kalamazoo County Health and Community Services, Maternal-Infant Health; Western Michigan University, Department of Geography; Western Michigan University, Department of Interdisciplinary Health Sciences; University of Southern California-San Francisco, Health Policy Institute

INTRODUCTION: Racial health disparities, most evident in infant mortality rates (IMR), have grown even as overall population health indicators have improved. Systematic exclusion from social and economic opportunities are the leading contributors, resulting in chronic stress, persistent poverty and physiological weathering. Neighborhoods are thought to serve as potential mediators. Kalamazoo County, although demographically similar, has double the national racial disparity in infant mortality.

PURPOSE: The goals of the current investigation were to examine the interrelationship of race and socioeconomic status upon infant birth weight at the individual and the census tract levels within a mid-sized, mixed urban-rural county in the Midwest; one marked by large racial disparities and high Black infant mortality rates.

MATERIALS & METHODS: This was a hierarchical secondary analysis of individual birth records, nested with census tracts: Y2010 birth certificate records (N=2,861) were geo-coded, then linked to the 57 Kalamazoo County census tracts through an ArcGIS10.0 spatial join. Predictors at both levels were dichotomized race and socioeconomic status. Birthweight, the outcome measure, was modeled using Bayesian regression with spatial random census tract effect.

RESULTS: As a group, Black women were more likely to deliver low birth weight infants (10.9% Black vs. 5.6% White, $\chi^2(1)=20.005, p<.001$). When stratified by maternal poverty, poor White women had better outcomes than higher-income Black women (7.7% poor White vs 11.3% higher-income Black, $\chi^2(1)=20.067, p<.001$). Hierarchical modelling demonstrated that race and SES were significant independent predictors: Low income was associated with 1.68 (CI 1.26, 2.14) times higher risk of LBW, and being Black race was associated with 1.61 (CI 1.15, 2.13) times higher risk of LBW.

When residence was taken into account, the importance of neighborhood upon Black birth outcomes became clear: Higher income Black women living in Black neighborhoods had the same birth outcomes as higher income White women: 4.0% LBW and 4.1% LBW, respectively. Whereas, higher income Black women living in White neighborhoods fared the worst, with 14.5% LBW.

CONCLUSION: This study adds to the literature by documenting the complex interaction of race, SES and neighborhood upon birth outcomes within a community that typifies large geographic swathes of the U.S. and that displays wide racial health disparities: that maternal Black race and low socioeconomic status are each associated with increased risk of low birthweight, and that neighborhood racial congruity may mitigate this risk and racial incongruity may exacerbate it.

MAPPING CORE TRANSMISSION AREAS OF SINGLE AND REPEATING CHLAMYDIA AND GONORRHEA CASES FOR PLANNING STI INTERVENTIONS IN AN URBAN-RURAL COUNTY (2012 - 2014).

Claudio Owusu, Kathleen M. Baker, PhD; Yasaman Back; Rajib Paul, PhD; Elizabeth MacQuillan;
Amy Curtis, PhD

Western Michigan University, Department of Geography; Western Michigan University, Department of Geography;
Kalamazoo County Health and Community Department, Epidemiology; Western Michigan University, Department
of Statistics; Western Michigan University, Department of Interdisciplinary Health Sciences;
Western Michigan University, Department of Interdisciplinary Health Sciences

In Kalamazoo County, an urban-rural county in southwest Michigan, chlamydia rates have been increasing annually since before 2006 and gonorrhea rates doubled from 2013 to 2014; rates for both are higher than the state average. One hypothesis of this study is that repeaters may lead to increasing sexually transmitted infection (STI) risk and may constitute the core group of transmission of STIs. The spatial patterns in repeaters may lead to better understanding of the critical areas of STI transmission especially during non-epidemic periods. This analysis aims to assess the spatial concentration of single and repeated occurrences of chlamydia, gonorrhea and individuals with both STIs from 2012 to 2014 to aid in planning interventions.

METHODOLOGY: Positive STI test results from Kalamazoo County (2012-2014) was obtained from the Michigan Disease Surveillance System. Residential street addresses associated with the individual records were geocoded. A unique identifier was generated for each STI case using the first name, surname and date of birth. Individuals for whom multiple records existed for gonorrhea or chlamydia more than 14 days apart were considered repeaters. Individuals with records for both STIs were categorized as both; this group represents individuals that tested positive for both STIs, either once or multiple times from 2012 to 2014. Kernel density estimation was used to generate density surfaces for chlamydia and gonorrhea. Consideration was given to all single cases, repeaters and the group with both STIs.

RESULTS: From 2012 to 2014, repeaters represented 32.3% (N=5746) of all chlamydia cases and 23.3% of gonorrhea cases (N=1205). Those with both STIs represented 9.8% of the total 5733 unique individuals in the sample. Three core areas of high spatial concentration of repeaters and those with both STIs were identified in the city of Kalamazoo. This study also found one core area of repeaters and individuals with both STIs in the city of Portage. Interestingly, the study found another core area with unusual high density values for individuals with both STIs in Oshtemo Township.

CONCLUSION: Overlapping core areas of high spatial concentration of chlamydia and gonorrhea cases were identified more in urban areas than in small municipalities. There are two emerging core areas with high spatial concentration of repeaters and individuals with both STIs: in the city of Portage and in Oshtemo Township. Considering that 53.7% of unique individuals with gonorrhea had once or multiple episodes of chlamydia, interventions should be planned for targeting both STIs.

A NASAL INTERMITTENT POSITIVE PRESSURE VENTILATION DEVICE FOR TREATMENT OF NEONATAL RESPIRATORY DISTRESS IN LOW RESOURCES SETTINGS

Nickolas D. Habben; Peter A. Gustafson, PhD; Stephen John, Joseph D. Barnett, Hoa T. Le

Western Michigan University, Department of Mechanical and Aerospace Engineering; Western Michigan University, Department of Mechanical and Aerospace Engineering; Western Michigan University, Department of Mechanical and Aerospace Engineering; Western Michigan University, Department of Biomedical Sciences; Western Michigan University, Department of Mechanical and Aerospace Engineering

INTRODUCTION: Neonatal respiratory problems are among the leading causes of death in children under the age of five. Ninety eight percent of neonatal mortality occurs in resource-limited countries. In the United States, moderate distress is treated with nasal continuous positive airway pressure (CPAP) while more severe distress is treated with mechanical ventilation.

Bubble CPAP is an effective treatment for infants with moderate respiratory distress in resource-limited settings where neonatal ventilators and reliable electrical power may not be available. It is simple to use, safe, and inexpensive. However, there is no treatment option available for those infants in more severe respiratory distress.

PURPOSE: To develop a device for treating neonates with moderate to severe respiratory distress in low resources settings.

MATERIALS & METHODS: We have modified a bubble CPAP system to provide nasal intermittent positive pressure ventilation (NIPPV). This new system does not require a traditional mechanical ventilator. Instead, an adapter enabling dual pressure delivery has been designed as an add-on to existing bubble CPAP systems. The peak inspiratory pressure and positive end expiratory pressure, and the rate and duty cycle of oscillation, are all selectable by the physician.

RESULTS: Bench testing of the pressure adapter has demonstrated consistent alternating pressure waveforms with a lower level pressure of 6 cm H₂O and upper levels ranging from 8.5-20 cm H₂O. The device has cycled continuously between these pressures for 1 month without interruption. The upper pressure duration was ~.7 seconds and the lower pressure duration was ~1.3 sec. These parameters are consistent with current biphasic positive airway pressures (9/6 cm H₂O) and NIPPV treatments (15/6 cm H₂O) traditionally administered with mechanical ventilation. The device has only one moving part and is powered by the wasted energy of bubble CPAP. The device can be manufactured at a small fraction of the cost of existing mechanical ventilators.

CONCLUSION: The described device may provide a treatment option for neonates with moderate to severe respiratory distress in resource limited settings. It is an easy to use add-on to existing bubble CPAP infrastructure and does not require complex maintenance which is unavailable in these settings. If proven safe and effective, the device may impact millions of lives annually.

NARRATIVE ANALYSIS OF FETAL INFANT MORTALITY REVIEW (FIMR) SUMMARIES

Yamini Kuchipudi, MD; Catherine L. Kothari, PhD; Amy Damashek, PhD; Camryn Romph, Terra Bautista

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics; Western Michigan University, Department of Psychology; Western Michigan School of Medicine, Department of Interdisciplinary Health Services; Kalamazoo County Health & Community Services, Healthy Baby Healthy Start

INTRODUCTION: Infant mortality in the United States is a significant public health problem. Approximately 23,440 infants died in the year 2013 in the U.S., at a rate of 6 deaths per 1,000 live births.

National disparities in infant mortality between black and white infants is slightly more than double, of which levels of disparity vary by state, and even county in the U.S. The disparity in the state of Michigan for 2013 was 2.3, similar to the national level. Unfortunately, however, the county of Kalamazoo has experienced a significantly larger disparity in mortality rates between White and Black infants for the past several years. Data for the years 2008-2010 indicate that black infants died 3.4 times more frequently than white infants. Moreover, the overall infant mortality rate (8.2) is higher in Kalamazoo County than it is state-wide. Determining the cause of this elevated disparity is crucial to reducing rates of infant mortality in Kalamazoo County. It's currently unclear whether the causes are similar to those reported in the literature, or if they are, which factors seem to account for the largest portion of the disparity between Black and White infant deaths.

PURPOSE: To identify the primary contributing factors to poor birth outcomes, including infant mortality here in Kalamazoo County.

MATERIALS & METHODS: This is a qualitative analysis of the de-identified FIMR summaries for the set of reviews conducted in Kalamazoo County, between the years 2010-2013. The research is a narrative analysis of the summaries that were generated by the public health department as part of the Kalamazoo County Fetal Infant Mortality Review (FIMR) process.

RESULTS: From the summaries reviewed, there were over-arching themes from each case summary that were recognized. Mothers with chaotic lives and families with interpersonal chaos, transportation and childcare being a constant struggle, ripple effect of depression, substance use/abuse and poor health, and "faking good".

CONCLUSION: Based on the above theme summaries, the systems serving these women were recognized and recommendations were developed to counteract these contributing factors to infant mortality.

TB OR NOT TB: PULMONARY INFECTION WITH AN UNUSUAL ORGANISM: MYCOBACTERIUM CELATUM

Larry Lutwick, MD; Pimpawan Boapimp, MD

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences;
WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

INTRODUCTION: *Mycobacterium celatum* was first described in 1993 as *M. xenopi*-like but was biochemically indistinguishable from *M. avium* complex. Initially reported to cause infection mainly in HIV infected patients, it is now known to cause TB-like illness in immunocompetent hosts. We present a case of pulmonary infection with *M. celatum*, an organism which can give a false positive gene probe for *M. tuberculosis*.

CASE REPORT: A 68-year-old Caucasian man with COPD was seen in the ER related to fatigue, dyspnea and tachycardia. An EKG showed atrial flutter with 2:1 block and chest imaging revealed biapical fibrocavitary changes compatible with tuberculosis. He admitted to having night sweats for 1 month, had a 70-pound weight loss that was partially intentional and had a productive cough without hemoptysis. A former Navy corpsman with time in Viet Nam, he had worked in a local jail and admitted to performing CPR on an inmate with active TB but has always had a negative tuberculin skin test.

Two sputa revealed many AFB on stain and he was begun on anti-TB therapy with INH, rifampin, ethambutol and pyrazinamide. Of note, a TB interferon release assay was negative and after growth in liquid media, a gene probe was negative for *M. tuberculosis* complex. Because of the gene probe and a bump in ALT level, his anti-TB meds were discontinued and he was discharged home. At the time of out-patient follow-up, his isolate had been identified by the Michigan State Lab as *M. celatum* and he was treated with clarithromycin, ciprofloxacin and ethambutol. His night sweats disappeared, his cough diminished and his weight increased by 3.1 kg and follow-up AFB smears showed only few AFB and are culture negative to date.

DISCUSSION: Initially characterized in 1993 from various isolates throughout the USA, not only is this organism biochemically identical to the *M. avium* complex, but research has demonstrated that 3 genotypes exist and two of the three produce a + gene probe for *M. TB* complex. If identification is not done further, misidentification will confound the treatment and prognosis of this increasingly recognized mycobacterium.

CONCLUSION: A pulmonary infection with *M. celatum* is reported. This chameleon-like organism is similar to *M. xenopi* in mycolic acid pattern, biochemically identical to the *M. avium* complex and can give a false positive gene probe for *M. tuberculosis* complex. Complete identification is vital in providing appropriate therapy.

AKT: A THERAPEUTIC TARGET IN HEPATIC ISCHEMIA-REPERFUSION INJURY

Stephen Covington; Luis H. Toledo-Pereyra, MD, PhD

Michigan State University College of Osteopathic Medicine, Medical Student Class of 2017;
WMU Homer Stryker M.D. School of Medicine, Program in Medical Ethics, Humanities, and Law

BACKGROUND: Liver transplantation is the second most common transplant procedure in the United States. A leading cause of post-transplantation organ dysfunction is I/R injury. During I/R injury, the serine/threonine kinase Akt is activated, stimulating downstream mediators to promote cellular survival. Akt has a crucial role in cell growth and survival, mitochondrially produced ROS, and vasoregulation during ischemic events. Akt is present in the brain, skeletal muscle, heart, kidney, liver, lung and the embryonic heart. Downstream mediators of Akt include BAD, FoXO1, Caspase 9, IKK α , GSK-3 β , nitrous oxide synthases and mTOR. Due to the cellular effects of Akt, therapeutic manipulation of the Akt pathway can help reduce cellular damage during hepatic I/R that occurs during liver transplantation.

OBJECTIVE: The connection between Akt and the I/R pathway has been well documented. However, a full description of therapeutic options available that target Akt to reduce hepatic I/R injury has not been addressed within the literature. The purpose of this review is to illuminate advances in the manipulation of Akt that can be used to therapeutically target I/R injury in the liver.

MATERIALS & METHODS: An in depth literature review was performed using the Scopus and PubMed databases. A total of 54 articles published between 1977 and 2015 were utilized for this manuscript. Terminology searched includes a combination of “hepatic ischemia/reperfusion injury”, “Akt/PKB”, “preconditioning” and “postconditioning”.

RESULTS: Four principal methods which reduce I/R injury by way of Akt during hepatic ischemia were identified in this review. Methods include hepatic pre- and post-conditioning, pharmacological intervention and gene/cell therapy. Each therapy reviewed was found to have multiple supporting experiments directed towards confirming the presence of increased Akt phosphorylation, downstream mediator activation and secondary measures supporting decreased hepatic damage. Secondary measurements included decreased serum alanine aminotransferase, alkaline phosphatase levels and improved histological changes confirming the Akt protective effect.

CONCLUSION: Akt has been proven to drive the cell survival pathway in hepatocytes during I/R injury. The activation of Akt from the reviewed therapies has resulted in predictable reduction in hepatocyte damage using the previously mentioned measurements. In a clinical setting, these therapies could potentially be used in combination to achieve better outcomes in hepatic transplant patients. Evidence supporting reduced I/R injury through Akt activation warrants further studies in human clinical trials.

MONONUCLEAR PHAGOCYtic INFILTRATION AND INFLAMMATION IN THE BRAIN IN RESPONSE TO ORAL SALMONELLA INFECTION

Tim Bauler, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences

Bacterial meningitis is a life-threatening disease with high mortality rates and frequent long-term neurological sequelae. Although *Salmonella enterica* infections in the U.S. are associated with self-limited gastroenteritis, in sub-Saharan Africa *Salmonella enterica* serovar Typhimurium is the most common cause of bacteremia and second most common cause of meningitis. As there is currently no animal model to study *Salmonella* Typhimurium infection of the central nervous system (CNS), we developed a mouse model by analyzing the development of meningitis in mice following oral infection, which is the natural route of *Salmonella* transmission in humans.

Subclinical CNS infection with focal meningitis and ventriculitis was seen in wild-type C57BL/6 mice infected with *S. Typhimurium*, as evidenced by confocal immunofluorescence imaging and flow cytometry to quantitate the inflammatory infiltrate. Dissemination of infection to the CNS was directly correlated with the level of bacteremia in these mice, which rapidly succumb to infection. The sensitivity of this standard laboratory mouse strain to acute *Salmonella* infection precluded observation of neurological symptoms. C57BL/6 mice are highly susceptible to *S. Typhimurium* infection because of their inability to restrict bacterial replication/survival in macrophage phagosomes, due to the expression of nonfunctional NRAMP1.

As the human genome includes a functional NRAMP1 gene, we hypothesized that mice genetically-engineered to express NRAMP1 would be a superior model. The NRAMP1-reconstituted C57BL/6 mice survived the acute *S. Typhimurium* infection, and the majority controlled the infection for greater than one month. However, a small subset of mice developed severe ataxia associated with high bacterial loads in the CNS, a pronounced phagocytic infiltrate, neuroinflammation, necrotizing vasculitis, and hemorrhage. This rate of CNS infection is similar to rates of meningitis in bacteremia patients in sub-Saharan Africa, and these histological results closely mimic *S. Typhimurium* meningitis in human patients.

The analysis of these two strains provides two distinct models of *Salmonella* meningitis. C57BL/6 mice cannot control peripheral infection, leading to rapid infection of the brain, and will be used to dissect mechanisms of bacterial dissemination from the gastrointestinal system to the nervous system. In contrast, NRAMP1-reconstituted mice are expected to more faithfully model the replication of *S. Typhimurium* in the brain, thereby permitting the investigation of the role of various types of immune cells and inflammatory mediators in neuroinflammation and subsequent CNS damage.

DECREASED TNF- α LEVELS IN PRECONDITIONED RAT LIVERS FOLLOWING ISCHEMIC INJURY

H. Arad Abadi; Luis H. Toledo-Pereyra MD, PhD; Tarannom Shoghi

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018;

WMU Homer Stryker M.D. School of Medicine, Program in Medical Ethics, Humanities & Law;

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

INTRODUCTION: Ischemia-reperfusion (IR) injury occurs during the rapid introduction of oxygen to a previously ischemic tissue, which can cause apoptotic and necrotic damage. Studies have shown that tumor necrosis factor- α (TNF- α) levels increase during an IR injury. TNF- α causes infiltration of neutrophils and monocytes, as well as an increase in levels of reactive oxygen species. Many mechanisms, including ischemic preconditioning (IPC), have been extensively studied to assess the potential to attenuate IR injury. IPC is an endogenous protective mechanism in which repeated short cycles of ischemia and reperfusion protects the tissue and decreases the ischemic damage following a longer period of ischemia. This effect has been observed and confirmed in several animal models. The purpose of this review is to evaluate the changes in TNF- α levels in preconditioned rat livers following an ischemic injury, and to determine whether lower TNF- α levels correlate with reduced liver injury.

RATIONALE: IPC has been considered to be an effective strategy to protect the liver from IR injury. TNF- α has also been linked to the IPC response. However, the exact role of TNF- α as a mediator within the IR/IPC processes is not well known.

MATERIALS & METHODS: We conducted a systematic search of PubMed and SCOPUS databases. The initial broad search of both databases resulted in 2138 articles. Our narrowed search phrase of “TNF AND Liver AND Preconditioning AND Rats” resulted in 186 articles. The articles selected for this review used direct organ IPC methods and evaluated serum TNF- α levels following reperfusion.

RESULTS: After our review of the literature, it is clear that TNF- α is an important mediator of IPC. Diminished plasma TNF- α levels following prolonged ischemia in preconditioned livers in comparison to livers exposed to prolonged ischemia alone has been shown by several groups ($P < 0.05$). These reduced serum TNF- α levels were associated with lower serum aspartate or alanine transaminase levels in comparison with the levels measured after IR alone, indicating reduced liver damage in preconditioned rats.

CONCLUSION: Literature review has made evident that serum TNF- α levels are reduced in rats that had undergone ischemic preconditioning prior to the onset of prolonged ischemia and reperfusion of the liver; which was generally associated with reduced liver damage. However, the exact role of TNF- α in IPC is still not well established.

EVALUATION OF mTOT MODULATORS IN KIDNEY CELL LINES

Eric Edewaard; Gregory Vanden Heuvel, PhD; Angela Brightell-Conrad, William McDonald, Jerry Colca, PhD;
Rolf Kletzien, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences; Metabolic Solutions Development Company; Metabolic Solutions Development Company; Metabolic Solutions Development Company; Metabolic Solutions Development Company

Autosomal dominant polycystic kidney disease (ADPKD) is one of the most common potentially fatal single gene disorders. Renal pathologies found in ADPKD include cysts resulting from increased fluid secretion, cell proliferation, and apoptosis, with an altered differentiation of the epithelial cells lining the cysts. ADPKD occurs in 1-in-500 to 1-in-1000 individuals, primarily as a result of mutations in one of two genes, PKD1 or PKD2. These mutations result in the disruption of numerous pathways, including the inactivation of AMPK, over-activation of mTOR and Wnt signaling pathways, increased expression of Cux1, and increased histone deacetylase activity. These disruptions lead to increased proliferation of the epithelial cells lining the tubules of the nephron. At present, there is no treatment approved for slowing or preventing PKD progression. Metabolic Solutions Development Company (MSDC; www.msdrx.com) is developing novel insulin sensitizing agents that interact with a newly identified mitochondrial target (mTOT, mitochondrial Target Of the Thiazolidinediones) without activating the PPAR γ receptor. These agents have shown efficacy in Phase II clinical trials for type 2 diabetes and modulate carbon flow from pyruvate into the mitochondrial matrix on a tissue specific/metabolic demand basis. Modulation of mTOT by these compounds elicits changes in signaling pathways that are in the opposite direction of those seen in ADPKD. Previously, MSDC evaluated the potential therapeutic use of these mTOT modulating agents in an animal PKD model and found that they reduced kidney and liver cyst volume, a prognostic biomarker in ADPKD. To begin to determine the mechanism of action of mTOT modulators, we analyzed the expression of proteins involved in cell growth and fluid secretion in kidney cell lines treated with MSDC-0602, one of these compounds. Our preliminary results suggest potential changes in key pathways that regulate the cell cycle and fluid transport.

ANALYSIS OF PREHOSPITAL OPIOID-RELATED CARDIAC ARRESTS IN A STATEWIDE EMS INFORMATION SYSTEM AND THE POTENTIAL PREVENTATIVE VALUE OF NON-PARAMEDIC FIRST RESPONDER NALOXONE

Kevin Patel, DO; William Fales, MD

WMU Homer Stryker M.D. School of Medicine, Department of Emergency Medicine;
WMU Homer Stryker M.D. School of Medicine, Division of EMS and Disaster Medicine

INTRODUCTION: Death rates from heroin and prescription opioid pain relievers (POPR) have doubled and quadrupled, respectively. Paramedic administered naloxone is an effective, safe opioid antidote. Many recommend naloxone for non-paramedic first responders (NPFR) despite limited evidence that this will prevent opioid-related cardiac arrests (ORCA).

PURPOSE: The purpose of this study is to determine the potential for NPFR-naloxone to prevent ORCA in a statewide EMS system.

MATERIALS & METHODS: This retrospective analysis of a statewide EMS information system (EMSIS) was conducted from 7/1/2013 to 6/30/2014. Data were obtained using a primary search for impression of cardiac arrest and drug overdose. An alternate search was done using opiate-related keywords and a cardiac arrest filter. A manual analysis of the record narratives was done categorizing cases as ORCA-suspected (opioid reported by name, injectable drug paraphernalia present, or clinical response to naloxone occurred); non-ORCA (clearly not ORCA); and ORCA-indeterminate. ORCA-suspected and ORCA-indeterminate were further analyzed to determine if NPFR-naloxone might have prevented ORCA. Standard descriptive statistical analysis was performed.

RESULTS: During the study period 1,537,334 records were in EMSIS, with 14,079 (0.9%) cardiac arrests. The primary search identified 76 potential ORCA cases with 511 additional obtained from the alternate search. The narrative analysis identified 164 ORCA-suspected cases (40 primary/124 alternate); heroin (108, 65.9%), POPR (53, 32.3%), and unknown opioid (6, 3.7%). The median (IQ) age was 38.2 (28,49) years. Ninety-seven (59.0%) were male with 153 (93.3%) presenting in arrest, 39 (23.8%) DOA. There were 129 (78.7%) unwitnessed arrests, and 22(13.4%), 8(4.9%), and 1(0.6%) witnessed by bystanders, EMS, and police, respectively. Three (1.8%) presented in a shockable rhythm. Paramedic response time (median/90%ile) was 6.0/12.0 minutes. Opportunities for pre-arrest NPFR-naloxone were identified in 7 (4.3%) cases. However, all of these developed ROSC, with 4 having a final GCS >13. Three (1.8%) ORCA-suspected patients who had signs of life upon NPFR arrival, promptly arrested, obtained ROSC but remained unresponsive might have benefited from NPFR-naloxone.

CONCLUSION: ORCA was usually unwitnessed, associated with non-shockable rhythms, and occurred prior to NPFR arrival. The opportunity for NPFR-naloxone to prevent ORCA was not identified. Further studies are needed to determine the life-saving benefit from NPFR-naloxone.

A CHALLENGING PERCUTANEOUS INTERVENTION OF AN UNPROTECTED LEFT MAIN CORONARY ARTERY

Monoj Kumar Konda, MD; Vishal Gupta, MD, MPH

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Borgess Cardiology Group

INTRODUCTION: Left main coronary artery supplies 75% of myocardial blood supply. Unprotected left main disease (UPLM) is a critically occluded left main with no other patent vessels and has been a major challenge for revascularization with percutaneous intervention (PCI) and such patients were traditionally referred for coronary artery bypass grafting (CABG).

CASE: A 77-year-old woman with a history of atrial fibrillation, coronary artery disease and CABG with known occluded right coronary artery, left internal mammary artery (LIMA) and saphenous venous grafts (SVG) to obtuse marginal presented to emergency room with acute onset chest pain, shortness of breath and EKG showed STEMI of anterolateral wall. Vitals were significant for tachycardia, tachypnea and hypoxia. Laboratory work notable for leukocytosis, K⁺5.5mmol/L, lactic acid 2.6mmol/L, BNP 567 pg/mL, normal troponin. She was also in atrial fibrillation with rapid ventricular response and congestive heart failure. She was taken for emergent cardiac catheterization which revealed 90% occlusion of left main (LM), 70-80% stenosis of proximal left circumflex (LCx) and 70-80% mid circumflex disease along with chronic occlusions of other vessels. After extensive discussion with family a decision was made to proceed with PCI of LM and LCx arteries. Three stents were placed successfully using crossover technique. Patient tolerated the procedure well. A post procedure echocardiogram showed a 20% reduction of EF from her previous echo with anterior wall and apical hypokinesis.

DISCUSSION: CABG has been the gold standard for patients with UPLM disease for many years. However, recently there has been increasing evidence suggesting that percutaneous coronary intervention (PCI) with drug-eluting stents (DES) may be an acceptable alternative in select cases. Major evidence on this treatment came from meta-analysis of four major RCTs comparing PCI to CABG in UPLM disease. There was consistency across the RCTs with respect to reduced rates of death, myocardial infarction, composite death/stroke and composite major adverse cardiac and cerebrovascular events. PCI however is associated with a significantly lower rate of stroke but higher rate of repeat interventions.

Another prospective study including 922 UPLM patients and a meta-analysis including 27 studies for UPLM (11,148 patients) also revealed similar results. A review article suggested that use of double stent techniques can provide good angiographic and clinical outcomes. Neither of the above mentioned studies would fit the criteria for our patient who presented with very high risk clinical illnesses but underwent a successful intervention.

INCREASED LUNG WEIGHTS IN DRUG OVERDOSES

Heather I. Chen; Joyce deJong, DO

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018;

WMU Homer Stryker M.D. School of Medicine, Department of Pathology

We conducted a retrospective study of autopsy data to determine whether organomegaly of the lungs can be considered a reliable indication of drug overdose as the cause of death. In previous literature, normal lung weight at autopsy for men has been determined to be about 445 g for the right lung and 395 g for the left lung (840g total)¹. The lung weights for women are slightly lower at 340g for the right lung and 299 for the left lung².

This retrospective study analyzed data from individuals whose cause of death was a drug overdose. The deaths occurred in 2014 in the SW Michigan region, which amounted to 133 deaths total. The counties covered were Allegan, Kalamazoo, Calhoun, and Muskegon. The manners of death were accidents (109 cases), suicides (15 cases), and indeterminate causes (9 cases). Resuscitation attempts were made on 27 of the individuals in the study and 16 individuals were found to have pneumonia on autopsy.

The average lung masses among cases examined were 700g for the right lung and 613g for the left lung (1313g total). When compared to previous reports of normal lung masses, the lung masses of people who had died of a drug overdose is significantly higher. On top of that, we identified other factors that might contribute to the increase in lung weight. The average mass of lungs in which pneumonia was identified was greater than the average mass of lungs in the study population in which pneumonia was not identified with 95% confidence in all lung weights for both gender groups. The same level of confidence (95%) was found in the lung masses of people who were resuscitated as compared to those who were not resuscitated. It should be noted that there was no statistical significance in lung mass between accidental deaths compared to deaths determined to be a suicide or indeterminate.

In conclusion, the nearly two-fold increase in average lung mass in our subjects compared to normal lung mass as reported in the literature suggests that drug overdose can be a cause of organomegaly of the lungs. In addition, factors such as evidence of pneumonia and attempted resuscitation are associated with increased lung weight. We suggest that lung organomegaly can be used as an indicator of death due to drug overdose, granted the presence of other pieces of evidence such as a history of drug abuse, toxicology levels, and scene paraphernalia.

REFERENCES:

1. Molina DK, Dimaio VJ. Normal Organ Weights in Men. *The American Journal of Forensic Medicine and Pathology* 2012;33(4):368–372.
2. Molina DK, Dimaio VJM. Normal Organ Weights in Women. *The American Journal of Forensic Medicine and Pathology* 2015;36(3):182–187.

RESTRICTIVE CARDIOMYOPATHY MISDIAGNOSED AS ASTHMA

Christopher J. Schmehil, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics

INTRODUCTION: Restrictive cardiomyopathy (RCM) is a disease of the heart muscle. It is characterized by impaired ventricular filling with normal or decreased diastolic ventricular volume where left ventricular systolic function is usually preserved. Childhood cardiomyopathies are generally categorized as hypertrophic, dilated, or restrictive. Restrictive is the rarest form of the pediatric cardiomyopathies.

CASE: A 4 year-old male with history of mild persistent asthma treated with albuterol and budesonide presented with a three-day history of rhinorrhea and worsening shortness of breath. His family history was unremarkable. Physical exam was only significant for mild respiratory distress without hypoxia and bibasilar crackles. A respiratory infectious disease PCR panel was positive for rhinovirus/ enterovirus. A chest x-ray showed an enlarged cardiac silhouette. This was unchanged from a prior chest x-ray in 2013. An echocardiogram demonstrated diastolic dysfunction, preserved systolic function, and moderate concentric hypertrophy. The patient was transferred to the Intensive Care Unit and started on propranolol, which he did not tolerate due to symptomatic bradycardia with cyanosis. Heart catheterization showed severe diastolic dysfunction with nearly equal pulmonary and systemic arterial pressures. He was subsequently started on milrinone, sildenafil, and lasix in anticipation for heart transplantation.

DISCUSSION: RCM is a rare disease of the myocardium characterized by ventricular stiffness. RCM accounts for only 2-5% of pediatric cardiomyopathies. It is characterized by diastolic dysfunction with preserved systolic function and typically in the absence of ventricular hypertrophy or dilatation. RCM can have an infiltrative, inflammatory, or genetic component, however many are idiopathic in nature. Medical treatment is often ineffective and the vast majority of patients do not survive more than 2-5 years from diagnosis unless they receive a cardiac transplant. In the presented case, the patient's respiratory symptoms were attributed to reactive airway disease rather than heart failure for several years.

CONCLUSION: Restrictive cardiomyopathy is a rare and life-threatening condition which often necessitates cardiac transplant. It is imperative that physicians consider cardiac conditions in patients presenting with respiratory symptoms. This is especially true when there is no improvement noted with initial therapeutic measures.

RAPID RESPONSE TO PROPRANOLOL IN A STRIDOROUS PATIENT WITH EXTENSIVE INFANTILE HEMANGIOMAS

Devika Malhotra, MD; Ryan F. Halas, DO; Robin Fountain, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics;
WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; Bronson Pediatric Cardiology

BACKGROUND: Infantile hemangiomas (IH) are the most common vascular malformation of infancy. IH can be superficial or deep with visceral involvement. When the airway is involved, treatment becomes a necessary entity. The incidental discovery of propranolol for the treatment of IHs has transformed the standard of care for such malformations. Though, for some this is still controversial despite clear evidence seen in several meta-analyses.

MATERIALS & METHODS: An African-American 4 month old female was admitted with respiratory distress and facial swelling. Medical history indicated a past episode of respiratory distress requiring a short stay in the PICU at 2 months of age.

RESULTS: Physical exam revealed tachypnea, tachycardia, normal saturations, drooling, biphasic stridor, retractions, right cheek swelling, and a hyperpigmented raised lesion on the lower lip. Chest x-ray was unremarkable. Direct fiber optic laryngoscopy showed narrowing of the larynx with erythema. Computed tomography (CT) of the soft tissue and neck with contrast showed numerous hemangiomas within the head and neck with lesions present in the parotid glands, submandibular glands, parapharyngeal spaces, subcutaneous facial tissue, and lower lip. Additional hemangiomas at the left lateral wall of the subglottic trachea and posterior wall of the glottic/subglottic junction resulting in mild narrowing of the subglottic trachea was noted. The patient was started on propranolol with rapid improvement and was discharged after 48 hours. At her 3 month follow up visit she was noted to have mild stridor on auscultation with no respiratory distress and improvement of her visible hemangiomas.

DISCUSSION: Airway IHs have the potential to be life threatening. With quick diagnosis and administration of propranolol, adverse sequelae may be avoided in patients with extensive oropharyngeal and airway involvement. Clinical evidence supports the use of propranolol as a first-line agent for complicated lesions. While other modalities of treatments have been described (ie. Angiotensin-converting enzyme inhibitors and angiotensin-receptor blockers), further research is needed to ascertain their potential benefits in the setting of IH.

Award Winning Presentations

PRE-GRAVID OVERWEIGHT AND RISK OF LOW BIRTHWEIGHT, PRETERM BIRTH, AND STILLBIRTH AMONG KALAMAZOO COUNTY MOTHERS.

Elizabeth MacQuillan; Amy Curtis, PhD

Western Michigan University, Department of Interdisciplinary Health Sciences

BACKGROUND: Low birthweight (LBW), preterm birth, and stillbirth are poor birth outcomes that place infants at risk of lifelong deficits in cognitive and physical development and quality of life. Additionally, for overweight women, experiencing a poor birth outcome further increases their already elevated chance of morbidity and mortality from cardiovascular disease later in life.

MATERIALS & METHODS: We used geographic information systems (GIS) mapping using ArcGIS, SPSS analysis of county birth records (2013, most recent year available,) and 2013 delivery records from Bronson and Borgess hospitals to evaluate risk of poor birth outcomes by pre-gravid body mass index (BMI) category and presence of gestational diabetes or pregnancy hypertension complications.

RESULTS: Of 3,038 singleton births to Kalamazoo Co. residents in 2013, 5% (n=151) were to underweight women, 36.6% (n=1,112) were to normal weight women, 30.4% (n=924) were to overweight women, and another 27.9% (n=848) were obese. The risk of experiencing a poor birth outcome was not significantly predicted by being underweight, compared with the normal weight group, and among obese women, the risk of poor birth outcomes was significantly reduced. However, for women with overweight pre-gravid BMI (BMI 25 to 29.9), there was a significantly increased risk of both first-time and recurrent poor birth outcomes in both white and black women and in both Medicaid and private insurance-paid deliveries, by chi-square analysis.

CONCLUSION: Results suggest overweight women may be at greater risk for low birthweight and pre-term birth than underweight, normal weight, or obese women, independent of race or income level. Additionally, it appears that Medicaid is factor in recurrent poor birth risk for overweight whites, but not blacks, who are at increased risk of recurrent poor birth regardless of Medicaid status. This is in conflict with previous work that has focused on underweight as a major risk factor for low birthweight births and hypertensive disorders and gestational diabetes among obese women as a major risk factor for pre-term birth. Possible explanations include increased inflammatory state due to adiposity (particularly abdominal subcutaneous fat) and micronutrient deficiencies due to maternal overweight.

DOMESTIC VIOLENCE TRAINING IMPROVES TRAUMA-RELATED COMPETENCIES AMONG MENTAL HEALTH AND SOCIAL SERVICE PROVIDERS

Eleanor Yu; Julie Helmer; Sherry Brockway; Catherine L. Kothari, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018;
Kalamazoo Community Mental Health and Substance Abuse Services; YWCA Kalamazoo;
WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics

BACKGROUND: While there is a growing body of research highlighting the importance of domestic violence and trauma (DVT) training in medical settings, and an emphasis on trauma-informed care within therapeutic settings, little is known about the current state of knowledge among mental health professionals and the effectiveness of DVT training to increase that knowledge.

PURPOSE: This study aims to address this gap by assessing the efficacy of DVT training on the knowledge, attitude, and skills of mental health and social service providers.

METHODOLOGY: This was an anonymous pre-post survey study of a one-day training workshop conducted by the YWCA for social service, mental health, and substance abuse providers. This training was offered three times over a four month period to 167 participants. The survey included questions regarding their knowledge, attitude, and skills helping DVT victims, and was based upon a four-point Likert scale. Bivariable analysis was conducted with Related-Samples Wilcoxon Signed Rank test, with two-sided significance set at 95% confidence levels.

RESULTS: One hundred and forty-nine participants completed the surveys. Survey results revealed that after training, providers had statistically significant gains in five of seven areas. Chief among these changes were providers' self-assessment of their current understanding of DVT, which increased four-fold. With a greater ability to assess a DVT situation, providers were significantly more likely to tell victims that the violence was not their fault (40.8% to 77.3% strongly agree, $p<001$) and that they knew how to safety plan with their victims (12.1% to 29.2% strongly agree, $p<001$). In addition to intervening, providers showed gains in their interdisciplinary collaboration and professionalism. After training, providers were significantly more likely to agree that they knew how to connect victims to community resources (24.2% to 46.6% strongly agree, $p<001$) and agree that they should not file a police report when a patient discloses partner abuse (3.9% to 16.9% strongly agree, $p<001$). Of the two items with no change, one (knowledge of when abuse begins in a relationship) had high competency levels to begin with and the other (comfort in asking about abuse) simply was not affected by the training. In general, the amount learned by participants varied by degree of prior training-those with less training learned more.

CONCLUSION: Trainings were successful in helping providers better understand DVT victims and the resources that victims need. However, more skills-based training around screening for abuse is needed.

IMPROVING THE QUALITY OF PRENATAL CARE PROVIDED AT THE WMED FAMILY MEDICINE CLINIC

Susan Jevort, DO; Kanika Jaggi, MD; Lauren Piper, DO; Allan Wilke, MD

WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine

BACKGROUND: Western Michigan University Homer Stryker M.D. Family Medicine Residency Clinic (Team Oakland) is housed in a federally qualified health center and is the safety net for medical care, including obstetrical care, in Kalamazoo County. Michigan currently ranks in the bottom half among states in regards to preterm birth rates and low birth weight infants.

HYPOTHESIS: The quality of prenatal care provided in our resident clinic can be improved through standardization of care and quarterly physician feedback.

MATERIALS & METHODS: A standardized “check list” for obstetrical care was developed in our EMR reflective of the current standards of care endorsed by the AAFP, CDC and ACOG and providers were then educated about these standards. Pre and post implementation data was collected through chart reviews of patient delivered by Team Oakland to assess compliance with 22 areas of prenatal care and education. 173 patients met our inclusion criteria for the baseline data analysis along with 130 patients for the year long implementation phase. Data was analyzed used Chi-square test of independence and the Fisher’s exact test as appropriate.

RESULTS: A statistically significant difference ($P < 0.0001$) was found in overall compliance with an increase from 58.66% to 72.2% as well as in 8 of the 22 identified areas of prenatal testing and education.

CONCLUSION: We proved our hypothesis by demonstrating an improvement in the quality of prenatal care provided in our clinic through standardization of care and quarterly physician feedback. As a result, we hope long term to reduce the number of preterm births and low birth weight infants in our community - an ongoing multidisciplinary effort. Limitations and barriers to success included patient non-compliance with keeping scheduled appointments, resident buy-in with the checklist and small sample sizes for several measures.

ACKNOWLEDGEMENTS: We would like to thank the Western Michigan University Homer Stryker M.D. School of Medicine Department of Epidemiology and Biostatistics for their assistance with this project. This study was approved as exempt on December 8, 2014 by the IRB committee at Bronson Methodist Hospital.

A HISTORICAL CONSIDERATION OF THE ROLE OF WHOLE ORGAN PANCREAS TRANSPLANTATION FOLLOWING 50 YEARS OF CLINICAL AND EXPERIMENTAL USE

Peter White; Luis H. Toledo-Pereyra, MD, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018;

WMU Homer Stryker M.D. School of Medicine, Program in Medical Ethics, Humanities, and Law

INTRODUCTION: Whole organ pancreas transplantation (WOPT) is a relatively new intervention that is directed at treating individuals with pancreatic insufficiency due primarily to type 1 diabetes mellitus. Since its inception at the University of Minnesota in 1966, the field has experienced a continuous evolution lead by researchers and clinicians alike.

RATIONALE: This project aims to examine developments in the field of transplantation and to utilize this perspective to reconsider the role of WOPT in modern medicine.

MATERIALS & METHODS: A detailed literature review was conducted using Cochrane Library and PubMed Database. Search terms included: pancreas, transplantation, complications, techniques, clinical response, immunosuppression therapy, history, and allograft rejection. Twenty-four publications were reviewed.

DISCUSSION: Initially, WOPT was considered experimental surgery and associated with significant morbidity and mortality. However, in the 1980s post-transplantation rates of thrombosis, fistula, and pancreatitis decreased in response to a transition from pancreatic duct ligation or intraperitoneal drainage of exocrine secretions to enteric or vesicular management. Early immunosuppressive therapies including corticosteroids, antilymphocytic globulins, azathioprine, and cyclosporine A were crucial to success. Concomitant advancements in gland placement and graft revascularization also improved clinical results. In addition, novel immunosuppressants played a critical role in preventing organ rejection and improving clinical outcomes. By the 1990s, more effective immunosuppressive protocols consisting of triple and quadruple drug regimens including mycophenolate mofetil and calcineurin inhibitors were developed.

The literature consistently indicates that WOPT is associated with significant improvements in quality of life and is successful at halting or reversing secondary diabetic complications. Patient (2007: 1-yr >96%; 5-yr >80% vs. 1984 1-yr 80%; 5-yr 60%) and graft (2007: 1-yr 80%; 5-yr 71% vs. 1984 1-yr 48%; 5-yr 30%) survival have continuously increased to the present.

The annual number of USA WOPT peaked at approximately 1,500 operations in 2004 and has been in decline since. This phenomenon could be due in part to a national organ shortage coupled with a scrupulous pancreatic procuring, matching, and transplanting process. Disparate factors such as the advent of islet cell transplantation, decreased WOPT reimbursement, and the arrival of convenient insulin pumps may also be contributory.

CONCLUSION: Over the last half century, significant advances have been made in WOPT resulting in increased positive patient outcomes. The data demonstrate this intervention's progression from experimentation to acceptance as a well-established therapeutic treatment for select patients with T1DM. Nevertheless, its current use continues to be limited and it may arguably be underutilized in the treatment of pancreatic insufficiency.

STRESS CONCENTRATIONS AT CORACOCALVICULAR LIGAMENT RECONSTRUCTION TUNNELS: A BIOMECHANICAL AND FINITE ELEMENT EVALUATION OF CLAVICLE FRACTURE RISK

Peter A. Gustafson, PhD; Mark Omwansa; Mark Sytsma, MD; Andrew G. Geeslin, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery and Western Michigan University, Department of Aerospace Engineering; Western Michigan University, Department of Mechanical Engineering; Bronson Sports Medicine Specialists;

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery

INTRODUCTION: Several studies report the high incidence of injury to the acromioclavicular (AC) joint. Surgical treatment is generally recommended for high-grade and some Type-III injuries. A current trend towards anatomic reconstruction is due to improved anatomical and biomechanical data.

While newer techniques have improved stability, clavicle fractures have been reported following reconstruction when using two “anatomic” clavicular tunnels. The options for treatment of coracoclavicular ligament injuries are numerous, and comparison among them is challenging.

PURPOSE: This study investigates the influence of two surgical techniques for treatment of coracoclavicular ligament ruptures. The biomechanics are illuminated via computationally-supported, laboratory-based testing. We hypothesized that the two clavicular tunnel technique would be associated with a statistically and clinically significant risk of clavicle fracture.

MATERIALS & METHODS: 4th generation synthetic clavicles were utilized in biomechanical tests on a servohydraulic load frame. A single-tunnel suture-washer construct technique was compared to an anatomic two-tunnel technique. Simulated surgical procedures followed manufacturer’s recommended techniques.

Four point bending loads were applied, load-displacement curves, failure loads, and mechanisms of failure were all recorded. Finite element (FE) models of each construct were created representing the test setup.

RESULTS: The average load to failure and standard deviation was calculated for the two groups. The single tunnel (3 mm) specimens failed at an average of 686 ± 45.2 N and all failures occurred through the tunnel. The average load to failure for the two-tunnel technique (6 mm) was 390 ± 31.7 N; all failures occurred through the medial tunnel. The single tunnel specimens averaged a stiffness of 19.9 ± 1.55 Nm², while the two tunnel specimens had an average stiffness of 15.8 ± 1.18 Nm².

In FE model, the two tunnel technique was found to have increased stress concentration and thus is confirmed to have a relative increase in risk of clavicle fracture compared to the single tunnel technique. The highest stress concentration was found at the medial tunnel. Data from the validated FE analysis was used to generalize the result to different anatomic placement and diameters of clavicular tunnels.

CONCLUSION: The anatomic two clavicular tunnel (6 mm) technique was associated with a statistically and clinically greater risk of fracture based on four-point bending testing in a synthetic bone model. The experimental outcome was used as validation for a finite element model; the model was used to further explore the consequences of anatomic and tunnel variations that could not be tested in the laboratory.

EXPERIMENTAL VIROTHERAPY OF HUMAN MELANOMA TUMORS IN NUDE MICE WITH 15L-KNOCK-OUT TANAPOXVIRUS

Tiantian Zhang, Karim Essani, Yogesh R. Suryawansh, Dennis H. Kordish, Helene M. Woyczesczyk; David Jeng, PhD

Western Michigan University, Department of Biological Sciences; Western Michigan University, Department of Biological Sciences; Western Michigan University, Department of Biological Sciences; Western Michigan University, Department of Biological Sciences; Western Michigan University, Department of Biological Sciences; Stryker

INTRODUCTION: Melanoma is one of the most common skin cancers with poor prognosis and survival rate. Oncolytic viruses, with the ability of causing replicative oncolysis and expressing toxic or immunostimulatory genes, are an appealing addition to the melanoma therapy. Tanapoxvirus (TPV) is a good candidate for melanoma therapy, as it is a benign virus that has exhibited tumor regression in human colon cancer xenografted in nude mice. TPV-66R gene encodes thymidine kinase (TK) that is more abundant in cancerous cells, and deletion of viral TK gene has widely been used for increasing the virus tumor-selectivity. Previous studies have shown that the TPV-15L protein functionally mimics human neuregulin (NRG) and that NRG promotes the proliferation of melanoma.

STUDY OBJECTIVES: We hypothesized that TPV-15L would enhance melanoma proliferation, and aimed to generate TPV recombinants with either the 15L gene deleted (TPV Δ 15L) or with both the 15L and the 66R gene ablated (TPV Δ 15L Δ 66R). We sought to determine the oncolytic effectiveness of TPV Δ 15L and TPV Δ 15L Δ 66R in human melanoma.

MATERIALS & METHODS: Owl monkey kidney (OMK) cells, human lung fibroblasts (WI38) and human melanoma cell line SK-MEL-3 were used. Construction of the recombinant viruses was done by transfecting the virus-infected cells with the plasmids targeted for gene deletion from the viral genome. Western blot was conducted for determining the protein expression. Melanoma tumors were induced by injecting SK-MEL-3 cells subcutaneously in the nude mice. Treatments consisted of intratumoral injection of viruses when the tumor volumes reached 45 ± 4.5 mm³.

RESULTS: The TPV-15L protein exhibits similar effectiveness as NRG in promoting melanoma growth in vitro. The replication kinetics of TPV Δ 15L was similar to that of wtTPV. However, TPV Δ 15L Δ 66R replicated less efficiently than TPV Δ 15L and the parental virus in vitro. TPV Δ 15L exhibited more robust tumor reduction in the human melanoma-bearing nude mice than other recombinant TPVs in vivo. Our results indicate that the deletion of the 66R gene, but not 15L gene, adversely affected virus replication, and that deletion of 15L (which elevates melanoma proliferation) enhanced virus oncolytic efficacy. Interestingly, an anti-viral activity, which was identified as Interferon- λ 1 (IFN- λ) was secreted in a significantly higher quantity by the cells infected with TPV Δ 15L. Additionally, IFN α exhibited a more pronounced antiproliferative effect in melanoma than IFN α and IFN β in vitro.

CONCLUSION: We conclude that TPV Δ 15L should be explored further for therapeutic use in human melanoma treatment.

This work was partially supported by an NIH grant to KE.

Poster Presentations

POSTER PRESENTATIONS

1. **State-wide Patterns in Diabetes Screening Service Utilization: Comparing Medicaid and Blue Cross Blue Shield of Michigan.** Stephen Anim-Preko, Kathleen M. Baker, Monica Kwasnik, Rajib Paul, Elizabeth MacQuillan, Amy Curtis
2. **Improvement in Skill Level of Interns After a Focused Training Session at the Start of an Academic Year.** Abhishek Seth, Thomas A. Melgar, Alec Wilson
3. **All Inside ACL: How Does it Compare to Standard Techniques?** Alexander J Connaughton, Christopher W. Uggren
4. **Hypernatremia in a Patient with Lithium Induced Diabetes Insipidus.** Allan Wilke, Uzair Munshey
5. **Diffuse Alveolar Hemorrhage Presenting Initially As Pneumonia, In A Patient With Systemic Lupus Erythematosus: A Case Report.** Amanda Springer, Lindsey Henderson, Kristi Vanderkolk
6. **Rare Cause of Neonatal Respiratory Distress: A Pink Puffer.** Anju Patel, Kristen Hastin, Kristen Hastings, Andrea Scheurer
7. **Offspring Phenotypic Expression of Maternal Balance Pericentric Inversion of Chromosome 18.** Thomas Pott, Anna Jain, Dilip Patel
8. **Initial Presentation of Angioedema and Hand Foot and Mouth Disease Caused by Coxsackie B4 Virus in an Adult.** Aness Al-Khateeb, Sumaiya Ansari, Chris Jacob, Guraminder Thind, Karthik Kailasam, Prashant Patel
9. **Review of an Infrequently Documented Rash.** Arthur Feinberg
10. **Mechanism of PWI Motif Function in RNA Processing.** Blair Szymczyna, Harry Chanzu
11. **Peer-Led Diabetes Self-Management Program in Kalamazoo: Preliminary Results.** Catherine L. Kothari, Michael A. Behun, McKenzie J. Akers, Peter J. White, Amy O. Chonghasawat, Yen-Yu Tina Chen, Thu N. Nguyen, Grant M. Finlayson
12. **Endulza tu Vida: a Tailored Diabetic Workshop for the Hispanic Community.** Catherine L. Kothari, Timothy Wysozan, Ana Villalobos
13. **Presentation Efficacy: A Comparison of Lecture and Powerpoint--Based Presentation Methods in the Dissemination of Medical Information.** Catherine L. Kothari, Satya Dalavayi
14. **Increasing Participation Rates of the Kalamazoo Summer Food Service Program.** Catherine L. Kothari
15. **A Study of Criminal Justice Involvement of Persons with Intellectual or Developmental Disabilities and Associated Health Consequences.** Catherine L. Kothari, Kathy Lentz

POSTER PRESENTATIONS

16. **Unsafe Sleep Related Deaths Spike in Kalamazoo County in 2015.** Catherine L. Kothari, Susmitha Daggubati, Terra Bautista
17. **Mini-Medical School Curriculum for Early Introduction to Health Careers (EIHC) Initiative for Kalamazoo Public Schools.** Cheryl A. Dickson, Bonny Dickinson, Jennifer Kim, Stephanie Chang, Audrey Jensen, David Lee, Kim Wells, Xavier Jean
18. **Explorations: Effects of Chemotherapy on Maternal Cancer and Neonatal Development.** Bonny Dickinson, Heather I. Chen, Patricia J. Choi, Nicole C. Foley, Alan J. Hifko, Sheila Sullivan
19. **The Experience of Teachers Managing Attention Deficit/Hyperactivity Disorders (ADHD) in Classrooms at Milwood Magnet Middle School.** Cheryl A. Dickson, Tarannom Shoghi, Alyssa Woodwyk, Abby Childs
20. **Views on the State of Mental Health Collaboration in Kalamazoo, MI.** Cheryl A. Dickson, Serena Chen, Olivia Fournier, Cody Overmyer, William Rasmussen, Daphne Sy, Alyssa Woodwyk
21. **Child Trauma Education at Domestic Violence Shelters.** Cheryl A. Dickson, Samarth Bhandari
22. **Evaluation of Access to Healthcare in Kalamazoo County.** Cheryl A. Dickson, H. Arad Abadi, Andrew Selles
23. **Reducing No-Show Rates at the Family Health Center.** Cheryl A. Dickson,
24. **Health Needs Assessment of the Homeless and Precariously Housed Population of Kalamazoo.** Cheryl A. Dickson, Eric Edewaard, Rohan Kedar, Joshua Szykowski, Lance von Bracht, Eleanor Yu
25. **How to Like Math Again: An Ecological Study in the Importance of High School Mathematics Coursework.** Cheryl A. Dickson
26. **An Unfortunate Consequence of Atrial Fibrillation.** Chris Jacob, Karthik Kannegolla, William Nichols
27. **A Severe Complication of Chronic Otitis Media.** Chris Jacob, Christopher DeFelice
28. **Injury-Induced Neuronal Turnover with Zinc Sulfate Affects Ciliated Olfactory Sensory Neurons More Than Microvillous Olfactory Sensory Neurons in the Adult Zebrafish.** Christine A. Byrd-Jacobs, James Hentig
29. **Plasticity of Mitral Cell Dendritic Morphology in the Adult Zebrafish Olfactory Bulb Following Deafferentation.** Christine A. Byrd-Jacobs, Joanna M. Dickens

POSTER PRESENTATIONS

30. **Loss of Specific Olfactory Sensory Neurons in Zebrafish after Chemical Exposure.** Tara L. Maser, Christine A. Byrd-Jacobs
31. **Social Determinants of Pneumococcal and Influenza Immunization Rates of Nursing Home and Homes for the Aged Residents in Kalamazoo and Calhoun Counties, Michigan: Role of Race and Segregation.** Cynthia Schauer
32. **Impact of Procalcitonin on Appropriate Antibiotic Days in Patient with Lower Respiratory Tract Infections: a Retrospective Study.** Dean Van Loo, Katelin Anderson
33. **Ingestion of a Hickory Tussock Caterpillar: A Case Report.** Dilip Patel
34. **Benign Paroxysmal Torticollis of Infancy.** Dilip Patel, Aaron Lane-Davies
35. **Perceptions of Low Socio-economic Families on Barriers to Accessing Free Health Services.** Diti Ronvelia, Catherine L. Kothari
36. **Cardiac Tamponade as a Result of Right Atrial Rupture in Blunt Trauma Patient.** Jerry Pratt, Hira Hasnain
37. **Protein Analysis by Desorption Electrospray Ionization Mass Spectrometry.** Elahe Honarvar
38. **'Gangrenous Finger' Proven to be an Acute Gout Flare in a Patient with Severe Gouty Arthritis.** Eric Gallagher, Todd Ruiter
39. **Spontaneous Arterial Hemorrhage of the Hand Resulting in Compartment Syndrome.** Eric Gallagher, Todd Ruiter
40. **Chronic Subtalar Subluxation in a Pediatric Patient.** Eric Gallagher, Nicholas Miladore, Robert Gorman
41. **Regulation of Chronic Inflammation in Endothelial Cells by Oxidized Fatty Acids.** Gabriel Cole, Abbie Brackman, Piao Jian Tan, James R. Springstead
42. **Caustic Ingestion of Laundry Detergent Pods.** Garrett Koon, Patrick Staso
43. **Isolated Native Tricuspid Valve Streptococcus Gallolyticus Endocarditis Initially Presenting as Pneumonia.** Geneva A. Sagun, Yashwant Agrawal
44. **Compliance of a Resident Clinic with KDIGO Guidelines for Early Nephrology Referral—a Quality Improvement Study.** Hardik Chhatrala, Christopher Begley, Andrew Whipple, Courtney Barrett, Sean Pippen, Emily Cordes, Joanne Baker, Valerie Duhn, Dominick Ohocinski

POSTER PRESENTATIONS

45. **Unexplained Myalgia in the Setting of Interstitial Lung Disease: Think About Antisynthetase Syndrome.** Hardik Chhatrala, Monoj Kumar Konda, Sandeep Patri, Sumaiya Ansari
46. **The RNA-binding Mechanism of Rotavirus Non-Structural Protein 3 (NSP3).** Harry Chanzu, Blair Szymczyna
47. **Rise in Narcotic-Related Deaths in South-West Michigan.** Heather I. Chen, Joyce deJong
48. **Eye Trauma on the Ice.** Hou-en Joseph Hui
49. **Empiric Antipseudomonal Monotherapy Versus Combination Therapy in the Treatment of Pneumonia in Ventilated Patients: A Retrospective Study.** Jaclyn Skradski, Dean Van Loo
50. **Utilization of Liposomal Bupivacaine for Robotic-assisted Gynecologic Surgery at a Community Teaching Hospital: A Retrospective Study.** James M. Curtis, David L. Montgomery, Brandon L. Seagle, Anna Hoekstra
51. **Investigation of the Regulation of Chronic Inflammation in Endothelial Cells by a Pro-Inflammatory Epoxyisoprostane Phospholipid.** James R. Springstead, Gabriel Cole, Piao Jian Tan
52. **Profuse Repetitive Vomiting Presenting as Food Protein Induced Enterocolitis Syndrome.** Jason Lam, Elena Lewis
53. **Double Vision and Neck Pain as Presenting Sign of Pseudotumor Cerebri.** Jason Lam, Claire Liepmann
54. **Efficacy of Transcutaneous Cerebral Oximetry Monitoring During Carotid Endarterectomy.** Jason T Ryan, John T. Collins, Jorge Weber
55. **Explorations: The Fundamentals of Female-to-Male Sex Reassignment.** Tarannom Shoghi, Thu N. Nguyen, Samarth Bhandari, Cynthia Bishara
56. **The Ruptured Bladder.** Thu N. Nguyen
57. **The Effectiveness of Frequent User System Enhancement in the Prevention of ED visits by Homeless Individuals suffering from Chronic Pain.** Jeffrey Johnson, Jacqueline Dauch, Philip Bystrom
58. **Prognostic Factors of Mortality in Patients with Necrotizing Fasciitis of the Abdominal Wall.** Jeffrey Johnson, Christian Ertl, Leandra Burke, Nicole Carpp
59. **Using Narrated-Animated Videos in Medical Education.** Jeffrey Johnson, Kelly Quesnelle, Maria Sheakley, David Riddle

POSTER PRESENTATIONS

60. **A Collaboration Between Medical Student and Pre-Medical AMSA Chapters in Kalamazoo County to Positively Impact Students' Interest in Healthcare Careers.** Jennifer Kim, Sulin Wu, Jean Shelton, Mark Loehrke
61. **A National Survey of Pediatric Medication Dosing Training, Practices and Errors in the Prehospital Setting.** John Hoyle
62. **Pediatric Prehospital Dosing Errors: A Mixed Methods Study.** John Hoyle
63. **IV Haloperidol for the Treatment of Pediatric Headaches in the ED.** Jessica McCoy
64. **Infant Volvulus Due to Intestinal Malrotation.** Claire Cameron-Ruetz, Joseph Prahlow
65. **Delayed Death After Aorta Laceration.** Diana Fidrocki, Joseph Prahlow
66. **Low Vaccination Rates for the Human Papilloma Virus (HPV) in Kalamazoo, Michigan.** Diana Fidrocki, Jessica Ramsay, Nina Sadigh
67. **Death due to Positional Asphyxia Related to Underlying Seizure Disorder.** Joseph Prahlow
68. **The Role of Hypertension and Cocaine Use in Blood Vessel Fragility of Arteriovenous Malformations.** Jacqueline Dauch, Joseph Prahlow
69. **Periventricular Hemorrhage with MTHFR Mutation.** Joseph Prahlow
70. **Death Due to Adenovirus Respiratory Infection.** Joseph Prahlow, Patricia J. Choi
71. **Sudden Death Related to Hip Replacement Surgery: A Case Series.** Joseph Prahlow
72. **New Onset Seizure In an Adult As the Presenting Symptom of Cardiovascular Disease.** Joseph Prahlow, Nicholas Beam
73. **Asphyxiation as a Consequence of Body Stuffing.** Joseph Prahlow, Sheila Sullivan
74. **Sudden Death Caused by Bilateral Diaphragmatic Eventration in Myotonic Dystrophy Type 1.** Joseph Prahlow, Sulin Wu
75. **The Cane-Sword: a Case Study.** Joseph Prahlow, Timothy Wysozan
76. **Sudden Death in Four-Day Old with Congenital Aortic Valve Stenosis.** Joseph Prahlow
77. **A Case of Hemolytic Uremic Syndrome in a 7-year-old Boy Caused by E. coli O157 Gastrointestinal Infection.** Philip Bystrom, Joseph Prahlow
78. **Untreated Multiple Myeloma, First Diagnosed at Autopsy.** Joseph Prahlow, Nicole C. Foley

POSTER PRESENTATIONS

79. **Ruptured Berry Aneurysm with Minimal Subarachnoid Hemorrhage.** Joseph Prahlow
80. **Smith-Lemli-Opitz Syndrome.** Joseph Prahlow
81. **The Effects of Synthetic Cannabinoids on Respiratory Function.** Joseph Prahlow
82. **Utilization of a 3-D Printed Model for Preoperative Planning and Operative Osteotomy of a Pediatric Cubitus Varus Deformity.** Karen Bovid, Peter A. Gustafson
83. **Evaluation of a Physician Education Program to Improve Understanding of Pre-Exposure Prophylaxis for HIV Prevention.** Kevin Cates, Kelly Doyle, Cheryl A. Dickson
84. **A Suspected Case of Alpha-1 Antitrypsin Deficiency in a Patient Deceased 8 Years Prior.** Kevin Cates, Joseph Prahlow
85. **Adaptive Immunity - A Historical Perspective.** Kevin Cates, Bonny Dickinson
86. **Tanapoxvirus Expressing Interleukin-2 Regresses Human Melanoma Tumors by a T-cell Independent Mechanism in Mice.** Karim Essani, Dennis H. Kordish, Yogesh R. Suryawansh
87. **“Quizzo” as a Cumulative Pharmacology Review for Undergraduate Medical Students.** Kelly Quesnelle, Shanna Cole
88. **Benzodiazepine Use and Falls in the Elderly.** Kendyll Erickson, Amanda Hult
89. **Improving Communication and Provider Satisfaction via Implementation of a Standardized Emergency Department Handoff.** Kevin McKelvey, Philip Pazderka
90. **Community Collaboration – Childhood Toxic Stress and Resilience.** Kristine M. Gibson, Jeannette Lia Gaggino, Jamie Harden, Megan Sikkema
91. **Hereditary Chronic Neutrophilia: A Family with a Probable CSF3R Activating Mutation.** Larry Lutwick, Chinton Shah
92. **Penelope's Purulence: A Case of an Infected Pet Pot-Bellied Pig Bite.** Larry Lutwick, Aness Al-Khateeb
93. **The First Reported Case of Mycobacterium paraense sp. nov. in North America.** Larry Lutwick, Elizabeth Kluka
94. **Imported Dengue with Prominent Hepatitis and Neutropenia.** Larry Lutwick MD, Sandra Koehn, Emily Cordes
95. **Prosthetic Hip Infection due to Pasteurella multocida.** Larry Lutwick, Mona M. Sonbol, Nancy Luethy
96. This poster has been withdrawn

POSTER PRESENTATIONS

97. **Pneumococcal Hip Bursitis: Two Cases of a Rare Infection.** Larry Lutwick, Kevin Cates, Deepak Garg
98. **The Basic Science of HIV Elite Control - A Case and Virologic Review.** Larry Lutwick
99. **Communication in the Patient Interview.** Leah Omilion-Hodges, Autumn Edwards
100. **Rudolf Ludwig Carl Virchow: Father of Modern Pathology.** Luis H. Toledo-Pereyra
101. **Doping Amines.** Mark Kanzawa, Sala Sadaps, Sarah Myer
102. **A Complex Crash Course.** Mark Kanzawa, Sala Sadaps, John Cochrane
103. **Lurasidone-Induced Mania: A Case Report.** Mark Kanzawa
104. **Urgent Release of Severe Psychomotor Retardation with Intramuscular Lorazepam.** Mark Kanzawa, Beena J. Premkumar
105. **Quetiapine: A Double Agent.** Mark Kanzawa, Andrea Landesman
106. **A Rare CFTR Mutation Associated with Severe Disease Progression in a 10-year-old Hispanic Patient.** M. Myrtha Gregoire-Bottex, Katherine Soe, Polly Hollenbeck
107. **Caspofungin Resistant Disseminated Candidiasis in T cell Lymphoma.** Manasa Josyula, Michael Schmalz, Arthur Feinberg
108. **It's Always Lupus: An ANA Negative Patient with Lupus Nephritis.** Manpreet S. Narwal, Kanika Jaggi, Larry W. Mann
109. **Meningitis Retention Syndrome: A Rare Case of Saddle Anesthesia and Motor Dysfunction.** Mark Schauer
110. **Self-Poisonings by Kalamazoo Community Mental Health Patients.** Matthew J. Radler, Catherine L. Kothari, Michael R. Liepman, Kathleen A. Gross, Suzanne Suchyta, Alyssa Woodwyk
111. **Successful Use of Acellular Dermal Matrix via a Single Stage Protocol for Volar Finger Soft Tissue Loss: A Case Report and Review of the Literature.** Matthew Jaykel, Todd Ruiter, Matthew Jaykel, Tyler Snoap
112. **Epidemiological Monitoring of Opioid Drug Use, Abuse, and Overdose Deaths in Southwest Michigan.** Michael R. Liepman, Achilles Malta, Ashley Bergeon, Mindie Smith
113. **Treatment for Bath Salts Addiction: Two Cases.** Michael R. Liepman, Matthew M. LaCasse, Matthew J. Radler, Nauman Khan
114. **Three Cases of Interaction between Buprenorphine and Naltrexone:** Michael R. Liepman

POSTER PRESENTATIONS

115. **Henoch-Schonlein Purpura Induced Renal Failure and Bowel Perforation in an Adult Patient.** Monoj Kumar Konda, Sandeep Patri, Hardik Chhatrala, Prince Sidhu
116. **Acute Renal Failure from Interstitial Nephritis Related to Proton Pump Inhibitors in a 39-year-old Patient.** Monoj Kumar Konda, Sumaiya Ansari, Yashwant Agrawal
117. **Hepatocellular Carcinoma presenting as Heart Failure due to Right Atrial Metastasis at the Time of Diagnosis.** Monoj Kumar Konda, Christopher DeFelice, Hardik Chhatrala
118. **Cystic Abdominal Mass Secondary to Distal Obstruction of Neovagina Mimicking Bowel Obstruction.** Monoj Kumar Konda, Sandeep Patri
119. **Chiari Network of the Heart.** Monoj Kumar Konda, Vishal Gupta
120. **Loculated Empyema Caused by Streptococcus constellatus.** Monoj Kumar Konda, Jason Lam, Mark Schauer
121. **Acute Triple Valve Infective Endocarditis Involving Native Valves.** Monoj Kumar Konda, Yashwant Agrawal, Jagadeesh K. Kalavakunta
122. **Aorto-Right Ventricular Fistula Following Percutaneous Trans-catheter Aortic Valve Replacement.** Monoj Kumar Konda, Jagadeesh K. Kalavakunta, Vishal Gupta
123. **Intravascular Leiomyomatosis Presenting as Right Atrial Myxoma.** Monoj Kumar Konda, Jagadeesh K. Kalavakunta, Vishal Gupta
124. **Acute Hypersensitivity Pneumonia in the Disguise of Community Acquired Pneumonia in a Young Exterminator.** Monoj Kumar Konda, Sumaiya Ansari
125. **Impact of Educational Intervention on Discussion of Advanced Directives in an Academic Outpatient Clinic.** Anusha Surender, Matthew T. Siuba, Karthik Kannegolla, Sourabh Aggarwal, Craig Swanson, Thomas A. Melgar
126. **A Rare Case of Corynebacterium Striatum Endocarditis in an Immunocompetent Patient.** Alexander Witte
127. **Structure and Function of Rotavirus Non-Structural Protein 6.** Nafiseh Jandaghi Jafari, Blair Szymczyna
128. **Enhancing After School Program for Mindfulness.** Nicole J. Baker, Timothy H. Truong, Samuel K. Yost
129. **A Rare Cause of Neck Pain in a Pediatric Patient: Spontaneous Septic Arthritis of the Cervical Facet joint.** Oro Enaohwo, Aaron Lane-Davies
130. **A Finite Element Analysis of the Effects of Lateral Meniscus Posterior Root Avulsions on Tibiofemoral Contact Mechanics.** Peter A. Gustafson, Andrew G. Geeslin

POSTER PRESENTATIONS

131. **Failure of a Unicondylar Knee Arthroplasty: A Rare Fracture of a Metallic Prosthesis.** Peter Howard, Bernard Roehr, David Christ
132. **The Age of Resilience.** Peter Longstreet
133. **Contrasting a Case of Paranoia Using Freud's Schreber Case, Bio-reductionism and Jasperian Phenomenology.** Peter Longstreet, Anusuiya Nagar
134. **Diagnosing Tracheoesophageal Fistula-H type.** Rasha Kazi, Joseph Fakhoury, Andrea Scheurer-Monaghan
135. **A Unique Case of Neuroleptic Malignant Syndrome with Medication Withdrawal.** Rasha Kazi, Joseph Fakhoury, Stephen Lee McGinnis
136. **The Importance of Routine Labs.** Robert Baker, Allan Wilke
137. **Preconceived Notions About a "Partier": The Key to Diagnosing a Troubled Mind Is to Keep an Open One.** Ruqiya Tareen
138. **Olanzapine Induced Acute Hepatotoxicity: Do We Overlook this Potential Side Effect?** Ruqiya Tareen, Anusuiya Nagar, Kevin Kunzer, Kathleen A. Gross
139. **Pneumomediastinum in High Flow Nasal Cannula Use for Rhinovirus Bronchiolitis.** Ryan F. Halas, Christopher J. Schmehil, Jason Lam, Sherry Pejka
140. **Multi-Drug Resistant Streptococcus Pneumoniae as a Presentation of Cystic Fibrosis in a Two Year Old Male.** Ryan F. Halas, Theotonius J. Gomes, Bryan Corpus
141. **Ingestion of Lightbulb Fragments as Presentation for Pica Associated with Iron Deficiency.** Ryan F. Halas, Jason Lam, Sherry Pejka
142. **Persistent Hyperinsulinemic Hypoglycemia of Infancy as a Seizure Trigger in a 21 Month Old with Previous Epilepsy.** Ryan F. Halas, Theotonius J. Gomes
143. **Bearded Dragon Exposure Resulting in Salmonella Bacteremia.** Silpa Nadella, Oro Enaohwo, Aaron Lane-Davies
144. **Blue Toe Syndrome in an Adolescent Male.** Silpa Nadella, Sonia Joychan, Saad A. Shebrain
145. **Pulmonary Cavitary Lesion in a Patient with Cystic Fibrosis: A Case of Aspergillus Overlap Syndrome.** Sonia Joychan, McKenzie J. Akers, M. Myrtha Gregoire-Bottex
146. **Basal Ganglia Calcification in Newly Diagnosed Pseudohypoparathyroidism.** Sonia Joychan, Silpa Nadella, Dilip Patel, Daniel Fain
147. **Physician Attitudes Towards Care of Patients With Opioid Use Disorders.** Sonia Motin, Kathleen A. Gross, Michael R. Liepman

POSTER PRESENTATIONS

148. **Analysis of Survival Motor Neuron Protein Expression, Stability, and Variability Over Time in Whole Blood Using a Qualified SMN-ECL Immunoassay.** Steven J. Weber
149. **Unplanned Donation After Circulatory Determination of Death (uDCD) Demonstration Project in Kalamazoo County.** Steven M. Rudich, William Fales, Paul A. Lange
150. **Radial Artery Approach for Diagnostic and Therapeutic Procedures in Peripheral Arterial Disease.** Syed Alam, Daniel Johnston, Mark Rummel, John Munn, Krishna Jain
151. **Recurrent Uterine Papillary Serous Carcinoma Seen as an Isolated Lung Mass Several Years After Completion of Standard Treatment.** Stephanie Chang, Monoj Kumar Konda, Anna Hoekstra
152. **Solitary Lung Metastasis 2 Years After Successful Treatment of Primary Cervical Adenocarcinoma.** Stephanie Chang, Monoj Kumar Konda, Anna Hoekstra
153. **Severe Respiratory Disease from Adenovirus Serotype 7.** Sumaiya Ansari, Christopher Begley, Andrew Whipple, Karthik Kailasam, Jeffrey Wilt
154. **Gliomatosis Cerebri: A Case of a Rare and Lethal Brain Malignancy.** Sumaiya Ansari, Monoj Kumar Konda, Jason Lam
155. **Cameron Ulcer as a Cause of Acute Symptomatic Anemia.** Sumaiya Ansari, Monoj Kumar Konda
156. **Acute Cerebral Infarct and Encephalitis as a Complication of Pansinusitis.** Susan Musyimi
157. **Role of Oxidative Stress in Glucosamine-Induced Insulin Resistance in Rat Liver Cells.** Susan R Stapleton, Sylvie F Coulibaly
158. **Immune Response Following Injury in the Adult Zebrafish Brain.** Susanna R. Var, Darcy M. Trimpe, Christine A. Byrd-Jacobs
159. **5-Year Experience with Pre-Hospital Antiarrhythmic Medication in Pediatrics in a Statewide EMS System.** William Fales
160. **A Retrospective Comparison of the King Laryngeal Tube and I-gel Airways in Out-of-Hospital Cardiac Arrest Initial Experience in a Single EMS System.** William Fales, Tyler Vaughn, Kevin Patel, Colleen MacCallum
161. **Evaluating the Cost and Utility of Mandating Schools to Stock Epinephrine Auto-Injectors.** William Fales, Chelsea Steffens, Benjamin D. Clement, Robert Swor
162. **Evaluating the Utility of the Statutory Requirement of Basic Life Support Epinephrine Auto-Injectors.** William Fales, Benjamin D. Clement, Robert Swor, Jason Wasserman, Jakob Taube

POSTER PRESENTATIONS

163. **Progressive Macrocephaly Leading to Emesis and Seizures as a Presentation of Cavernous Hemangioma in a Nine Month Old Infant.** Theotonius J. Gomes, Ryan F. Halas, Bryan Corpus
164. **Rapid Gram Negative Pathogen Identification Using PCR Diagnostics at Bronson Hospital.** Thomas Beuschel
165. **Feasibility of an Early Discharge Protocol in Patients with New Venous Thromboembolism in an Emergency Department.** Thomas M. Blostica, James M. Curtis
166. **A Novel Technique: Retrograde Fixation Femoral Neck for Combined Femoral Head and Neck Fractures Utilizing Surgical Hip Dislocation.** Jeffrey Freyder, Tyler Snoap, Jason Roberts
167. **Incidence and Epidemiology of Posterior Cruciate Ligament Injuries in National Collegiate Athletic Association Football Players.** Jeffrey Freyder, Andrew G. Geeslin, Christopher W. Uggen, Colleen MacCallum
168. **Open Hip Dislocation Through the Scrotum: A Case Report.** Tyler Snoap, Jason Habeck, Jason Roberts
169. **Bone Grafting around an Antibiotic Nail: A Small Case Series.** Tyler Snoap, Jason Roberts
170. **Bilateral Frostbite of the Hands.** Tyler Snoap, Eric Gallagher, Adam Snoap, Todd Ruiter
171. **MADI: Medication and Allergy Discrepancy Improves.** Tracey Mersfelder, Kevin J. Kavanaugh, Carleigh Zahn, John S. Fleming, Richard D. Card II, T. Kurtis Schubert, Ryan F. Halas, Abhishek Seth
172. **Analysis of Pathogens Responsible for Health Care Associated or Community Acquired Pneumonia in the Intensive Care Unit (ICU).** Tara Longman, Dean Van Loo
173. **Evaluation of a Heparin Infusion Dosing Protocol During Therapeutic Hypothermia.** Tara Holt
174. **Adjunctive Valproic Acid for the Treatment of ICU Delirium.** Tara R. Holt, James M. Curtis, Tyler J. Monroe

STATE-WIDE PATTERNS IN DIABETES SCREENING SERVICE UTILIZATION: COMPARING MEDICAID AND BLUE CROSS BLUE SHIELD OF MICHIGAN

Stephen Anim-Preko; Kathleen M. Baker, PhD; Monica Kwasnik; Rajib Paul, PhD; Elizabeth MacQuillan; Amy Curtis, PhD

Western Michigan University, Department of Geography; Western Michigan University, Department of Geography; Michigan Department Health and Human Services; Western Michigan University, Department of Statistics; Western Michigan University, Department of Interdisciplinary Health Sciences; Western Michigan University, Department of Interdisciplinary Health Sciences

Diabetes is of great concern in the US. Adults having elevated glucose levels are recommended to A1C testing. These screenings help in reducing insurance cost for diabetes-related complications and hospitalizations. Insurance coverage can have a significant impact on which patient obtain these tests as recommended.

Secondary data for a period of three years (2011-2013) from Medicaid, including 13 health plans, and Blue Cross Blue Shield (BCBS) were analyzed for the state of Michigan.

The number of patients recommended to receive diabetes related screenings were compared with the actual rate of screening achieved for the period under study for each provider and health plan. Consideration was given to individual level factors, such as, race, gender and insurance plans associated with the rates of A1C testing.

Counties and prosperity regions were compared to identify geographic disparities in preventive testing rates, particularly in regions with high rates of diabetes. Preliminary results show that the urban-rural interface and type of insurance plan are key factors in understanding patterns of service utilization. For example, in 2013, BCBS screening rates for A1C was 68%; the comparable rate for Medicaid plans were 71%. Results can assist health policy and decision makers with planning diabetes screening interventions in Michigan.

IMPROVEMENT IN SKILL LEVEL OF INTERNS AFTER A FOCUSED TRAINING SESSION AT THE START OF AN ACADEMIC YEAR.

Abhishek Seth, MD; Thomas A. Melgar, MD; Alec Wilson, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

BACKGROUND: In July 2015 the internal medicine program at Western Michigan University Homer Stryker M.D. School of Medicine initiated a program to provide training in essential clinical skills in internal medicine. An intern class consists of doctors, who have gone to different medical schools and have trained in different environments. Due to this variation in training, interns have different strengths and skill levels. We conducted a study of the effectiveness of the program with respect to their self-reported proficiency in different clinical skills before and after receiving training.

MATERIALS & METHODS: Foundations of Clinical Medicine (FoCM) is a program conducted by the Internal Medicine (IM) and Medicine-Pediatrics (MP) department of Western Michigan University Homer Stryker M.D. School of Medicine using simulated patient encounters in the simulation lab.

At the beginning of the program the interns filled a questionnaire in which they self-reported their competency in medical history taking, clinical examination, use of ultrasound and difficult conversations with patients and/or family. Over the next four sessions the interns received close individualized training in these areas by senior residents and the faculty of WMED.

At the end of the program the interns filled the questionnaire again. We compared the two questionnaires to check for changes in their self-reported competence in these skills.

RESULTS: All fifteen IM and MP interns participated in the program. Thirteen residents completed the initial survey and 14 completed the follow up survey. At the beginning of the program the participants had varying levels of confidence in their self-reported proficiency in history-taking and physical examination. All the participants reported no to little prior experience with the use of ultrasound. Most of them had a beginner to intermediate skill levels in communication with families.

At the end of the program they reported improved skills in patient communication, physical examination and history taking. Most of the interns said they felt at ease in the use of the ultrasound and reported an improvement in their ultrasound skills. All the participants said that such a program is essential as it improved their confidence in medical history taking, physical examination and discussion with the family.

CONCLUSION: An educational session like Foundation in Clinical Medicine helps raise the confidence of the interns and improves their clinical skills. Such a program is essential as it prepares the new doctors for the intern year and can help an intern class reach uniform abilities in different clinical skills.

ALL INSIDE ACL: HOW DOES IT COMPARE TO STANDARD TECHNIQUES?

Alexander Connaughton, MD; Christopher W. Uggen, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopaedics and
WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery

1. The all inside ACL technique has become one of the latest new developments in ACL reconstruction. While this new minimally invasive technique is very attractive it is important to see how this technique compares to historical ACL reconstruction techniques. In this article we first perform a systematic review of the All inside ACL literature to identify the limited number of studies available. We then utilize the papers discovered to see how different aspects of the all inside ACL technique compare to standard ACL techniques. We then review all of the clinical patient outcome studies that use the all inside ACL technique that currently exist in the literature. The purpose of this paper is to present information from the literature to help orthopaedic surgeons determine whether current all-inside ACL reconstruction techniques may have a role in their practice.

2. Purpose of the study was to compare the all inside ACL reconstruction technique to standard ACL reconstruction techniques.

3. We performed a systematic review of the literature by using the search term “all inside ACL” in the pubmed search engine from 1980 to December 2015. Our systematic review came up with 280 results. We then only included papers that described the “all inside ACL” technique in the abstract or methods of the papers. After this our search had 38 results. We then decided to include 16 of those papers that were relevant to the topics we were discussing in our paper. Of note we excluded any papers that looked at double-bundle reconstructions. As expected the majority of results in our systematic review search that were not included in our paper described all inside meniscus repairs and posterior cruciate ligament reconstructions. To broaden our search we also performed a more extensive review of the literature by using multiple search terms in the pubmed, scopus, cochrane, and googlescholar search engines. This enabled us to discover more papers describing the all inside ACL technique, different techniques that compared different variables of the all inside ACL, and studies of standard ACL techniques to compare to the all inside ACL.

4. With the current available literature on the all inside ACL technique it appears to be as equally efficacious with potentially lower pain scores in the early post-operative period compared to standard ACL techniques.

5. The all inside ACL reconstruction technique appears to be an equally efficacious and acceptable alternative to standard ACL techniques at this time.

HYPERNATREMIA IN A PATIENT WITH LITHIUM INDUCED DIABETES INSIPIDUS

Uzair Munshey, MD; Allan Wilke, MD

WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine

Nephrogenic Diabetes Insipidus (NDI) is a disorder where the nephrons in the kidney do not adequately concentrate urine, resulting in dilute urine and excessive thirst. In adults this is almost always caused by lithium use. Lithium was the first drug used to treat bipolar disorder and continues to be a mainstay of treatment. In the clinical setting it is imperative to screen patients who are more susceptible to long term and acute side effects of this potent drug. For example, in hospitalized patients with inadequate ability to respond to thirst and inadequate free water replacement, iatrogenic hypernatremia may develop causing neurological symptoms. In this case an elderly patient with history of schizophrenia and long term treatment on lithium for bipolar disease with altered mentation was found to have acute kidney injury. It was found that he discontinued lithium on his own 1 week prior, but levels were therapeutic on admission. After administration of normal saline this patient developed hypernatremia. He began to have continuous dilute polyuria which did not respond to vasopressin administration. Free water replacement was started but unable to normalize sodium levels and his mentation continued to wax and wane. Hydrochlorothiazide and amiloride were started to help normalize sodium levels and clear lithium. Lithium was replaced with Depakote to treat the patient's bipolar disorder. He was able to perform some activities of daily living but required complete assistance with Instrumental Activities of Daily Living. It is difficult to pinpoint the cause of neuropsychological symptoms in a patient switching psychotropic drugs at the same time as hypernatremia. Elderly patients with NDI usually exhibit typical symptoms less frequently, and if they do, they may have concurrent prostate and bladder issues to confound the diagnosis. It is these same patients that are at a higher risk for hospitalization for falls as well as hypernatremia once admitted. In the clinical setting, patients treated with lithium for bipolar affective disorders should be screened for symptoms of excessive thirst or urine. Laboratory screening for these patients may include urine specific gravity from a Urinalysis as a measure of urine osmolality. Hospitalized patients with this history may benefit from hydration with hypotonic fluid to replace hypotonic urine loss. Most importantly, long term lithium patients may develop chronic kidney disease which will interfere with lithium metabolism. In these patients an alternative treatment should be considered.

DIFFUSE ALVEOLAR HEMORRHAGE PRESENTING INITIALLY AS PNEUMONIA, IN A PATIENT WITH SYSTEMIC LUPUS ERYTHEMATOSUS: A CASE REPORT

Amanda Springer, MD; Lindsey Henderson, MD; Kristi Vanderkolk, MD

WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine

Systemic lupus erythematosus (SLE) is a multisystem autoimmune disease of which the exact cause is unknown. Its multisystem nature can lead to secondary complication that can be devastating. One such devastating, rare, and often fatal complication of SLE is diffuse alveolar hemorrhage (DAH). DAH occurs most often in patients with a known diagnosis of SLE. It can present with dyspnea, cough, sometimes hemoptysis, hypoxia, a decrease in hemoglobin, and bilateral infiltrates seen on chest x-ray. Bacterial pneumonia can co-exist with DAH as well.

The case presents a 31 year old, African American female with productive cough, fever, dyspnea, and bilateral infiltrates on chest x-ray, who was admitted and treated for suspected hospital acquired pneumonia. Her clinical course deteriorates despite treatment, and she is transferred to the intensive care unit and intubated. Bronchoscopy performed after intubation, demonstrates friable mucosa and easy bleeding suggestive of DAH. She is successfully treated with high dose IV methylprednisolone. Her course is also complicated by bacterial endocarditis and severe mitral regurgitation.

The case discussion emphasizes the importance of a broad differential, especially when treating patients with an immune-compromising, multi-organ involving disease, such as SLE. It encourages one to consider DAH in the differential, when managing a patient with known SLE, who presents with dyspnea, hemoptysis, and pulmonary infiltrates. Also, if DAH is suspected, start high dose IV steroids and watch closely, as transfer to the intensive care unit may be needed.

RARE CAUSE OF NEONATAL RESPIRATORY DISTRESS: A PINK PUFFER

Manasa Josyula, MD; Anju Patel, MD; Kristen Hastings, MD; Andrea Scheurer, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Detroit Medical Center, Neonatology ICU

INTRODUCTION: Solitary Median Maxillary Central Incisor syndrome (SMMCI) is a rare dental anomaly with prevalence of 1:50,000 live births. SMMCI is characterized by a single central incisor in the maxilla, positioned in the midline. This single incisor is symmetrical and can be present in the deciduous as well as in the permanent dentition. SMMCI is often associated with other structural defects. We discuss a case of SMMCI with congenital pyriform aperture stenosis (CPAS) which presented as respiratory distress in a newborn.

CASE: Patient is an African American female, small for gestational age, born at 38 weeks. Pregnancy was complicated by pre-eclampsia requiring magnesium sulfate during delivery. Infants Apgars were normal but shortly after birth she developed respiratory distress and was admitted to NICU. Physical exam was remarkable for decreased air entry bilaterally, visible and audible puffing sounds from her mouth, mild retractions and mild hypotonia. She did not require oxygen. Feeding tube passed through both nares. Chest X-ray and labs were normal. She was initially started on nasal CPAP but required intubation for worsening respiratory distress. Due to concerns for upper airway obstruction, a CT head and MRI brain were performed which revealed pyriform aperture stenosis and a single median maxillary central incisor. Genetic microarray testing was normal. Pediatric otolaryngologist was consulted who recommended medical management with flonase and saline drops. Her respiratory status improved and she was discharged home without need for respiratory support on day seven of life.

DISCUSSION: SMMCI is often associated with midline structural malformations such as holoprosencephaly, choanal atresia, CPAS, cleft lip/palate, congenital heart disease, intellectual disability, and pituitary defects causing growth hormone deficiency. SMMCI requires orthodontic referral to correct the single incisor by expanding maxilla which includes multiple steps. CPAS usually improves with age but severe stenosis requires nasal stenting. The etiology is unknown however maybe associated with deletion at 18p11 in the TGIF1 gene, missense mutation at 7q36 in the SHH gene, or a mutation in SIX3. Patients may require comprehensive care by a multidisciplinary health team (including pediatricians, orthodontists, geneticists, speech therapists, and psychologists) in order to receive optimal care. Close monitoring of growth and development is crucial.

CONCLUSION: Pediatricians should be aware of SMMCI, its association with other midline structural abnormalities, and should have CPAS in their differential for an infant with unusual puffing type respirations. Head imaging is critical for proper diagnosis and these infants may require multidisciplinary team to optimize outcome.

OFFSPRING PHENOTYPIC EXPRESSION OF MATERNAL BALANCE PERICENTRIC INVERSION OF CHROMOSOME 18

Thomas Pott, MD; Anna Jain, MD; Dilip Patel, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics and Adolescent Medicine

INTRODUCTION: Chromosomal inversion occurs when there are two breaks in a single chromosome. The segment between break points rotates 180° and reinserted itself into the gap remaining. Pericentric inversion occurs when the break occurs in the p-arm and the other in the q-arm of the chromosome including the centromere. When there are no missing segments of DNA it is considered a balanced inversion. This case highlights the phenotypic expression of the offspring of maternal balanced pericentric inversion of chromosome 18.

CASE: Patient is a two hour old newborn male born at 40 weeks 3 days gestation via normal spontaneous vaginal delivery to a G1 P0 20-year-old mother. Maternal history includes a balance pericentric inversion of chromosome 18p11.2q21.3. Maternal family history includes a maternal half sister and mother with a balanced 18p11.2q12.3 pericentric inversion, in addition to MTHFR heterozygosity of maternal grandmother. Maternal grandmother also had a neonatal loss secondary to sinus inversus in addition to a terminated pregnancy mid-trimester due to a duplication of the long arm of chromosome 18 identified by amniocentesis.

Newborn examination reveals anatomic anomalies of the hands and feet (Images 1-5). Right hand reveals a well-formed thumb, index, ring and small fingers. Ring finger has a relatively shallow amniotic band of the middle phalanx with no distal deformity or swelling. Middle finger has deep constricting amniotic band at approximately the level of the proximal phalanx /proximal interphalangeal joint. Distal aspect of the finger has perfusion but some swelling. Distal interphalangeal joint and nail present. Left hand with relatively normal small finger, ring finger slightly shortened, congenital amputation and then a band over the middle and index fingers, thumb maybe slightly hypoplastic. Bilateral feet with 5 toes, clubfoot bilaterally with cavus, adductus, varus and equinus. Passive adduction to 60° bilaterally. Well perfusion to all toes. Remained of newborn examination within normal limits. Spine radiographs reveal mild dextroconvex curvature, no anomalous vertebral bodies or subluxation. Pediatric transthoracic echo cardiogram failed to identify the presence of cardiac disease. Chromosomal testing is currently pending.

CONCLUSION: Phenotypic expression of chromosomal inversion abnormalities is dependent on the location and length of the inversion segment. The closer the break points are to the telomeres of chromosome the greater the chance the child of surviving birth. This case highlights the wide variation a phenotypic expression that it can occur in the offspring of a mother with balanced inversion of chromosome 18 (46xx, inv(18)(p11.2q12.3).

INITIAL PRESENTATION OF ANGIOEDEMA AND HAND FOOT AND MOUTH DISEASE CAUSED BY COXSACKIE B4 VIRUS IN AN ADULT

Aness Al-Khateeb, MD; Sumaiya Ansari, MD; Chris Jacob, DO; Guraminder Thind, MD; Karthik Kailasam, MD; Prashant Patel, DO

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

Coxsackievirus B4 (CVB4) is a common enterovirus that is known to infect most of the general population in infancy and is rarely associated with new onset infections in the adult population. Hand foot and mouth disease (HFMD) is usually caused by the CVA16 strain. Coxsackie is also a rare cause of urticaria and angioedema which is a localized swelling of the deeper layers of the skin and mucous membranes of the upper respiratory and gastrointestinal tracts.

26 year old male with no past medical history presented with 2 day history of rash on his palms and soles which was preceded by hives and angioedema one day prior to their eruption. Physical examination revealed multiple 3-5 mm erythematous non-blanching macular and vesicular rash on the palms, soles, and inside the oral mucosa. The patient received multiple serological test and viral cultures. Labs revealed serology positive for IgM CVB4, but negative for IgG CVB4 and IgM CVA16.

Coxsackie B4 is known to be an antecedent to many immune-mediated inflammatory diseases such as type 1 diabetes mellitus, myocarditis, aseptic meningitis, and pericarditis. Even though the management of HFMD does not change; recognizing the strain B4 as a cause of HFMD is important because it is associated with serious conditions as mentioned above. Therefore, educating the patients about specific signs and symptoms is important so that they may seek medical attention appropriately.

REVIEW OF AN INFREQUENTLY DOCUMENTED RASH

Garrett Koon, DO; Arthur Feinberg, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics

A 14-month-old male presented to outpatient pediatrics clinic with chief complaint of worsening rash. Prior emergency room evaluation yielded diagnosis of otitis media and post viral exanthem with prescription for amoxicillin in addition to symptomatic management of rash. Upon clinic presentation, the rash was reported to be spreading, more erythematous and more papular than previous. Other than rhinorrhea, child was asymptomatic. He was up to date on his immunizations and had never experienced similar rash before. On examination, this is a well appearing child in no acute distress. Physical exam was unremarkable with the exception of his skin. There was a papular, umbilicated rash on his extremities bilaterally, both dorsal and ventral surfaces, as well as on his face, ears and sparsely on his low back. The rash was without diaper distribution and with the exception of his low back the trunk was spared. No blood work or other investigative studies were performed. A visual diagnosis was made based on history and physical. Final diagnosis is Gianotti Crosti syndrome, a.k.a. Juvenile Papulo-vesicular Acrodermatitis. It is most commonly a sequelae of a viral infection. A brief review of differential diagnoses diagnosis includes: Varicella, Molluscum Contagiosum, bed bugs, scabies, and cutaneous drug eruption. Gianotti Crosti is not a well reported rash and often diagnosed as viral exanthem. Though often self-limiting, children must be observed for jaundice as Hepatitis B may be one of the many causative viruses. Our patient was immunized, therefore this infection is less likely. However mother was instructed to observe for jaundice. His history, lack of other symptoms and findings on exam made the other differential diagnoses less likely. Although not rare, Gianotti Crosti syndrome should be more considered by generalists, family practitioners and emergency room physicians alike. Ultimately, as Gianotti Crosti is better reported we may be more conscious of the condition and know its true prevalence so more timely and effective treatment related to specific viral complications may be implemented.

MECHANISM OF PWI MOTIF FUNCTION IN RNA PROCESSING

Blair Szymczyna, PhD; Harry Chanzu

Western Michigan University, Department of Chemistry

The processing of RNA molecules involves a collection of critical and carefully regulated steps and is required in production of human proteins. Incorrect processing can cause or contribute to several diseases, such as cancer and heart failure. Hundreds of proteins are involved in RNA processing and its regulation, but many of the mechanistic details by which they function are unknown. One domain that is found in several proteins that are involved in RNA processing and has an unknown mechanism of function is the PWI motif. The PWI motif is a highly conserved domain that is named after a nearly invariant Proline-Tryptophan-Isoleucine sequence found within its protein sequence, although structurally homologous, non-canonical PWI-like motifs that lack this trinucleotide sequence have been discovered. Three distinct classes of canonical PWI motifs can be defined by sequence homology, the presence of an adjacent sequence rich in positively-charged amino acids and the position of the motif in the protein. PWI motifs adopt a four-helix bundle structure and are involved in the binding of nucleic acids, yet the PWI motif has little to no affinity for nucleic acids itself. In human SRm160, PRP3 and RBM25, optimum binding of the motif to both single and double-stranded DNA and RNA requires the adjacent positively-charged region. The individual roles of the PWI motif and the basic region in nucleic acid binding and the mechanism by which the PWI motif containing proteins associate with nucleic acids are still not clear. We hypothesize that the PWI motif is a protein-protein interaction domain that orients and facilitates ionic interactions of the positively-charged region with nucleic acid molecules. We are currently using site-directed mutagenesis and fluorescence and NMR spectroscopies to determine the stoichiometry of PWI motif binding to nucleic acids, identify the molecular surfaces involved in biomolecular interactions, and determine the roles of dynamic molecular motions in the binding mechanism. Our recent unpublished results from these studies will be presented. Completion of this project will provide a greater insight into the molecular mechanism associated with the PWI motif and guide structural studies of the protein-nucleic acid complex.

PEER-LED DIABETES SELF-MANAGEMENT PROGRAM IN KALAMAZOO: PRELIMINARY RESULTS

Michael A. Behun; Catherine L. Kothari, PhD; McKenzie J. Akers; Peter White; Amy Chonghasawat; Yen-Yu Tina Chen; Thu N. Nguyen; Grant Finlayson

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

BACKGROUND: Type II diabetes mellitus is the 7th leading cause of death in Kalamazoo County as well as in the entire United States. Moreover, nearly 1 in 10 Americans currently suffer from this condition. As such, the primary purpose of this pre-post test study is to determine the effectiveness of a free diabetes self-management program, designed by researchers at Stanford University, when the program is implemented in Kalamazoo County. Secondary and tertiary aims of the study are to improve the overall health of individuals with diabetes mellitus, as well as provide primary care providers with an additional resource to which they may refer their patients for education.

MATERIALS & METHODS: Glycated hemoglobin (HbA1c) is a biomarker used to evaluate blood glucose control spanning a 3-month period; a value $>7\%$ indicates poorly controlled diabetes over the past 3 months. Individuals with type II diabetes mellitus and an HbA1c $>7\%$ will complete a 6-week diabetes self-management program, in which participants meet in small groups for 2.5 hours each week. The focus of this program is for participants to build skills that enable them to better manage their chronic disease by improving problem solving, nutrition, blood glucose monitoring, and working with healthcare providers. HbA1c values will be monitored at 3 months, 6 months, and 12 months post-program and will be compared to a recent pre-program value. Participants will also fill out pre-program and post-program surveys that evaluate subjective information such as severity of diabetes symptoms, frequency of healthy eating, and self-reported skill of self-management.

RESULTS: This study received Institutional Review Board approval in October 2015 and is still recruiting participants. Preliminary data analysis of 8 participants via McNemar's test suggests no statistical difference in nutrition, glucose testing frequency, or diabetes symptoms from workshop day #2 to workshop day #6. However, future analysis will include participants' frequency of physical activity, feelings of self-confidence, and results of a Patient Health Questionnaire depression screening. Our research team hypothesizes a statistically significant improvement in these metrics, as well as a statistically significant decrease in HbA1c at 3 months post-program.

DISCUSSION: This study not only strives to improve the health and well-being of the community, but also expects to contribute to the medical literature by evaluating the program's efficacy for those with an HbA1c $>7\%$. If successful, expansion of this model could help address a relative lack of low cost diabetes education on a local level.

ENDULZA TU VIDA: A TAILORED DIABETIC WORKSHOP FOR THE HISPANIC COMMUNITY

Ana Villalobos, Timothy Wysozan; Catherine L. Kothari, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics

INTRODUCTION: Diabetes is a health concern at a national, state, and local level. In Kalamazoo County, as of 2013, the prevalence of diabetes is 9.3%. The Hispanic community in Kalamazoo is at an increased risk of having diabetes (13.2% prevalence in the Hispanic community nationally versus 7.6% of non-Hispanic whites).

RATIONALE: The purpose of this study is to describe the process and observed effect of a diabetic intervention that was specifically tailored to cater to the needs of the Hispanic community. This is important because there are currently very few diabetic interventions that are targeted at this community, which appears to be particularly vulnerable to diabetes. The creation of a successful diabetic workshop would provide a solid framework for future interventions of the same type. Our hypothesis was that the participants in the program would have an increase in knowledge regarding diabetes after they had successfully completed the workshop.

MATERIALS & METHODS: Study design was a pre-post test without a control group. Participants were recruited by the Hispanic American Council. The intervention, a Spanish diabetes workshop, consisted of one two-hour meeting per week for six weeks. Participants were given information via presentations and interactive activities in Spanish. This workshop was developed entirely from scratch and consisted of numerous topics, including healthy eating, meal planning, exercise, medications, and helpful strategies to talk to physicians. A pre-post test of 12 items was developed to measure knowledge of content prior to and following the workshop. Items included multiple choice and true or false questions. Data was collected via paper surveys and was analyzed using frequencies.

RESULTS: 10 individuals attended at least one workshop session, and 3 attended all of them. Low retention rate was likely due to the workshop extending over six weeks. Pre-test was completed by n=9 participants while the post-test was completed by n=3 participants. The sample size was too small to conduct statistical analysis. Knowledge that diabetes means your body cannot use sugar increased from 44.44% (n=4/9) prior to workshop to 100.00% (n=3/3). Correct identification of diabetic risk factors remained fairly consistent prior to and following the workshop.

CONCLUSION: Despite low retention rates, the idea and approach taken in this study showed potential to reach and educate a vulnerable population. The study began with nine participants and ended with three, indicating initial enthusiasm that waned over the six weeks of the workshop. Future workshops aimed at this population should be carried out over smaller periods of time to improve retention rates and obtain greater sample sizes that may provide adequate power for formally assessing the efficacy of such programs.

PRESENTATION EFFICACY: A COMPARISON OF LECTURE AND POWERPOINT-BASED PRESENTATION METHODS IN THE DISSEMINATION OF MEDICAL INFORMATION

Guston Zervoudakis; Catherine L. Kothari, PhD; Satya Dalavayi

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

INTRODUCTION: Currently, there exist a number of methods utilized to distribute educational information to the general public. These methods include television, radio, newspaper, PowerPoint, brochure, and group discussion, to name a few. It is important to determine the most effective means of dissemination for educational material to the general public for a number of reasons: to efficiently alert and educate the public on current health situations i.e. the recent Ebola outbreak, address common misconceptions of health practices, and to combat inaccurate or dangerous health advice provided by non-credited public sources. By establishing the most effective and reproducible method of disseminating medical information to the general public, it will allow healthcare providers to utilize limited time and resources to efficiently address medical hot topics en masse rather than many times individually.

PURPOSE: The aim of this study was to compare the effectiveness of two presentation methods: lecture-based and PowerPoint-based.

MATERIALS & METHODS: Presentation efficacies were determined by comparing audience performance on anonymous, standardized quizzes distributed before and after presentations. Participants signed up to attend sessions and were given pre-tests with additional questions about education level and position type (health vs. non-health). Following the presentation, participants were given post-tests. To compare the difference in number correct (pre v. post), a two sample t-test was used. To compare the proportion of correct responses for each item, multiple chi-square analyses were completed. Where assumptions were not met, nonparametric alternatives were utilized. SAS 9.4 and a significance level of $\alpha=0.05$ were used for all analyses.

RESULTS: 100% of the test-takers maintained or had an improved post-test score. Overall improvement in total pre- to post-test scores was not statistically significant between the two presentation methods. However, there was statistically significant improvement on two items regarding the treatment of the flu ($p < 0.05$).

DISCUSSION: There were no significant differences when comparing the improvements from the pre- to post-test scores and presentation modality. This may be due to a number of reasons including small sample size, small question bank, high pre-test scores, and complexity of questions. However, both presentation methods showed either a maintenance of score or an improvement, suggesting that education is beneficial.

REFERENCES:

1. Jobson, N., Crowley, T., Coulson, C., & Cahill, D. (2008). Power of powerpoint and role of chalkboard. *Medical Teacher*, 30(6), 640-641. <http://doi.org/10.1080/01421590801947002>
2. Miller, R. (2001). The responsibility of separating truth from myth to patient and family, 91-96.

INCREASING PARTICIPATION RATES OF THE KALAMAZOO SUMMER FOOD SERVICE PROGRAM

Michelle Walker; Jacob Brugger; Brian Cheung; Catherine L. Kothari, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics

BACKGROUND: In 2013, 45.3 million people in the United States, including 15.8 million children, lived below the federal poverty guideline.^{1,2} The Summer Food Service Program (SFSP) was created to provide free, healthy food to children from low-income families during the summer months. Alarming, only about 11% of children who participate in free and reduced lunch programs during the school year participate in SFSP.³ Thus, many children are likely not getting the nutrition they need during the summer.

PURPOSE: Kalamazoo Loaves and Fishes, as a member of the Kalamazoo County Hunger-Free Community Coalition, helps operate the SFSP locally. We sought to investigate the reason for the low participation and to provide an intervention that would draw more children to participate. We intend to help advise KLF on beneficial ways to utilize their monetary and volunteer resources to support the SFSP.

MATERIALS & METHODS: The primary intervention implemented was organized, volunteer-led activities for program participants at SFSP sites. Parents and accompanying adults of SFSP participants were invited to complete one of two forms of survey (depending if there were activities at the site or not), which focused on the impact of activities on their participation. Twelve surveys were conducted at 4 activity sites, and 26 surveys were taken at 7 non-activity sites. Site sponsors tallied total meals served.

RESULTS AND DISCUSSION: Activities did not play a large role in affecting participation, as only 45% of activity site respondents stated 'agree' when asked if activities influenced their decision to participate, while 55% were neutral or disagreed.

CONCLUSION: Our recommendations to KLF include reallocating funds into opening up more sites closer to participants' residences. We advise against continuing to heavily fund activities or scheduling many volunteers to implement activities due to the low yield in drawing participants. In the future, research measuring the impact of new sites or other measures can help to further the fight against childhood hunger in Kalamazoo.

References

1. DeNavas-Walt C, Proctor BD. Income and Poverty in the United States. United States Census Bureau. 2014. Available at: <http://www.census.gov/library/publications/2014/demo/p60-249.html>. Accessed Jan 5, 2015.
2. Coleman-Jensen A, Gregory C, Singh A. Household Food Security in the United States in 2013. United States Department of Agriculture. 2014. Available at: <http://www.ers.usda.gov/media/1565415/err173.pdf>. Accessed Jan 5, 2015.
3. USDA Child Nutrition Tables. National School Lunch Program: Participation and Lunches Served. 2014. Available at: <http://www.fns.usda.gov/sites/default/files/pd/slsummar.pdf>. Accessed Jan 5, 2015.

A STUDY OF CRIMINAL JUSTICE INVOLVEMENT OF PERSONS WITH INTELLECTUAL OR DEVELOPMENTAL DISABILITIES AND ASSOCIATED HEALTH CONSEQUENCES

Garlen Yu; Catherine L. Kothari, PhD; Kathy Lentz; Jeff Patton

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine; Department of Epidemiology and Biostatistics; Kalamazoo County Mental Health and Substance Abuse Services; Kalamazoo County Mental Health and Substance Abuse Services

INTRODUCTION: This abstract intends to explore opportunities for injury prevention and health promotion linked to criminal justice involvement (both as victims and perpetrators), emergency department visits, medical and psychiatric hospitalizations, within the intellectual and developmentally disabled population. The purpose is to fill gaps of information, build a reliable and valid database on people with developmental disabilities, direct policy development, and develop evidence-based practices.

OBJECTIVES: To identify crime victimization and perpetration by adults receiving developmental disability services (DD consumers), and associated emergency department visits and hospitalizations.

MATERIALS AND METHODS: This was a cross-sectional study of all consumers receiving services from Kalamazoo Community Mental Health and Substance Abuse Services (KCMHSAS) in 2009 (N=5906). A database was built integrating administrative records from KCMHSAS, county prosecutor's office, and the two county hospitals for the 2000-2010 period.

RESULTS AND DISCUSSION: Compared to other consumers, DD consumers (N=631) were significantly less likely to have any involvement in police-reported crime (13.2% DD vs. 26.7% non-DD-consumers, $p<.001$). Relative to other crime-involved consumers, DD-crime-involved consumers were more likely to be victims (55.4% DD-victims vs. 36.9% non-DD-victims, $p=.002$). Although a fewer in number, DD-consumers who perpetrated a crime were significantly more likely than non-DD-perpetrators to commit an assault crime as opposed to a property crime (100% DD-perpetrators vs. 80.6% non-DD-perpetrators, $p=.015$). Compared to DD consumers who were not crime-involved, those that were had higher high-school-graduation rates and were more likely to be minority race.

Among DD-consumers, criminal-justice-involvement, regardless if it was as a victim or perpetrator, was associated with greater emergency department visits (63.9% DD-crime-involved vs. 36.9% DD-non-crime-involved, $p<.001$) and increased psychiatric hospitalization (8.4% DD-crime-involved vs. 2.6% DD-non-crime-involved, $p=.005$). Criminal-justice involvement had no measurable association with medical hospitalization rates.

CONCLUSION: While less likely to be crime-involved than non-DD consumers, a notable minority of DD consumers are both victims and perpetrators of crime. This crime involvement is associated with increased emergency department visits and psychiatric hospitalizations.

UNSAFE SLEEP RELATED DEATHS SPIKE IN KALAMAZOO COUNTY IN 2015

Catherine L. Kothari, PhD; Susmitha Daggubati; Terra Bautista

WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics; Kalamazoo College;
Kalamazoo County Health and Community Services, Maternal-Infant Services

INTRODUCTION: Infant deaths (to children under one year of age) account for nearly four out of ten child deaths (ages 0-18) in Michigan every year. The most common preventable cause of infant death is asphyxia associated with unsafe sleep environment. Prevention efforts have shown to increase safe sleep knowledge and practice among healthcare, public health and childcare providers, and crib distribution to low-income families.

PURPOSE: The study goal was to map infant mortality trends related to race/ethnicity and socioeconomic status (SES), including cause-of-death trends.

MATERIALS & METHODS: This surveillance study used vital records data of infant births and deaths in Kalamazoo County Michigan for the period 2010-2015. Birth and death records were obtained from the Michigan Department of Community Health Vital Records Division (for 2010-2013) and the Kalamazoo County Clerks' Office (for 2014-2015 deaths). Individuals were considered low SES if delivery was Medicaid-paid. Race was identified by a parent on the infant death record.

RESULTS AND DISCUSSION: Among the estimated 3,120 annual births in Kalamazoo County, roughly 23% are to women of minority race/ethnicity and 48% are Medicaid-paid low-SES deliveries. During the 2010-2015 period, minority infant death rates were 4.1 times higher than white infant rates and low-SES infant death rates were 2.6 times higher than higher-SES rates. Rates as well as causes varied by race and by SES:

- White/higher-SES rates were the lowest (2.6 deaths per 1000 births) and 96% of them were natural, the most common cause being congenital anomalies (43.5% of deaths)
- Minority/higher-SES rates were five times higher than their White/high SES counterparts (13.0 deaths per 1000 births) and while they too fell into the "natural" (100%), the primary cause was prematurity (66.7% of deaths)
- Among low-SES population, minority death rates were also higher than White, but the differential was not as great: 2.9 RR compared to the 5.0 Black:White RR among higher-SES
- Another key difference between high- and low-SES populations was that the reason for deaths among low-SES infants was more likely to be non-natural (39.2% versus 2.9%); deaths due primarily related to unsafe sleep environments
- 2015 has seen a spike in sleep-related deaths (primarily among minority/low-SES infants), from 18.8% of total infant deaths (2010-2014) to 38.9% in 2015

CONCLUSION: Community-wide, grassroots prevention efforts supporting safe sleep practices are called for. More research into the high rates of prematurity among minority/higher-SES populations is also needed.

MINI-MEDICAL SCHOOL CURRICULUM FOR EARLY INTRODUCTION TO HEALTH CAREERS (EIHC) INITIATIVE FOR KALAMAZOO PUBLIC SCHOOLS

Samuel Lai, Nathan Whelham; Cheryl A. Dickson, MD; Bonny Dickinson, PhD; Jennifer Kim, Stephanie Chang, Audrey Jensen, David Lee, Kim Wells, Xavier Jean

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs; WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019

The Early Introduction to Health Careers (EIHC) initiative is part of a larger effort at WMed to address the educational achievement gap that presents as a barrier to diversification in health professions. As part of our efforts, this pilot program targets 10th graders of underrepresented minorities and disadvantaged backgrounds in the Kalamazoo and Battle Creek public high schools. EIHC aims to foster biomedical science and health career aspirations amongst this target group through an innovative mini-medical school curriculum.

One of the main components of EIHC is to utilize the team-based learning (TBL) approach to involve high school students in science through a healthcare lens. TBL is an instructional technique used at WMed to engage learners in active and team-oriented learning. TBL is an evidence- and collaboration-based-learning teaching strategy designed around a specific topic. An anticipated strength to this learning approach is the ability to facilitate an environment for students to develop a sense of ownership over one's education and intellectual growth. This approach is also aimed to relieve any students' negativity towards science learned through traditional lecture-style teaching.

To this end, we adapted pre-existing TBL modules from WMed's curriculum to an age-appropriate level of difficulty. At the beginning of each TBL, students will individually, then as a small group, take a readiness assessment test (RAT) to gauge their level of knowledge regarding the topic of that session, followed by a large group discussion on answers to the RAT. Following the RAT, students will work in their small groups on application exercises that may contain simulation components to engage them in critical thinking.

For example, a TBL on cardiovascular disease will be presented as a case study with discussion questions covering basic cardiac physiology and cardiovascular disease risk factors. To supplement the educational component, a hands on simulation, such as proper bystander protocol for handling a cardiac arrest, may be integrated with the TBL. Subsequently, students will be given a post-TBL assessment to gauge overall knowledge attainment as well as survey questions to determine whether the TBL was an engaging and effective methodology of learning.

We anticipate that the short-term benefits of EIHC among the students will be greater interest in science and health care careers, and the possible incorporation of TBL in secondary education. We also believe that this approach will help facilitate future diversification of the biomedical community by increasing the number of underrepresented minorities interested in healthcare.

EXPLORATIONS: EFFECTS OF CHEMOTHERAPY ON MATERNAL CANCER AND NEONATAL DEVELOPMENT

Mona Sonbol; Bonny Dickinson, PhD; Heather I. Chen; Patricia J. Choi; Nicole C. Foley; Alan J. Hifko; Sheila Sullivan

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

INTRODUCTION: Breast cancer is one of the most common cancers diagnosed during pregnancy. Physiological changes, such as engorgement, hypertrophy, nipple discharge, and increased firmness and density, that occur during pregnancy will obscure and delay diagnosis. Pregnant women have delayed diagnosis, more advanced cancer, more metastases, and poorer outcomes than non-pregnant women. Healthcare professionals should be aware of the management of pregnant women with cancer and the effect of treatment on child health outcomes.

OBJECTIVE: The purpose of this review is to identify the most appropriate treatment plan for pregnant women with breast cancer to achieve the best health outcomes for both mother and child.

MATERIALS & METHODS: This was a retrospective literature review performed for our Explorations course.

RESULTS: Based on current studies, prenatal exposure to chemotherapy or systemic therapy does not appear to significantly impair cardiac, cognitive, and gross development of the fetus. However, studies recommend radiation therapy be done post-partum as there may be various potential risks to the fetus. In addition, pregnancy termination does not seem to significantly improve the outcome. Taken together, maternal cancer diagnosed during pregnancy can be treated with appropriate guidelines to protect the fetus.

CONCLUSION: It is the aim of this review to help guide the decision making process of prenatal and perinatal breast cancer patients as well as the physicians treating them. While it can be an emotional time it can be reassuring to know that treatment has no effect on cardiac function, cognitive function and overall health of the infant regardless of the treatment modality or decision to withhold treatment. Our recommendation is to continue the gold standard of treatment for breast cancer and to educate patients about mother and child health outcomes.

THE EXPERIENCE OF TEACHERS MANAGING ATTENTION DEFICIT/HYPERACTIVITY DISORDERS (ADHD) IN CLASSROOMS AT MILWOOD MAGNET MIDDLE SCHOOL

Mona Sonbol; Cheryl A. Dickson, MD; Tarannom Shoghi; Alyssa Woodwyk; Abby Childs

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine; Department of Epidemiology and Biostatistics; WMU Homer Stryker M.D. School of Medicine, Department of Clinical Research

INTRODUCTION: Attention Deficit Hyperactivity Disorder (ADHD) is a commonly diagnosed behavior disorder amongst school-aged children in the general-education environment. Structured and consistent interventions are crucial to assist students with ADHD, since ADHD behaviors are disruptive to the learning environment if a management plan is lacking. Many teachers convey concerns regarding their ability to successfully educate ADHD students; and many express lack of training as the potential underlying problem.

RATIONALE: The purpose of this study is to determine the amount of experience of the teachers at Milwood Magnet Middle School in dealing with students with physician-diagnosed ADHD, and their level of comfort in managing ADHD behaviors. The data from this study will assist us in determining the need for training teachers in managing ADHD behaviors in the classroom within this community.

MATERIALS & METHODS: The data was obtained by conducting a survey, which included information on teachers' level of education, ADHD training, and self-reported comfort with recognizing and managing ADHD behavior. The survey also included a vignette section in order to objectively determine the ability of teachers to recognize ADHD behavior. Descriptive statistics were obtained for all variables. Correct answers were stratified by formal training (Yes/No), comfort identifying ADHD (Yes/No), and highest level of education.

RESULTS: Results are reported as mean (standard deviation) with a maximum total correct of 4. For those that received formal training, the average number of correct responses was 2.67 (0.58). For those that did not receive formal training in identifying ADHD, the average number of correct responses was 1.50 (1.20). For those who felt comfortable identifying ADHD, the average number of correct responses was 2.50 (1.26). For those who did not feel comfortable identifying ADHD, the average number of correct responses was 2.00 (1.26). Only one respondent had 1-3 years teaching experience, and they answered zero questions correctly. For those that had 4-6 years teaching experience, the average number of correct responses was 2.50 (0.710). For those with 7 or more years teaching experience, the average number of correct responses was 1.67 (1.22).

CONCLUSION: Due to a small sample size of only 12 teachers, we are unable to draw conclusive results about the community as a whole. However, based on these results, receiving formal training is beneficial for teachers' ability to identify and appropriately correct ADHD behaviors in the classroom. We can improve the learning environment for all students in the classroom by providing teachers with training in managing ADHD behavior.

VIEWS ON THE STATE OF MENTAL HEALTH COLLABORATION IN KALAMAZOO, MI

Cody Overmyer; Cheryl A. Dickson, MD; Serena Chen; Olivia Fournier; William Rasmussen; Daphne Sy;
Alyssa Woodwyk

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics

Integrated behavioral healthcare has been shown to reduce symptoms in patients with mental and physical multimorbidity in national literature; however, the few studies that exist have shown great variability in the attitudes of health care providers in different communities. Characterizing provider perceptions about the state of behavioral healthcare is essential in deciding what interventions are most appropriate to improve care in a given community.

This descriptive study evaluates and contrasts the opinions of primary care providers (PCPs) and behavioral health case managers (CMs) in Kalamazoo, MI, by inquiring about issues such as interorganizational communication and the referral process between PCPs and behavioral health providers (BHPs). By reviewing these opinions, we hope to suggest changes to provide better care for mental health consumers in Kalamazoo.

Information was gathered through cross-sectional surveys of Kalamazoo Community Mental Health and Substance Abuse Services (KCMHSAS) CMs and PCPs at Family Health Center and WMed clinics, which are organizations that provide the majority of care for Medicaid patients in this community. The surveys gathered opinions on the importance of collaboration between the two populations as well as its current efficacy.

Both CMs and PCPs expressed a need for a more direct way of communicating and a need for increased mutual exchange of information about medications, treatment plans, and status changes. 100% of CMs and 86% of PCPs agreed that communicating regularly with each other is important for providing quality care to their mutual patients; however, only 5% of PCPs agreed that it is easy for them to communicate with a patient's BHP and only 10% find the referral process efficient for patients. 90% of PCPs agreed that patient care would improve if their facility had BHPs on-site. Additionally, 90% of PCPs agreed that they would benefit from using a simple screening/treatment toolkit for behavioral health complaints.

This study suggests that PCP and CM attitudes are in alignment with the concept of integrated behavioral healthcare, agreeing that same-site access to BHPs would improve care. Many PCPs indicate a desire for more efficient updates on patient care changes, but do not feel that communicating with their patient's BHP is easy to accomplish. Providing a behavioral health toolkit for PCP use and improving lines of communication, possibly by utilizing a standardized form passed between the PCP and BHP via the CM, appear to be the most appropriate next steps for the Kalamazoo community.

CHILD TRAUMA EDUCATION AT DOMESTIC VIOLENCE SHELTERS

Cynthia Bishara; Cheryl A. Dickson, MD; Samarth Bhandari

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

INTRODUCTION: Children are greatly affected by domestic violence in their household. Being a victim or witnessing abuse can be a very traumatic experience. Experiencing trauma in childhood can have long lasting mental and physical consequences. Therefore, it is important to recognize child trauma and intervene early.

RATIONALE: Domestic violence shelters, like the YWCA, work with a vulnerable population and serve as an opportunity to screen children for trauma. This study aimed to use a child trauma training program to help employees recognize the signs and symptoms of child trauma.

MATERIALS & METHODS: An educational training PowerPoint session was developed using information from the DSM-V and The National Child Trauma Stress Network Child Trauma Toolkit for Educators. Two ten-question surveys were self-developed for this study. One assessed knowledge about child trauma, and another assessed comfort levels screening for child trauma. The answers to the knowledge survey were discussed in the training module. A set of identical pre and post surveys were given to 17 YWCA employees to determine the effect of the training session. Pre-test and post-test comfort level scores were tabulated by adding the score of four questions with responses such as “Not at all(0), Somewhat(1), Neutral(2), Comfortable(3), Very comfortable(4) for a combined maximum score of 16”. Statistical analyses were performed using SPSS 23. Pre-test and post-test scores were tabulated using paired sample T-tests. Out of the four domains - recognition, comfort, knowledge on milestones, and motivation, comfort level increased the most.

RESULTS: The mean age of the employees is 38, with most being female. Surprisingly, 56% of the employees experienced trauma themselves as a child. The average combined pre-test comfort level score was 9.88 out of 16 compared to the post-test score of 12.35 out of 16. There was a statistically significant difference ($p=0.000$) between the pre-test and post-test scores of comfort level. For the knowledge based quiz, the average pre-test score was 6.7 questions correct out of 10. The post-test average was 7.71 questions correct. There was also a statistically significant difference ($p=0.001$) between the pre-test and post-test scores of comfort level.

CONCLUSION: The educational PowerPoint that was presented to the domestic violence shelter employees significantly improved both comfort level in recognizing and screening for child trauma and also the knowledge level regarding child trauma. With this newfound comfort and knowledge, we are hoping the staff is better equipped to recognize children in need of further psychiatric evaluation.

EVALUATION OF ACCESS TO HEALTHCARE IN KALAMAZOO COUNTY

Jennifer Chao; Cheryl A. Dickson, MD; H. Arad Abadi; Andrew Selles

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018;

INTRODUCTION: The Affordable Care Act expanded the number of people with health insurance through the expansion of Medicaid and by offering more insurance options at lower prices. However, with the increase in number of insured people, the access to primary care centers that accept new patients has been a challenge. There is anecdotal evidence that many primary care practices in Kalamazoo County do not accept new patients. Currently, there is no concrete evidence that access to primary care for newly insured persons is an issue. The goal of this study is to evaluate the relationship between type of insurance, income, and zip code with access to health care and satisfaction with the care received.

RATIONALE: The results will help elucidate the relationship between the type of insurance and the ease of access to care in the community. This could be used as evidence to improve local policies.

MATERIALS & METHODS: Upon Bronson IRB approval, the anonymous and voluntary survey will be distributed through electronic newsletters of a few local organizations to their members, and the paper survey will be distributed and collected with the help of other partnering institutions in Kalamazoo County. Any adult ages 18 years or older is welcomed and encouraged to participate in our survey. The survey will ask the participant to share his or her age, gender, ethnicity, household income and size, zip code, and insurance type. Furthermore, it will ask a series of questions that will gather information regarding the ease of access to care, type of care, location where the care was received, and level of satisfaction of the care. Survey results will be collected and analyzed by descriptive statistical methods.

RESULTS: To Be Determined. (Pending the IRB approval)

CONCLUSION: To Be Determined. (Pending the IRB approval)

REDUCING NO-SHOW RATES AT THE FAMILY HEALTH CENTER

John Livingstone; Cheryl A. Dickson, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs

INTRODUCTION: The Family Health Center on Paterson Street (FHC) has had an appointment attendance rate of approximately 50% throughout 2013-2015 for advanced scheduled appointments. This equates to roughly 4000-5000 missed appointments each year, a considerable loss in revenue, and delays for patients who are trying to schedule an appointment. One method of improving appointment attendance rates is to remind patients of their appointments more frequently and through different means of communication. The FHC previously used front desk staff to manually call and remind patients of their appointments approximately one day prior to their appointment date. Unfortunately, only 66% of patients were called in this manner. The FHC also handed out appointment reminder cards at the front desk but they were difficult to read and underutilized.

PURPOSE: The objective of this study is to reduce the no-show rate at the FHC by implementing new and improved appointment reminder cards and implementing an automated appointment reminder system that emails, calls, or texts patients about their upcoming appointments.

MATERIALS & METHODS: Appointment attendance was measured before and after the implementation of the new appointment reminder cards and the automated appointment reminder system. Attendance was quantified by no-show appointments and no-show rate. A no-show is defined by the FHC as a missed appointment or by a patient who arrived for their appointment more than 7 minutes late. Data was also collected on patient satisfaction, employee satisfaction, and other phone data such as call wait time, call queue length, and call abandonment rate to look for effects of using the automated appointment reminder system.

DISCUSSION: No show data was compared before and after the new appointment cards were implemented on July 15th of 2015 and were shown to have no statistically significant difference with a $p > 0.05$ for the Chi Square and Fisher Exact test.

Data is still being collected to determine the effect of the automated appointment reminder system which was officially implemented on February 5th of 2016.

CONCLUSION: It can be concluded that the newly improved appointment reminder cards had no significant effect on no-show rates at the FHC. As more data is collected conclusions can be drawn about the effect of the automated appointment reminder system.

HEALTH NEEDS ASSESSMENT OF THE HOMELESS AND PRECARIOUSLY HOUSED POPULATION OF KALAMAZOO

Nicholas Beam; Cheryl A. Dickson, MD; Eric Edewaard, Rohan Kedar, Joshua Szykowski, Lance von Bracht, Eleanor Yu

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

INTRODUCTION: Unstably housed individuals are a medically underserved population. Nationally, they have higher rates of mortality, uncontrolled diabetes and hypertension, psychiatric diagnoses, and usage of acute hospital services compared to the general population. In Kalamazoo, many homeless and precariously housed individuals utilize services at Ministry with Community, a daytime shelter. We designed and implemented a survey to identify chronic health concerns as well as challenges and barriers to health in this low-income, unstably housed population. We anticipated providing guidance to efforts addressing the healthcare needs of these individuals.

MATERIALS & METHODS: An anonymous, voluntary health assessment was administered to members of Ministry with Community over a two-month period. Survey administration occurred in a one-on-one interview setting to minimize literacy concern with this population. The survey included questions on a wide variety of aspects of health including chronic health, physical activity, nutrition, and substance use.

RESULTS: Seventy-one individuals completed this survey. Survey results revealed that sixty-three members or 88.7% of individuals were insured. Among the insured, 92.3% were covered under Medicare/Medicaid. In addition, 94% of members reported suffering from at least one chronic health condition. Of these health conditions, members predominantly suffered from physical disability (40.8%), high blood pressure (38%), migraines (33.8%), and heart issues (21.1%). In addition, transportation (46.5%), poor home environment (42.3%), and poor diet (36.6%) were rated as the most common barriers to managing chronic health.

DISCUSSION: The results of this study highlights the success of Medicaid expansion and community enrollment efforts in facilitating the acquisition of health insurance by those previously uninsured. Remarkably, the percentage of insured individuals in our study was comparable to the general populations of Kalamazoo County and Michigan. Despite the high insurance rate, significant barriers to consistent, high quality care remain. The need for this care is made apparent by the significant burden of chronic disease in this population. Notably transportation issues and poor home environment were the greatest perceived barriers to managing health. We believe that future community interventions should focus on mitigating these obstacles.

CONCLUSION: While the remarkable insurance rates among the homeless are heartening, significant barriers remain to this population in managing their health conditions. This indicates that additional community investment is needed to reduce disparities in healthcare delivery.

HOW TO LIKE MATH AGAIN: AN ECOLOGICAL STUDY IN THE IMPORTANCE OF HIGH-SCHOOL MATHEMATICS COURSEWORK

Tyler Harris; Cheryl A. Dickson, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs

It has been said that there are three kinds of people in this world; people who can count and people who can't. It has also been said that students who score higher on standardized testing in areas of mathematics are more likely to progress to college. Studies have shown that college students are more likely to graduate if they took higher mathematics courses in high school. In short mathematics is one of the best predictors for progression and success in post-secondary education. Although many areas around educational success and mathematics have been studied, research specifically looking at progression to college and mathematics courses taken in high school is scarce. This ecological study seeks to answer the question: does a correlation between the highest level of math taken in high school and progression to a postsecondary education exist? This study focuses on high school students from the state of Michigan and uses data gathered by the National Center for Educational Statistics (NCES). This study highlights the importance of mathematics courses in high school education and their ability to help students succeed in future schooling.

AN UNFORTUNATE CONSEQUENCE OF ATRIAL FIBRILLATION

Andrea Landon, DO; Chris Jacob, DO; Karthik Kannegolla, MD; William Nichols, DO

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Bronson Methodist Hospital, Adult Critical Care

INTRODUCTION: Renal infarction is a rare condition caused by embolic or thrombotic occlusion or vasospasm of the renal artery. While valvular or ischemic heart disease, endocarditis, hypercoagulopathy, hematologic disease and renal artery dissection can be risk factors for it, atrial fibrillation remains the most common causal factor. Below we describe a patient with renal artery thrombosis related to paroxysmal atrial fibrillation that was complicated by hemorrhage stroke.

CASE DESCRIPTION: A 74 year old man with history significant for atrial fibrillation that had been treated by catheter-directed ablation 9 years prior, presented to the hospital with acute, sharp periumbilical pain that woke him from sleep and then moved to the right flank. Cardiac monitoring revealed paroxysmal atrial fibrillation. His abdomen was soft with tenderness to palpation on the right lower quadrant and the right flank. Urinalysis was normal, labs revealed acute kidney injury and a normal lactate. CT of the abdomen revealed complete thrombosis of the right renal artery and a patent left renal artery with several wedge-shaped defects in the left kidney. Heparin infusion was started and catheter-directed thrombolysis to the right renal artery was performed with patency restored. Creatinine peaked at 2.2 mg/dL, but trended back down to a baseline of 1.2 mg/dL. On hospital day three, the patient became encephalopathic, a head CT revealed an acute right-sided hemorrhagic infarct with 8mm of midline shift. This was determined to be a hemorrhagic conversion of an ischemic stroke that was presumably from an atrial thrombus that had formed during atrial fibrillation. The patient was managed conservatively. Following a prolonged hospitalization, our patient was discharged to a rehabilitation facility for continuation of therapy for residual neurologic deficits.

CONCLUSION: In our patient's case, continued oral anticoagulation following catheter ablation may have prevented or lowered the risk of a renal artery infarct. It is difficult to predict what the patient's kidney function would have been if thrombectomy was not performed, but the limited data available suggests that the patient would not have required hemodialysis. Finally, we would advise considering investigation for ischemic stroke in the setting of atrial fibrillation and renal artery thrombosis, as the frequency of stroke is much higher than renal artery thrombosis. This case demonstrates the need for careful evaluation of the utility of therapeutic procedures and comparison of expected benefit to possible risk.

A SEVERE COMPLICATION OF CHRONIC OTITIS MEDIA

Chris Jacob, DO; Christopher Di Felice, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

INTRODUCTION: Serious complications of middle ear infections are rarely seen in North America currently, as treatment is readily available. However, in situations where patient compliance or follow-up is limited, the risk for serious complication persists.

CASE DESCRIPTION: A 26 year old man presented to the hospital with acute onset severe, diffuse headache, nausea, and vomiting. He reported no neck stiffness, rigidity, or visual disturbance. He has had clear yellowish drainage from the left ear over the past year, and bloody, purulent drainage over the past two months that had not responded to courses of amoxicillin/clavulanate and trimethoprim/sulfamethoxazole. Outpatient consultation with otorhinolaryngology was pending at the time of admission. On examination, the left ear canal was swollen and pale. Clear drainage was present and air bubbles were noted to exit out of the tympanic membrane. Serum WBC was elevated to 15.8K cells/uL. CT of the head showed complete opacification of the left mastoid air cells and partial opacification of the external auditory canal and middle ear. Cerebrospinal fluid analysis showed 6,980 WBC/uL (91% polynuclear), 260 RBC/uL, 11mg/dL glucose, and 469mg/dL protein. Vancomycin, ceftriaxone, and dexamethasone were started empirically. Vancomycin and dexamethasone were discontinued and ceftriaxone was continued for 7 days and then transitioned to oral levofloxacin. The patient's headache abated early in hospital course, but the ear drainage persisted. CSF antigen testing was positive for *Neisseria meningitidis* groups A, C, Y, W135, however growth was not observed on culture. CT of the temporal bones with contrast and MRI of the brain were performed and showed a 2.2 centimeter soft tissue mass in the left mastoid air cells, and chronic inflammatory changes in the left middle ear cavity extending into the left membranous labyrinth and intracranial extension into the left internal artery canal involving the left seventh and eighth cranial nerve complexes, consistent with chronic mastoiditis-otitis media and cholesteatoma formation. On recommendation from otorhinolaryngology, the patient was referred to a specialty center for advanced surgical repair.

DISCUSSION: This case illustrates the potential of life-threatening complications from an ear infection. While this outcome is already very rare with modern medical therapy, it is seen with even less frequency in patients who are not immunocompromised. While *Neisseria meningitidis* has been implicated as a cause of otitis media previously, it has been rarely implicated in otitic meningitis. This case demonstrates the importance of appropriately treating infections promptly, maintaining close follow-up and ensuring symptom resolution.

INJURY-INDUCED NEURONAL TURNOVER WITH ZINC SULFATE AFFECTS CILIATED OLFACTORY SENSORY NEURONS MORE THAN MICROVILLOUS OLFACTORY SENSORY NEURONS IN THE ADULT ZEBRAFISH

James Hentig; Christine A. Byrd-Jacobs, PhD

Western Michigan University, Department of Biological Sciences

BACKGROUND: Zinc is a crucial element used in various cold and allergy medications and is also a common olfactotoxin that has resulted in anosmia. The olfactory system is vulnerable to toxic insult and as such exhibits natural neuronal turnover, making it a good model for regeneration studies.

OBJECTIVE: Our aim was to examine differential effects of zinc sulfate on olfactory sensory neuron (OSN) subtypes in the adult zebrafish. We hypothesized that chemical ablation of the olfactory epithelium with zinc sulfate would result in the loss of ciliated OSNs and the ability to perceive bile salts.

MATERIALS & METHODS: Fish were anesthetized and 1M ZnSO₄ was infused into the right olfactory organ, while the left served as an internal control. Immunohistochemistry was used to examine morphological changes in the olfactory epithelium, while a cell specific marker, anti-calretinin, was used to quantify the degeneration and regeneration of mature OSNs. Scanning electron microscopy was used to characterize the apical ultrastructure of neuronal subtypes following chemical insult. A behavioral analysis measuring responses to distinct odors allowed examination of the effect on neuronal function.

RESULTS: Histological analysis showed severe morphological disruptions 2 d after exposure: the olfactory organ was highly inflamed and presence of anti-calretinin was significantly reduced. After 5 d, inflammation had subsided, anti-calretinin labeling began to return, though the olfactory epithelium appeared thinner than controls. By 10 d, the olfactory organ resembled control in morphology and in presence of anti-calretinin labeling. The ultrastructure of unlesioned olfactory organs displayed densely packed ciliated OSNs. At 2 d following chemical insult, the apical surface of the sensory region was absent of ciliated structures, while microvillous OSNs and non-sensory structures remained. At 5 d, areas of ciliated OSNs were observed, and at 10 d the sensory area resembled controls. The behavior assay demonstrated that at 2 d fish could not detect bile salts or amino acid mixture. Given 10 d to recover, the ability to perceive amino acids was regained, but it was not until 14 d that the ability to detect bile salts recovered.

CONCLUSION: Thus, structure of the olfactory organ returns prior to function, and microvillous OSNs recover before ciliated OSNs, showing differential effects of this chemical on neuron subtypes.

Supported by NIH-NIDCD #011137 (CBJ), NSF-REU DBI-1062883 to WMU (JTH), WMU College of Arts and Sciences (JTH), WMU OVPR (JTH), and the Lee Honors College Research and Creative Activities Scholarship (JTH).

PLASTICITY OF MITRAL CELL DENDRITIC MORPHOLOGY IN THE ADULT ZEBRAFISH OLFACTORY BULB FOLLOWING DEAFFERENTATION

Joanna Dickens; Christine A. Byrd-Jacobs, PhD

Western Michigan University, Department of Biological Sciences

BACKGROUND: Afferent input is known to be critical to the maintenance of adult brain structures. The removal of sensory input to the olfactory bulb of adult zebrafish, accomplished through ablation of the olfactory epithelium, results in numerous effects including a decrease in bulbar volume. To study this effect on a cellular level, mitral cells, the primary output neurons of the olfactory bulb, were examined. The dendritic arbors of neurons are complex structures, with their shape and synaptic connections necessary for the maintenance of neuronal structure and function.

RATIONALE: Within the adult brain the cellular interactions that moderate dendritic morphology are not yet well understood. Our hypothesis is that permanent removal of sensory input will result in a decrease in complexity of the dendritic arbors of mitral cells within the olfactory bulb. We further hypothesize that temporary removal of sensory input will also decrease the complexity of dendritic arbors of mitral cells, but these effects will be reversed with reinnervation.

MATERIALS & METHODS: The olfactory epithelium of adult zebrafish was permanently ablated using a small-vessel cautery iron and temporarily removed through repeated intranasal infusion with the detergent Triton X-100 every three days for 8 weeks. Mitral cells were identified using retrograde tract tracing with a fluorescent dextran applied to the olfactory tracts of whole brains in culture. Projection images were obtained using whole-mount confocal microscopy, and the dendritic arbors were traced with an image analysis program. Dendritic traces were used to quantify the total number of major dendritic branches, their length, and the size of the dendritic field. Overall dendritic complexity was determined using a modified Sholl analysis.

RESULTS: Following 6, 8, and 20 weeks of permanent deafferentation there were significant reductions in the total number of dendritic branches, the length of those branches, and the size of the dendritic field compared to internal control ($p < 0.05$). Following 8 weeks of temporary deafferentation there were similar significant decreases ($p < 0.05$), and following 8 weeks of recovery the number of major branches, length of major branches, and size of the dendritic field returned to near control levels.

CONCLUSION: Sensory innervation is critical for the maintenance of mitral cell dendritic morphology in the adult zebrafish. This study provides a model that will allow for future investigations into dendritic plasticity and the potential for recovery of output neurons in the adult brain following injury or disease.

LOSS OF SPECIFIC OLFACTORY SENSORY NEURONS IN ZEBRAFISH AFTER CHEMICAL EXPOSURE

Tara Maser; Christine A. Byrd-Jacobs, PhD

Western Michigan University, Departments of Chemistry and Biological Sciences; Western Michigan University,
Department of Biological Sciences

BACKGROUND: The zebrafish is an important model organism for studying vertebrate neural plasticity because of the natural turnover of olfactory sensory neurons (OSNs) and quick regeneration after damage. The three main types of fish OSNs are ciliated, microvillous, and crypt neurons that are distinct in structure and behavior. Ciliated OSNs detect bile salts that are important for social behaviors, microvillous OSNs detect amino acids that are important for feeding behaviors, and crypt neurons appear to mediate sexual cues. Previously, our lab has shown that chemical ablation of the olfactory organ using zinc sulfate results in the degeneration of ciliated sensory neurons 2 days after treatment along with the loss of bile salt detection, however, microvillous sensory neurons still remain as well as the ability to detect amino acids. This suggests that microvillous OSNs may be more resistant to damage in order to retain the ability to detect food stimuli.

RATIONALE: Our hypothesis is that neurons mediating reproductive and social behavior are more sensitive to damage while neurons required for food detection are more resistant. The purpose of this study is to show that after chemical treatment with Triton X-100 ciliated neurons are lost due to damage, but microvillous and crypt neurons remain.

MATERIALS & METHODS: Adult zebrafish were intranasally infused with 0.7% Triton X-100 and were allowed to recover for 24 hours post treatment. OSNs were identified using either anti-Hu (all OSNs), anti-TrPC2 (microvillous OSNs), anti-Gasolf (ciliated OSNs), and anti-S100 (crypt and some microvillous OSNs). Comparisons in the amount of label were made between the treated side and the internal control side.

RESULTS: One day following Triton X-100 treatment there is a reduction in anti-Gasolf and anti-Hu labeling compared to the internal control side and untreated control fish. There were no differences noted in amount of anti-TrPC2 and anti-S100 label. This suggests that ciliated neurons are no longer present and there is an overall reduction of OSNs in the olfactory epithelium; however, microvillous and crypt sensory neurons remain after chemical exposure.

CONCLUSION: This study provides a further investigation into the prospective resilience of microvillous sensory neurons and the retention of food sensing abilities after chemical damage. This work has relevance to general neuroprotective mechanisms that ensure proper functioning of sensory input after toxic insult.

SOCIAL DETERMINANTS OF PNEUMOCOCCAL AND INFLUENZA IMMUNIZATION RATES OF NURSING HOME AND HOMES FOR THE AGED RESIDENTS IN KALAMAZOO AND CALHOUN COUNTIES, MICHIGAN: ROLE OF RACE AND SEGREGATION

Cynthia Schauer

University of Alaska, Public Health, Anchorage

The disparity in health outcomes between African Americans and Caucasians continues to exist (US ACMH, 2009) despite public policy that promotes equity (US DHHS, 2012). Data suggests African Americans over age 65 living in institutions are less likely to receive flu and pneumonia vaccinations (US DHHS, 2013; US DHHS, 2012) and more likely to live in segregated housing (Smith, Feng, Fennel, Zinn, & Mor, 2007). This project collected data on the local level to determine vaccination rates and assess the potential impact of segregated housing on African Americans in Southwest Michigan. Data regarding flu and pneumonia immunization status was collected from 816 residents in 13 nursing homes (NH) and homes for the aged (HFA) in two southwest Michigan counties by voluntary survey of facility administrators. The populations of African Americans in the NH and HFA was much less dense than the population of African Americans in the counties where the nursing homes were found suggesting no potential increase risk on the basis of segregated housing for the erosion of community immunity at this local level. However, a disparity in immunization rates persisted on the local level: Caucasians were 4.7 times (odds ratio = 4.7; $p > 0.001$) more likely than African Americans to be immunized against flu and 1.7 times (odds ratio = 1.7; $p = 0.002$) more likely to be immunized against pneumonia. All facility residents spent the majority of their time with nursing assistants, a group of health care workers least likely to have received the annual seasonal flu vaccine. Fifty seven percent of nursing assistants in the study NH and 80% of nursing assistants in HFA had received the vaccine compared to 74% and 100% of registered nurses in NH and HFA, respectively.

IMPACT OF PROCALCITONIN ON APPROPRIATE ANTIBIOTIC DAYS IN PATIENT WITH LOWER RESPIRATORY TRACT INFECTIONS: A RETROSPECTIVE STUDY

Katelin Anderson; Dean Van Loo, PharmD

Ferris State University College of Pharmacy, Pharmacy Student; Bronson Methodist Hospital, Pharmacy Services

BACKGROUND: There is data to suggest that procalcitonin can be a useful tool in guiding antibiotic therapy in patients with lower respiratory tract infections.

OBJECTIVE: The primary objective of this study is to determine if procalcitonin levels are being used to guide antibiotic therapy in patients with Chronic Obstructive Pulmonary Disease who present to Bronson Methodist Hospital with lower respiratory tract infection.

MATERIALS & METHODS: This study is a retrospective chart review of patients diagnosed with Chronic Obstructive Pulmonary Disease who present to Bronson Methodist Hospital with a lower respiratory tract infection. The primary outcome of this study is to determine if patients with Chronic Obstructive Pulmonary Disease who receive procalcitonin levels have a greater number of days of appropriate antibiotics. Secondary outcomes include length of antibiotics and length of stay.

RESULTS: Although the statistics have not been run on the data, it appears that there is no difference in appropriate antibiotic days between patients who received a procalcitonin compared to those that did not.

CONCLUSION: This study could provide data needed to adopt a procalcitonin guided algorithm for antibiotic use in lower respiratory tract infections at Bronson Methodist Hospital and ultimately promote antibiotic stewardship.

INGESTION OF A HICKORY TUSSOCK CATERPILLAR: A CASE REPORT

Anna Jain, MD; Dilip Patel, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics

INTRODUCTION: A 10 month old previously healthy male presented to ED with drooling and refusal to swallow. Symptoms began suddenly. He was playing in a corner of his grandmother's day care, located in a barn, when he began to cry and scream. Grandmother reports that patient began to drool excessively and refused to swallow anything, including saliva. Mother reported mild rash around his mouth with mucosal irritation of his lips that had resolved on arrival to ED. Parents were concerned for foreign body ingestion but reported that when symptoms began, patient had been playing in an empty corner with a walker. He was taken to ED where XR was performed for suspicion of foreign object ingestion. XR was negative for radio-opaque object. He was observed over 10 minutes, making no effort to swallow. As symptoms persisted, Pediatric GI was consulted and performed EGD for concern for radiolucent foreign object. During procedure, multiple small white filaments were found embedded in esophageal mucosa. These filaments were difficult to remove as they broke apart when pulled. Ultimately, small biopsies were done to remove these filaments. Pathologic exam revealed scattered eosinophils and filaments were described as "white-pink soft tissue up to 0.2-0.3 cm". During this procedure, Grandmother thoroughly searched patient's play area and reported that "the only thing [she] could find was a half a caterpillar". Based on EGD findings, filaments could be consistent with caterpillar hairs. The half-caterpillar was examined and filaments appeared to match hairs covering the body of the caterpillar. Furthermore, caterpillar has been preliminarily identified as a Hickory Tussock caterpillar, known to cause contact dermatitis. Poison control was contacted and recommended treatment with Benadryl and Pepcid with possibly steroids and/or viscous lidocaine for persistent symptoms. Patient improved, was discharged in two days and remains healthy today.

CONCLUSION: The Hickory Tussock or *Lophocampa caryae* caterpillar is native to the eastern United States. When provoked, these insects will extend hairs that barb into predators and cause contact dermatitis. There are many reports of skin contact with these insects but few reports of ingestion. One report identified a few cases in Pennsylvania where children presented with drooling, refusal to drink, and diffuse urticaria, similar to this patient. Review of literature suggests that this may be the first documented case of Hickory Tussock ingestion in Michigan.

BENIGN PAROXYSMAL TORTICOLLIS OF INFANCY

Manasa Josyula, MD; Dilip Patel, MD; Aaron Lane-Davies, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Bronson Pediatric Hospitalist Service and Bronson Pediatric Referral Service

INTRODUCTION: Benign paroxysmal torticollis of Infancy (BPTI) is a rare self-limiting disorder characterized by recurrent episodes of head tilting accompanied by periods of irritability, ataxia, emesis and weakness. It occurs within the first few months of life, it usually improves by 2 years and typically resolves by 3 years. It is often underdiagnosed and leads to unnecessary extensive workup. We describe a case of an 11-month-old infant with BPTI.

CASE: An 11-month-old Caucasian female presented with emesis, weakness in upper extremities and torso, accompanied by neck tilting towards the right. Her symptoms started 1 day prior to admission, with sudden onset of weakness in extremities and torso causing her difficulty in crawling and imbalance while sitting. She had 6-7 episodes of emesis. Mom reported she was irritable and crying. Past medical history is significant for intermittent torticollis (alternating between right and left) that started at 4-5 months of age. 3 months prior to admission she had a similar episode of the weakness of torso and emesis. She was seen in emergency department, had lab work which was normal. Her symptoms improved in 6-8 hours and the patient was sent home. Family history is significant for dad having severe migraines. On physical exam, she had right-sided torticollis and difficulty supporting her head and torso while sitting. CBC, electrolytes, C-reactive protein, cortisol were normal. Creatinine kinase 176. The patient was given IV fluids and within 4-5 hours her weakness improved and her emesis was controlled.

DISCUSSION: BPTI is most commonly reported in females than males (3:1). It often presents as early morning retrocollis, later torticollis, often triggered by postural changes. The etiology of BPTI is unknown, but it is postulated to be due to disorders in the central vestibular region or vestibulocerebellar connections, especially when ataxia is associated. Neurologic exam between attacks, EEG and MRI done are often normal. BPTI has a strong correlation with migraines and can be associated with neurodevelopmental delay. A national, telephone survey of pediatricians, showed only two out of 82 (2.4%) pediatricians stated that they were aware of the condition telling us that BPTI is underdiagnosed.

CONCLUSION: All pediatricians should be aware of BPTI which is self-limiting and does not require medical therapy. It is a migraine equivalent and should be in our differential in patients presenting with torticollis and transient weakness.

PERCEPTIONS OF LOW SOCIO-ECONOMIC FAMILIES ON BARRIERS TO ACCESSING FREE HEALTH SERVICES

Andrew Chen, Diti Ronvelia; Catherine L. Kothari, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics

Many low-socioeconomic families under-utilize free health care services, which can lead to poorer health outcomes. We seek to identify barriers that low-socioeconomic members of our community may face when attempting to access healthcare services for their children

We investigated this by conducting a qualitative study consisting of two thirty-minute semi-structured interviews with parents of children identified as those in need based on their enrollment in Medicaid and free/reduced lunch at Lincoln Elementary school. We interviewed two parents by asking them a list of eight open-ended questions, who then shared their experiences with the healthcare system with us. Their responses were collected by audio recording and reviewed. Common themes were identified which provided insight into the healthcare barriers that they have experienced.

Our interviews with the parents indicate that the most significant barrier experienced by them was a lack of knowledge of what benefits their Medicaid plans provided them for their children. Although these parents had health insurance for their children, they were unable to easily find providers that would accept their insurance plans. This was due to several reasons, including a lack of concise information about the benefits of their insurance plan, which one parent described as “overwhelming”. One parent also claimed that transportation to the doctor’s office serves as a major barrier. Additionally, long wait times to see a primary care doctor or dentist sometimes results in them forgoing these services completely, and seeking immediate care at an ER.

Based on the results of the interviews, there is anecdotal evidence that some parents have a lack of information pertaining to what health care services are covered by their Medicaid insurance resulting in difficulties finding a primary care doctor and receiving regular dental and eye care. This signifies the need for an improvement in the delivery of health care resource information in a clear, concise manner that these families can understand. Possibly a readily available list of providers who accept Medicaid would greatly diminish the frustration of finding the right provider. Addressing long wait times at the doctor’s office might also increase the utilization of healthcare services by these parents. Furthermore, this population would benefit from easier accessibility to transportation services to the doctor’s office.

CARDIAC TAMPONADE AS A RESULT OF RIGHT ATRIAL RUPTURE IN BLUNT TRAUMA PATIENT

Hira Hasnain, MD; Jerry Pratt, MD

WMU Homer Stryker M.D. School of Medicine, Department of General Surgery

BACKGROUND: Blunt chest trauma resulting in rupture of cardiac chambers is associated with high mortality rates, frequently causing immediate death on scene. Cardiac rupture in a blunt trauma setting results in 0.16-2% of hospital trauma admission. Diagnosis of cardiac tamponade in such settings may be delayed as patients are often seen with other associated injuries as well. Intra-abdominal, orthopedic, and head or spinal cord injuries requiring immediate attention can delay proper workup and identification of fatal cardiac contusions, chamber ruptures, and tamponade. However, in a blunt trauma patient with hypotension refractory to fluid resuscitation, a high index of suspicion should be held for cardiac injuries.

CASE REPORT: Here we present a case of a 46-year old male with cardiac tamponade secondary to a right atrial rupture following a motor vehicle accident. The patient was treated with a pericardial subxiphoid window for evacuation of hemopericardium and definitive repair of injury using a median sternotomy approach and use of cardiopulmonary bypass. This case is of particular interest due to the uncommon location of rupture at the right atrial - inferior vena cava junction resulting in cardiac tamponade in the setting of blunt trauma.

DISCUSSION: In a review of 160 trauma autopsy cases with cardiac injuries, 96.9% of cases were noted to have cardiac rupture, of which 6% were found in the right atrium. The most common locations for cardiac rupture in blunt trauma were the left ventricle (29.3%), followed by right ventricle (21.8%). Death on scene was noted for the majority of cardiac injury victims. For the patient discussed in this report, persistent hypotension not responsive to resuscitative efforts was a key indicator of cardiac injury. As the patient was stable upon immediate evaluation, a CT scan was performed which revealed a pericardial effusion. He was taken to the operating room where a pericardial window evacuated over 1 L of blood, requiring conversion to median sternotomy and eventual repair of right atrial rupture under cardiopulmonary bypass.

CONCLUSION: Cardiac injuries prove to be fatal in a large majority of blunt trauma cases. However, for those patients who reach the hospital, prompt identification of a cardiac injury requires a high index of suspicion and efficient diagnostic evaluation.

PROTEIN ANALYSIS BY DESORPTION ELECTROSPRAY IONIZATION MASS SPECTROMETRY

Elahe Honarvar

Western Michigan University, Department of Chemistry

Desorption Electrospray Ionization (DESI) is a method that allows the detection of organic molecules from ambient surfaces by mass spectrometry. Imaging of tissue samples by ambient mass spectrometry is an important new pathology tool and is used for tumor detection and identification, to study drug action and other important applications. Unfortunately, DESI-imaging is currently limited to the analysis of small molecules such as lipids, fatty acids, and small molecule therapeutics. Developing the ability to analyze proteins and determine their spatial distribution in tissues and cells would make imaging DESI-MS much more useful.

DESI is challenged by a molecular mass dependent loss in signal response. When proteins are analyzed by DESI-MS, the sensitivity decreases with increasing molecular weight, limiting the useful analytical range to proteins smaller than 25 kDa. By using Spray Desorption Collection and Reflective Electrospray Ionization - new tools we developed to decipher mechanistic aspects of the DESI technique - we demonstrated that this loss in sensitivity originates primarily from the incomplete dissolution of large biomolecules such as proteins into the desorption spray solvent during the millisecond timescale of the process. Learning the cause of the problem allowed us to propose improvements to the DESI experiment. Some preliminary results on our current efforts to improve on the detection of proteins by DESI-MS will be presented.

“GANGRENOUS FINGER” PROVEN TO BE AN ACUTE GOUT FLARE IN A PATIENT WITH SEVERE GOUTY ARTHRITIS

Eric Gallagher, MD; Todd Ruiter, DO

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics, Orthopedic Surgery

INTRODUCTION: Gout is a commonly encountered pathology and can be very symptomatic. Knowledge of the pathophysiology and clinical manifestations of gout is essential for timely diagnosis and treatment.

CASE REPORT: A 64-year-old female with severe gouty arthritis presented with 1 week of progressively worsening left small finger pain, erythema, and swelling. Gout was suspected but septic arthritis could not be excluded. Aspiration was performed which revealed uric acid crystals. She was diagnosed with an acute on chronic gout flare. Oral colchicine and oral prednisone were begun with great improvement over the course of 24 hours.

DISCUSSION: Hyperuricemia is the most important risk factor for developing gout. The clinical manifestations of gout are secondary to this crystal-induced inflammation. Classically involving the first MTP joint, acute flares are more common in lower extremity than upper and typically involve only one joint. Symptoms include a rapid onset of pain, swelling, and functional limitation of the involved structure. Erythema and local soft tissue inflammation are often present and can be quite severe. Features of chronic gout include tophi, joint arthropathies, and joint deformity. The mainstay of acute treatment is rest, ice and NSAIDs. Colchicine is another option for treating an acute flare. In refractory cases corticosteroids can be used. Studies have shown corticosteroids to be as effective as NSAIDs. The data does not support that any of the treatment options are more efficacious; therefore, treatment should be based on individual cases. Management of chronic gout attempts to prevent acute flares and long-term sequelae. The recommendation is to maintain serum uric acid levels below 6mg/dL. The medications available for treatment are either uricostatic, uricosuric or uricolytic agents. Uricostatic agents, allopurinol and febuxostat, decrease urate production through inhibition of xanthine oxidase. The mainstay of treatment is allopurinol; when contraindicated febuxostat can be used. Uricosuric agents, benzbromarone, probenecid, and sulphinpyrazone, are used in a minority of patients when allopurinol is ineffective or contraindicated. Uricolytic drugs, rasburicase and polyethylene glycol-uricase, are able to rapidly lower serum urate levels but have limited use due to potentially severe side effects and limited efficacy data.

CONCLUSION: Gout can present a diagnostic dilemma due to the clinical similarities with septic arthritis and other inflammatory arthritides. Our patient demonstrates the clinical features of both chronic gout and an acute gout flare. Initiation of colchicine and prednisone relieved her symptoms but long-term therapy is critical to prevent recurrence.

SPONTANEOUS ARTERIAL HEMORRHAGE OF THE HAND RESULTING IN COMPARTMENT SYNDROME

Eric Gallagher, MD; Todd Ruiter, DO

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics, Orthopedic Surgery

INTRODUCTION: Acute compartment syndrome (ACS) is serious diagnosis requiring emergent intervention. It is necessary for all practitioners to have a basic understanding of the diagnosis and treatment of ACS so that urgent consultation and timely intervention can occur.

CASE REPORT: A 70-year-old female presented to the Emergency Room with severe pain and swelling of her hand. She reported that it gradually worsening over the course of two days without a history of trauma to the hand. She was on Coumadin and was found to be supratherapeutic with an INR of 5.3. Serial examinations noted an expanding hematoma, worsening pain, and evidence of acute compartment syndrome. She underwent emergent evacuation of the hematoma and limited compartment release. She had no pain or limitations with activities of daily living at her 3 month postoperative appointment.

DISCUSSION: Most commonly ACS results from high energy injuries to the tibia or forearm and occurs within the first 36-72 hours after injury. Early findings are pain with passive muscle stretch and swollen tense compartments. Pain out of proportion to injury is a common finding that should prompt high suspicion. These symptoms progress to sensory deficits and muscle weakness. Very late findings are pallor, pulselessness, paralysis, and poikilothermia. These late findings represent complete ischemia and a poor prognosis.

The diagnosis of ACS is mostly clinical. If findings are inconclusive it is important to have an accurate and reliable way to measure compartment pressures. The three most commonly used instruments are the arterial line manometer, handheld Stryker system and Whiteside manometer. Studies have shown that side-port needles and slit catheters are more accurate than straight needles. The arterial line manometer is the most accurate method. The Stryker needle is also very accurate. The Whitesides manometer may be the least precise instrument.

Sources vary on what pressure constitutes ACS. Some define ACS as a difference between diastolic blood pressure and compartment pressure measuring <20 mmHg. Others define it as a difference between MAP and compartment pressure of <30 mmHg. Others, an absolute compartment pressure >30 mmHg. These cut-offs should be used as an adjunct to clinical symptoms.

CONCLUSION: Compartment syndrome is a surgical emergency that can have severe consequences if left untreated. Presenting signs and symptoms guide diagnosis but often invasive pressure measurement is necessary. Our patient had an excellent outcome due to timely diagnosis and urgent release.

CHRONIC SUBTALAR SUBLUXATION IN A PEDIATRIC PATIENT

Eric Gallagher, MD; Nicholas Miladore, MD; Robert Gorman, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Bronson Orthopedic Trauma Foot & Ankle Specialists

INTRODUCTION: Subtalar dislocations are a rare injury typically resulting from a high energy impact. However, low energy and isolated subtalar dislocations have also been described, with less frequency. Clinical outcomes vary, depending upon the mechanism of injury, direction of the dislocation and other associated injuries. Studies have described treatment of subtalar subluxations acutely, but to our knowledge no reports exist of treatment of a chronic subtalar subluxation. This case describes a chronic subtalar subluxation in a pediatric patient who successfully underwent operative repair with good results nine months after surgery.

CASE REPORT: An 11-year-old male presented for evaluation after several months of left ankle pain. Four months prior, while running at school, he sustained an inversion type injury. He was originally diagnosed with an ankle sprain but after months of symptoms he was referred to an Orthopedic Foot and Ankle specialist for further evaluation. Examination and advanced imaging revealed a chronic subtalar subluxation. Due to the nature of the injury and persistent pain, stiffness, and deformity, operative intervention was recommended. He underwent open reduction and K-wire fixation followed by 6 weeks of non-weight bearing. At 9 month follow up, he had only occasional pain with uneven ground and mildly diminished subtalar motion.

DISCUSSION: Subtalar dislocations are well described in the literature but this is a very rare injury in the pediatric patient. To our knowledge there are no reports of chronic subtalar subluxation in a pediatric patient. One case series of ballet dancers describes acute subtalar subluxations treated with reduction and rehabilitation with variable results. Another case describes a fixed subtalar subluxation in a pediatric patient without antecedent trauma that was successfully treated with closed reduction and casting. We describe our technique of open reduction and k-wire fixation resulting in a positive outcome at nine month follow up. This case demonstrates the need for high clinical suspicion and critical review of the x-rays when presented with low energy, inversion type injuries that are not improving.

CONCLUSION: Although rare, chronic subtalar subluxations can result from a low energy inversion injury. Even rarer, occurring in a pediatric patient can make the diagnosis and treatment difficult. We conclude that chronic subtalar subluxations can be successfully treated in pediatric patients with open reduction and K-wire fixation. High clinical suspicion is needed and early advanced imaging may be necessary to aid in the diagnosis of this extremely rare injury.

REGULATION OF CHRONIC INFLAMMATION IN ENDOTHELIAL CELLS BY OXIDIZED FATTY ACIDS

Gabriel Cole; Abbie Brackman; Piao Jian Tan; James Springstead, PhD

Western Michigan University, Department of Chemical and Paper Engineering

Coronary heart disease is now one of the leading causes of death in men and women in the United States. Epoxyisoprostane (EI) has been proven to downregulate the monocyte recruitment pathway (including Monocyte Chemotactic Protein-1 known as MCP-1) in human aortic endothelial cells (HAECs), however the mechanism by which EI acts in endothelial cells is unknown. Our central hypothesis is that EI binds one or more proteins in endothelial cells; an initial event leading to the downregulation of MCP-1. In these studies, candidate protein GRP78 is deregulated by siRNA in HAECs, and effects on gene expression are measured with real-time PCR. Additionally, recent research indicates that eating walnuts improves cholesterol levels, and improves the function of the small arteries and vessels within the body. The research also suggests that gene regulation by several other epoxyisoprostanes and neuroprostanes should be analyzed in order to determine chemical moieties that are important in regulation of the monocyte recruitment pathway. We compare these results with HAEC treatment with known chronic inflammatory mediators OxPAPC, oxidized 1-palmitoyl-2-arachidonoyl-sn-glycero-3-phosphocholine. We have determined that Interleukin (IL-8) and Hemeoxygenase (HO-1) are upregulated by both epoxyisoprostanes and neuroprostanes, while MCP-1 is differentially regulated. This element is downregulated by epoxyisoprostanes and upregulated by neuroprostanes. Particular differences in chemical structure may account for these differences in regulation.

CAUSTIC INGESTION OF LAUNDRY DETERGENT PODS

Patrick Staso, MD; Garrett Koon DO

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics;

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics

INTRODUCTION: Imagine you are a 14 month old helping out with laundry. You see a soft, squishy, bright colored block which resembles an oversized gummy candy. What would you do next?

This is an all too familiar occurrence recently seen in Pediatric floors and Emergency departments. With the innovation of Tide Pods® and other detergent pods, we have seen an increase in caustic ingestions leading to esophageal and gastric erosions, strictures, airway compromise and even subsequent death. Though, the most common symptoms include nausea, vomiting, cough, drowsiness, ocular burns, and rash. These seemingly non-threatening pods are actually concentrated compounds of an ionic detergent, cationic surfactant, and a non-ionic detergent. While all brands contain irritants, some also contain alkaline substances. The polyvinyl membrane is easily soluble when exposed to a mucous membrane that releases its contents further down the alimentary and/or respiratory tracts. Between 2012 and 2013, the US poison control center received 17,000 calls reporting laundry detergent pod exposure among children younger than 6 years of age with the following year only increasing in incidence. I believe it is imperative for the community to be educated and informed on the potential dangers of these seemingly helpful detergents.

OBJECTIVE: We will demonstrate this to fellow clinicians with a case presentation and expand on knowledge to evaluate and treat patients with suspected and confirmed ingestion. We will inform the community on possible dangers of detergent pods and how to proceed if an accident should occur.

MATERIALS & METHODS: Thorough literature review recent on treatment and statistical data related to detergent pods. We will describe an actual case with results and outcomes.

RESULTS AND DISCUSSION: With extensive research it was found that avoidance of the incident was proven best with education to the community. When ingestion did occur there were two major pathways one would take depending on known or uncertain ingestion and presence or absence of symptoms. Questionable ingestion would have investigation including a history and physical as well as monitoring for 2-4 hours. Certain ingestion with mild symptoms and no airway compromise required an esophagogastroduodenoscopy (EGD) within 24 hours and definite ingestion needed EGD under anesthesia.

DISCUSSION: In summation, laundry detergent pod ingestion should be examined quickly and the public should be informed of its possible risk.

ISOLATED NATIVE TRICUSPID VALVE STREPTOCOCCUS GALLOLYTICUS ENDOCARDITIS INITIALLY PRESENTING AS PNEUMONIA

Geneva Sagun, MD; Yashwant Agrawal, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

BACKGROUND: Streptococcus gallolyticus infective endocarditis (IE) is associated with colon cancer and liver disease. Native valves are often affected, most commonly aortic alone, followed by combined aortic and mitral, then mitral alone. Tricuspid valve S.gallolyticus IE is rare with seven cases reported in literature. We report a case of isolated tricuspid valve S.gallolyticus IE in a patient without underlying colon malignancy or liver disease.

CASE: 80 year old female with history of mitral valve prolapse (MVP), ulcerative colitis (UC), and no illicit drug use was admitted with fevers, chills, cough, tachypnea, tachycardia, leukocytosis, and elevated inflammatory markers. Azithromax and ceftriaxone were started to treat pneumonia based on bilateral infiltrates on CXR and gram positive chains and pairs in blood. Later, blood culture identified S.gallolyticus prompting ECHO.

DECISION-MAKING: Transesophageal ECHO revealed large isolated tricuspid valve vegetation without perivalvular abscess. During admission, patient developed pleuritic chest pain, respiratory distress, and back pain. Chest CT angiography demonstrated pulmonary emboli requiring rivaroxaban treatment. MRI spine indicated degenerative disk disease without discitis, osteomyelitis, or epidural abscess. Abdominal CT was negative for hepatobiliary pathology or colon tumor. Colonoscopy showed only chronic active colitis. With preserved cardiac function, subsequent negative blood cultures, and clinical improvement, patient was not a surgical candidate and completed four weeks of ceftriaxone treatment.

CONCLUSION: Cases of S.gallolyticus IE warrant imaging and endoscopy to evaluate underlying cause given its association with colon cancer and hepatobiliary disease. As our case was negative for both, her risk factor was underlying UC. Interestingly, despite pre-existing MVP, our case had isolated tricuspid valve involvement. As such, S.gallolyticus' predilection for native healthy valves and its association with inflammatory bowel disease requires further investigation. Furthermore, clinicians must maintain low threshold to suspect complication of pulmonary emboli as it occurs in 70-80% of cases.

Hardik Chhatrala, MD; Christopher Begley, MD; Andrew Whipple, MD; Courtney Barrett, DO; Sean Pippen, MD; Emily Cordes, DO; Joanne Baker, DO; Valerie Duhn, MD; Dominik Ochocinski

CONCLUSION: This quality improvement study demonstrated that Nephrology referral rates in patient with stage 4 CKD can be improved through a resident education intervention, ultimately leading to quality patient care.

UNEXPLAINED MYALGIA IN THE SETTING OF INTERSTITIAL LUNG DISEASE: THINK ABOUT ANTISYNTHEASE SYNDROME

Hardik Chhatrala, MD; Monoj Kumar Konda, MD; Sandeep Patri, MD; Sumaiya Ansari, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

BACKGROUND: Polymyositis (PM) and dermatomyositis (DM) are idiopathic inflammatory myopathy syndromes characterized by proximal muscle weakness and antibody mediated muscle inflammation. DM has additional characteristic skin features. Interstitial lung disease (ILD) in the inflammatory myopathies often occurs in the setting of antisynthetase antibodies (a group of myositis-specific antibodies directed against histidyl-tRNA synthetase). These antibodies are associated with a constellation of clinical findings, including fever, ILD, myositis, Raynaud phenomenon, non-erosive arthritis, and/or cracking/thickening of finger pad skin (mechanic's hands) called antisynthetase syndrome.

CASE: We present a 61-year old African American male with a history of two emergency room visits in the past 5 months where he had received oral antibiotics, prednisone bursts and bronchodilators for what appeared to be an atypical pneumonia with a possible reactive airway disease. Mild creatine kinase elevation noted during those visits was attributed to statin induced myopathy and it was discontinued. He had never recovered fully from those episodes from a respiratory standpoint. He again presents with a 2-month history of gradually worsening myalgia/weakness of proximal muscles along with acute respiratory distress. Exam revealed bibasilar crackles, tenderness and mild decrease in strength of proximal muscles; no skin changes or joint problems were observed. Moderately high levels of muscle enzymes (creatine kinase, myoglobin, aldolase) were noted with normal kidney function. Chest X-ray demonstrated worsening patchy bilateral airspace opacities more pronounced over lung bases.

CT chest with contrast noted multifocal ground glass opacities and interstitial marking pointing towards a cryptogenic organizing pneumonia (COP) versus eosinophilic pneumonia. The latter was ruled out by a bronchoalveolar lavage. Negative respiratory bacterial, fungal, viral and acid-fast bacilli cultures pointed against an underlying infectious etiology. Transbronchial biopsies showed acute pneumonitis with evidence of organization which established a working diagnosis of COP. Treatment with empiric high dose steroids improved his respiratory distress and muscle weakness. ANA titers were >1:640 with atypical speckled pattern. Among many myositis-specific antibodies, anti Jo-1 antibody was positive. Electromyography demonstrated irritability myopathy of proximal muscles but muscle biopsy showed atrophy of 2B fibers without any inflammation/necrosis. A diagnosis of cryptogenic organizing pneumonia in the setting of antisynthetase syndrome was established. Patient was discharged home on tapering doses of prednisone after improvement in his breathing, resolution of muscle weakness/tenderness and serial decline in creatine kinase levels.

CONCLUSION: Antisynthetase syndrome should be a part of differential diagnosis in patients presenting with unexplained interstitial lung disease, especially with evidence of myositis.

THE RNA-BINDING MECHANISM OF ROTAVIRUS NON-STRUCTURAL PROTEIN 3 (NSP3)

Harry Chanzu; Blair Szymczyna, PhD

Western Michigan University, Department of Chemistry

Rotavirus is a member of the Reoviridae family of viruses and can cause severe, life threatening gastroenteritis in children under the age of five. Rotaviruses consist of an 11-segment double stranded RNA genome which encodes for 12 different proteins. Six of the proteins are structural proteins (VPs), while the other six are non-structural proteins (NSPs) and are believed to play regulatory roles in the replication cycle of the virus. Some rotavirus NSPs are believed to encode proteins that hijack cellular machinery, thereby enhancing virus replication and suppressing cellular processes. Mechanisms that enhance the translation of rotaviral messenger RNA (mRNA) molecules and suppress the translation of cellular messenger RNA molecules are important in the replication cycle, but not fully understood. Rotavirus mRNAs have a 5'-cap structure and a conserved tetranucleotide sequence at the 3'-end (GACC), which are believed to play a role in the regulation of virus protein synthesis. One model is that host translation machinery is specifically directed to viral mRNA by NSP3, which plays a role that is analogous to the eukaryotic poly (A) binding protein (PABP). The unique N-terminal, RNA-binding domain of NSP3 binds the 3'-end of rotavirus RNA molecules, while the C-terminal protein interaction domain recruits ribosomal machinery to the 5'-end of the RNA molecule. Since NSP3 sequesters the ribosomal machinery, the recruitment is also believed to play a role in inhibiting the expression of host proteins at the translational level. Although this model of function is supported by experimentation, gene knock-down experiments suggest that NSP3 is predominantly involved in other processes using unknown mechanisms. Consequently, we hypothesize that NSP3 is a polymorphic protein than can potentially bind to other, unknown biomolecules. To determine the binding mechanism of the NSP3 RNA-binding domain to its target sequence and to assess its potential to bind other molecules, our laboratory is using NMR spectroscopy and other biophysical techniques. Our recent unpublished results from these studies will be presented. Determination of the NSP3 functional mechanism will provide an important insight into the regulation of host and virus protein synthesis and potentially facilitate the identification of small molecule inhibitors of the assembly process.

RISE IN NARCOTIC-RELATED DEATHS IN SOUTH-WEST MICHIGAN

Heather I. Chen; Joyce deJong, DO

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

HYPOTHESIS: In South-West Michigan, there has been a surge in overdose-related deaths in the last few years, from 2 in 2008 to 151 in 2014. We think the majority of these deaths are due to narcotics and that the proportion of narcotic-related deaths has risen significantly in the past 7 years.

MATERIALS & METHODS: Toxicology data from 468 autopsy reports representing all deaths ruled a drug overdose in the region from 2008-2014 was compiled in a database. We then assessed trends in drug overdoses involving fentanyl, heroin, hydrocodone, methadone, morphine, and oxycodone during this time. Cocaine related deaths were assessed as a potential indicator of overall illicit drug use increasing. Individuals with multiple drugs in their system were included in the counts for each drug. Our analysis compared deaths that involved each drug to the total number of accidental deaths of that year. Statistical Process Control (SPC) charts were utilized and RStudio 3.1 was used for analyses.

RESULTS: The number of accidental overdose deaths compared to total accidental deaths rose from 4% in 2008 to 42% in 2015. We found that over the time period of 2008 to 2014, the proportion of overdose deaths related to fentanyl rose by 7.7%; oxycodone by 6.7%; hydrocodone 10.4%; and heroin by 11.4%. The changes seen in the death rates related to cocaine, methadone, or morphine were not significant.

CONCLUSION: Overall, we have concluded that there is statistically significant evidence that narcotic drug overdoses are increasing significantly in southwest Michigan. Since this trend has also been seen in other parts of the United States, we think that preventing narcotic-related deaths should garner more attention as a public health issue.

EYE TRAUMA ON THE ICE

Hou-en Joseph Hui, MD

WMU Homer Stryker M.D. School of Medicine, Primary Care Sports Medicine

CASE:

- **HISTORY:** 28 year old male professional hockey player gets into an altercation on the ice during an away game. Patient sustains multiple blows to the face and orbit from a gloveless opponent.
- **PHYSICAL EXAM:** Gen: no nausea or vomiting. HEENT: bilateral ecchymosis of the periorbital, periorbital edema present subconjunctival hemorrhage, no obvious bony deformity, mild enophthalmos and mild hypoglobus. Tenderness to palpation around the entire globe, guarding. No subcutaneous emphysema after brief nose blowing. Extraocular movements intact bilaterally and symmetric. No difficulties with upward gaze. Mild blurred vision without double vision. PERRLA.
- **DDX:** Impure vs pure orbital fracture with entrapment vs w/o entrapment, Contusion, Closed Injury to the Orbit, Corneal edema vs abrasion, Retinal/Choroid trauma, Optic neuropathy.
- **TESTS RESULTS:** CT Facial Bones w/o contrast: medial orbit fracture and inferior orbit fracture with herniation without extraocular muscle entrapment. 5 days s/p injury patient was evaluated by a plastic surgeon for surgical intervention. 10 days s/p injury, patient underwent surgery with synthetic implant fixation.
- **FINAL DIAGNOSIS:** Medial and inferior blowout fracture without entrapment

DISCUSSION: Common signs and symptoms associated with orbital floor fractures include in descending order: periorbital ecchymosis, diplopia, subconjunctival hemorrhage, and enophthalmos. This patient demonstrated all but diplopia. Robust guidelines for when to order a CT scan currently do not exist. It is important to recognize extraocular entrapment as a serious sequela of blowout fractures; however, its incidence is not particularly high, present in only 20% of confirmed orbital fractures in a large study.

The patient's mild enophthalmos and hypoglobus is an example of the controversy that exists in the literature regarding the optimal fixation period and indications for immediate vs delayed repair. Other indications for delayed repair include: infraorbital hypoesthesia, diplopia, delayed enophthalmos, and the size of the fracture defect ~ 2 cm². Had the patient demonstrated clear entrapment on CT and clinically, immediate repair would have been the likely intervention. Other possible indications for immediate repair include: oculocardiac reflex.

The most common complications following surgical repair of the orbital floor are persistent postoperative diplopia, infraorbital nerve dysfunction, and enophthalmos. Poor cosmesis may also result secondary to enlargement of the bony orbit due to reconstruction imperfections. Implant associated infections include implant migration, infection, exposure, palpability, or local inflammatory reaction.

OUTCOME/FOLLOW UP: Short term enophthalmos and hypoglobus have resolved. Vision changes have resolved. Patient is currently 8 weeks s/p surgery and is back playing with a full face shield

EMPIRIC ANTIPSEUDOMONAL MONOTHERAPY VERSUS COMBINATION THERAPY IN THE TREATMENT OF PNEUMONIA IN VENTILATED PATIENTS: A RETROSPECTIVE STUDY

Jaclyn Skradski; Dean Van Loo, PharmD

Ferris State University College of Pharmacy, Pharmacy Student; Bronson Methodist Hospital, Pharmacy Services

There have been conflicting views by health care providers on the appropriate empiric therapy for pneumonia in ventilated patients in regards to *Pseudomonas aeruginosa* coverage. Some health care professionals believe combination therapy with two antipseudomonal agents is more advantageous because it is recommended in the Infectious Diseases Society of America guidelines. Others believe monotherapy with a single medication is sufficient based on current literature and studies that have been done. This research will assist in identifying differences in efficacy between using combination therapy or monotherapy.

This study is a retrospective chart review of patients diagnosed with pneumonia who are on a ventilator treated with either antipseudomonal monotherapy or combination therapy. Data will be collected from records prior to May 31, 2015, until there are 50 patients in the monotherapy group and 50 patients in the combination therapy group. Patients will be included if they are diagnosed with pneumonia and on a ventilator via the ICD-9 and ICD-10 codes as well as on antipseudomonal therapy. Patients will also have to be on the antibiotic(s) for >24 hours and be >18 years of age. The primary objective of this study is to compare the two groups of patients to see if there is a difference in resolution of infection. The primary outcome is the documentation of the clinical resolution of the infection as determined by the time to normalization of white blood cell count, time to defervescence, or physician notation of clinical improvement in the patient chart. Secondary objectives include length of hospital stay, time to extubation, time to procalcitonin level of <0.5 ng/mL, and steroid use. Safety endpoints include antibiotic failure, death, and adverse drug reactions.

UTILIZATION OF LIPOSOMAL BUPIVACAINE FOR ROBOTIC-ASSISTED GYNECOLOGIC SURGERY AT A COMMUNITY TEACHING HOSPITAL: A RETROSPECTIVE STUDY

Caitlin Durkin, PharmD; James Curtis, PharmD; David Montgomery, RPh; Brandon Seagle, MD;
Anna Hoekstra, MD

Bronson Methodist Hospital, Pharmacy Services; Bronson Methodist Hospital, Pharmacy Services; Bronson Methodist Hospital, Pharmacy Services; Danbury Hospital, Department of Obstetrics and Gynecology; West Michigan Cancer Center, Gynecologic Oncology

PURPOSE: Despite limited evidence for liposomal bupivacaine in surgical procedures there is an interest in the use of liposomal bupivacaine by Bronson anesthesiology for a specific indication; a replacement for bupivacaine or ropivacaine for transversus abdominis plane (TAP) blocks for robotic assisted gynecological surgery. Given that current published data do not provide clear, overwhelmingly superior clinical results for liposomal bupivacaine over conventional agents used in TAP blocks based upon the lack of adequately powered multi-centered clinical trials with comparison groups, the purpose of this study is to determine if a TAP block with liposomal bupivacaine decreases the length of hospital stay and total healthcare costs following an elective, robotic assisted, gynecologic surgery at Bronson Methodist Hospital.

MATERIALS & METHODS: This is a retrospective chart review of female patients 18 years of age who received elective robotic assisted gynecologic surgery, conducted at Bronson Methodist Hospital, a community teaching hospital. The primary outcome of this study will be a comparison of overall healthcare costs and hospital length of stay (LOS) of patient who receive a TAP block with liposomal bupivacaine and those who received conventional long acting anesthetic (bupivacaine or ropivacaine) via a TAP block or otherwise. Secondary endpoints include the impact of liposomal bupivacaine on analgesic use, percentage of patients discharged home from the PACU setting, the presence of nausea/vomiting, incidence of post-operative constipation, safety outcomes, patient satisfaction and 30 day readmission.

RESULTS AND CONCLUSION: Data collection and analysis are ongoing. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

OBJECTIVES: Describe the mechanism of action of liposomal bupivacaine that contributes to its analgesic effects. Identify the pros and cons of instituting the use of liposomal bupivacaine in TAP blocks for gynecologic surgeries.

INVESTIGATION OF THE REGULATION OF CHRONIC INFLAMMATION IN ENDOTHELIAL CELLS BY A PRO-INFLAMMATORY EPOXYISOPROSTANE PHOSPHOLIPID

Abbie Brackman; James Springstead, PhD; Gabriel Cole; Piao Jian Tan

Western Michigan University, Department of Chemical and Paper Engineering

Oxidation products of 1-palmitoyl-2-arachidonoyl-sn-glycerol-3-phosphatidylcholine (PAPC), referred to as OxPAPC, accumulate in areas of chronic inflammation and regulate over 1000 genes in human aortic endothelial cells, affecting many pathways, including inflammation and monocyte recruitment. It is hypothesized that PEIPC, the most active component of OxPAPC, binds with a mediating protein to activate a biological mechanism that triggers an upregulation of the gene that codes for MCP-1. Potential candidate proteins include GRP-78, VEGFR2, and EP2; however, GRP-78 has proven to be the most likely candidate that binds to PEIPC based off of previous binding studies to Ox-PAPC. This study will investigate the unknown proteins that bind to PEIPC and test regulation of IL-8, HO-1, and MCP-1, representing the inflammatory, oxidative stress, and monocyte recruitment pathways. Binding of PEIPC to endothelial proteins was detected using biotin tagged lipid and Western blotting, and gene regulation in HAECs was tested using real time PCR. We anticipate that PEIPC regulation in endothelial cells is mediated by GRP78, and in the future we plan to compare the mechanism of PEIPC regulation with other chronic inflammatory mediators, including IL1 β and TNF- α .

PROFUSE REPETITIVE VOMITING PRESENTING AS FOOD PROTEIN INDUCED ENTEROCOLITIS SYNDROME

Jason Lam, DO; Elena Lewis, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; Asthma Allergy Centers, P.C.

INTRODUCTION: Food protein induced enterocolitis syndrome (FPIES) is a non-immunoglobulin E mediated food hypersensitivity reaction. FPIES primarily affects infants and acute presentations are often misdiagnosed as viral gastroenteritis or sepsis.

CASE: Eight-month-old male with a history of eczema and chronic loose stool presented to the emergency department (ED) for profuse, repetitive vomiting. He had eaten dinner with a full serving of sweet potatoes 2 hours earlier. Sick contacts included his mother and grandmother who have viral gastritis. On exam, patient was hypothermic, tachycardic, and lethargic. Intravenous fluid bolus and ondansetron were given. Patient became more alert and emesis was resolved with treatments. Lab work revealed metabolic acidosis, leukocytosis with mild left shift, normal C-reactive protein and procalcitonin. Patient was discharged the next day with a diagnosis of viral gastritis. A week later, he was given sweet potatoes, and 2 hours later, developed similar symptoms of repetitive vomiting, lethargy, and hypothermia. He was taken to the ED and received intravenous fluid resuscitation. Infectious work up was unremarkable. The ED physician phone consulted an allergist immunologist who believes patient has FPIES. Patient was discharged after one day of observation.

DISCUSSION: The most common triggers of FPIES are cow milk and soy formula. Infants affected by these foods typically have a chronic presentation with signs/symptoms of chronic intermittent vomiting, chronic diarrhea, and poor weight gain. Acute presentation may occur if these foods are removed and then re-introduced. Solid foods (such as sweet potatoes) may also trigger FPIES and typically have a more acute presentation. In the acute setting, FPIES presents as profuse, repetitive vomiting, often with diarrhea, one to three hours after ingestion of food. Patients are often dehydrated, pale appearing, and lethargic on examination. Diagnosis of FPIES is based on history, typical clinical symptoms after food ingestion, and resolution of symptoms following removal of food trigger. Oral food challenge in a supervised setting may be needed in unclear cases. In acute settings, treatment consists of intravenous fluid resuscitation and intravenous ondansetron or glucocorticoids. Intramuscular epinephrine is used in patients with shock. Treatment is avoidance of food triggers. FPIES resolves by 3 years of age in the majority of patients.

CONCLUSION: Although uncommon, FPIES should be considered in pediatric patients who present with sudden onset, profuse, repetitive vomiting, especially if it occurs shortly after ingestion of newly introduced solid food. A thorough history is crucial to diagnosis.

DOUBLE VISION AND NECK PAIN AS PRESENTING SIGN OF PSEUDOTUMOR CEREBRI

Jason Lam, DO; Claire Liepmann, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

INTRODUCTION: Pseudotumor cerebri (PTC) is a syndrome of increased intracranial pressure (ICP) without any underlying cause. Although it is classically described in obese women of reproductive age, PTC is increasingly recognized in children. Classic symptoms of headache, nausea, and vomiting are not always present.

CASE: A 14-year-old obese male presented to the emergency department (ED) diplopia and neck pain. He reports of hearing his heart beat for the past month followed by symptoms of neck pain, back pain, and intermittent headache. Headache has resolved though persistent diplopia had developed over the past week. In the ED, Head CT without contrast was normal and lumbar puncture (LP) was attempted. On admission, examination revealed binocular diplopia, right ptosis, and right cranial nerve (CN) 6 palsy. MRI brain with and without contrast revealed no acute abnormalities. Ophthalmology evaluation revealed mild to moderate papilledema. A LP was performed and opening pressure was 37cm of H₂O. CSF studies were unremarkable. Patient was diagnosed with PTC and started on Acetazolamide. Symptoms improved with treatments and patient was discharged home.

DISCUSSION: The incidence of PTC is ~1/100,000 of the general population. There is an increasing incidence of children with PTC among adolescent compared to young children. Like adults, risk factors for PTC in children are obesity and female sex. Signs and symptoms of PTC are related to increased ICP, which include headache, nausea, vomiting, visual loss, diplopia, and pulsatile tinnitus. As in our patient, diplopia is usually horizontal and due to CN 6 palsy. This occurs in ~30% of patients with PTC and is believed to be due to increased ICP causing a downward displacement of the brainstem and leading to stretching of CN 6, which is tethered as it exits the pons. CN palsy resolves when ICP normalizes. Other symptoms of PTC include neck pain and back pain. PTC is a diagnosis of exclusion and requires signs of symptoms of increased ICP, a non-focal neurological exam (except for CN6 palsy), normal neuroimaging, an LP with an opening pressure greater 25cm of H₂O, and normal CSF analysis. Treatment is weight loss in obese patient and acetazolamide in symptomatic patients. Steroids are used in patients with substantial visual field loss. Surgical intervention is employed in patients with progressive visual loss unresponsive to medications.

CONCLUSION: Signs and symptoms of PTC are not always classic and clinicians should be aware and able to recognize different manifestation of increased ICP.

EFFICACY OF TRANSCUTANEOUS CEREBRAL OXIMETRY MONITORING DURING CAROTID ENDARTERECTOMY

Jason Ryan, MD; John Collins, MD; Jorge Weber, MD

WMU Homer Stryker M.D. School of Medicine, Department of General Surgery; Borgess Medical Center, Department of Vascular Surgery; WMU Homer Stryker M.D. School of Medicine, Department of General Surgery

INTRODUCTION: Disease of the internal carotid artery is estimated to account for 15-20% of ischemic strokes. Carotid endarterectomy (CEA) is the most frequently performed procedural intervention in stroke prevention. Complications from intra-operative cerebral hypo perfusion are of concern.

There is currently no “standard” with regards to monitoring of adequacy of cerebral perfusion during CEA.

OBJECTIVE: Determine efficacy of cerebral oximetry during CEA and analyze outcomes.

MATERIALS & METHODS: This study was approved by IRB at the Borgess Medical Center. Patients were selected based on current recommendations for CEA. 51 consecutive patients over a 6-month period undergoing CEA were monitored using a NONIN Sensmart Oximetry device.

Data was recorded at defined 4 second intervals which included values at baseline, induction of anesthesia, time of carotid clamping, shunt placement, restoration of flow, and at emergence from anesthesia. Data was retrospectively analyzed. Repeated measures ANOVA was performed to assess differences in oximetry values. PROC GLM in SAS 9.4 was used to perform all analyses, and a significance level of $\alpha = 0.05$ was used for significance. Patients deemed to have had “intraoperative cerebral events” were further reviewed.

RESULTS: 51 patients were included in the analysis. The average baseline value on the ipsilateral side was 69.1%. After shunt placement, the value increased by an average of 3.38 percent (95% CI 1.19-5.58, $P = <0.0001$). The average oximetry value at the time of carotid clamping was 2.3 units higher than at the time of shunt placement (95% CI 0.11-4.5, $P = 0.0401$). When comparing extubation values to those at baseline, there was an average of a 10.78 unit increase in value (95% CI 8.60-12.96, $P = <0.0001$). No difference existed comparing baseline values with those at the time of clamping ($P = 0.314$).

Two patients were reviewed based on observed adverse clinical outcome. Patient 1 had oximetry values 8% lower than expected after flow was restored and post operatively had CT evidence of ischemia. Patient 2 suffered profound hypotension intraoperatively as a consequence of Protamine administration. Values fell to 26% on the ipsilateral side and 40% on the contralateral side.

CONCLUSION: The use of cerebral oximetry as an adjunct to routine monitoring during CEA is safe, adds no additional cost to the patient, and may result in earlier detection of adverse intraoperative events.

EXPLORATIONS: THE FUNDAMENTALS OF FEMALE-TO-MALE SEX REASSIGNMENT

John Livingstone, Tarannom Shoghi, Thu N. Nguyen, Samarth Bhandari, Cynthia Bishara

WMU Homer Stryker M.D. School of Medicine, Medical Students Class of 2018

INTRODUCTION: From both legal and clinical perspectives, changing sexual identity is a challenging, complex process. In this project we review the fundamental aspects of female-to-male (FTM) sex reassignment.

RATIONALE: Despite a rise in sex reassignment in the US, few medical professionals are familiar with the basics of this process. This review is designed to educate medical professionals about the basics of FTM sex reassignment, so they can better discuss this process with prospective candidates.

MATERIALS & METHODS: The information presented in this project was obtained from conducting literature searches on Google Scholar, PubMed and others. Information was collated from medical journals, websites of private practitioners who offer sex reassignment surgery, and other online resources. Research was focused on four primary topics: (1) legal issues surrounding sex reassignment, (2) the psychological evaluation of patients wishing to have sex reassignment, (3) the pharmacologic interventions used for FTM sex reassignment, and (4) the FTM sex reassignment surgical procedures, including phalloplasty procedures.

RESULTS: This review retrieved information from 3 primary articles, 5 review papers, and 16 electronic-sites. With only 12 clinics offering phalloplasty procedures in the US, the waitlists for these clinics can be several years long.

There are several legal and financial barriers to sex reassignment. Insurance companies only provide coverage for certain procedures potentially making the FTM transition a costly process. Every state except Idaho, Ohio, Tennessee, and Kansas legally permits an individual to change sexual identity, but the requirements differ per state.

Most physicians follow the Standards of Care provided by the World Professional Association for Transgender Health to determine medical necessity for sex reassignment. Physicians may consider prescribing their patients hormonal therapy. GnRH analogues or antagonists can prevent pubertal changes in adolescents and testosterone therapy can be used to induce male characteristics.

There are several surgical options available for FTM sex reassignment: mastectomy, hysterectomy, ovariectomy, scrotoplasty, phalloplasty, metoidoplasty, and urethral reconstruction. The phalloplasty procedure may require multiple surgeries over the course of several years. Including preoperative care, the FTM transition can exceed five years in total.

CONCLUSION: University of Michigan, University of Chicago, and University Plastic Surgery in Chicago, IL are three local clinics which perform phalloplasties and can provide valuable information to patients considering FTM sex reassignment surgery. Both Michigan and Illinois require patients to be 18 years of age to receive a phalloplasty and require sex reassignment surgery in order to change the patient's legal sexual identity.

THE RUPTURED BLADDER

Thu N. Nguyen; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Spontaneous bladder rupture is a rare cause of death in healthy young male. There are two possible reasons including pathological bladder rupture and idiopathic bladder rupture. For pathological bladder rupture, the underlying reasons can be the genetic conditions that cause congenital connective tissue disorders such as Marfan syndrome, Ehlers-Danlos syndrome or Impaired copper metabolism. For spontaneous idiopathic bladder rupture, it is a rare differential in young healthy male that can significant morbidity and mortality. We would like to describe a case of a 32-year-old white male died as a result of a hemoperitoneum due to a traumatic rupture of the urinary bladder with underlying acute ethanol intoxication. The significant factor that contributes to this case is the alcohol intoxication. This rare case shows the difficulties with identifying the exact mechanism of death.

OBJECTIVE: The purpose of this presentation is to present a case of idiopathic ruptured bladder.

MATERIALS & METHODS: The case is selected from the case files of Joseph Prahlow, a practicing forensic pathologist.

RESULTS: A 32-year-old white male died as a result of a hemoperitoneum due to a traumatic rupture of the urinary bladder with underlying acute ethanol intoxication. Acutely intoxicated individuals with hyperdistended urinary bladders are at risk for traumatic bladder rupture. This rupture can occur as a result of accidental trauma, such as occurs in a fall, or as a result of accidental trauma, such as occurs in a physical altercation. The final findings are traumatic rupture of urinary bladder with hemoperitoneum (2,000 cc) and acute ethanol intoxication. The manner of death is undetermined.

DISCUSSION AND CONCLUSION: A few cases reported of spontaneous bladder ruptures are available in the literature. According to a report from Muneer et al., the cause of the bladder rupture was from alcohol abuse with absence of any signs of physical trauma. In addition, the bladder can also rupture from the result of urinary tract infection and chronic diabetes that is reported by Sawalmeh et al. However, the cause of spontaneous bladder rupture can be idiopathic according to a rare case from Uysal et al. In our case, the male patient is suspected to die of a rare spontaneous bladder rupture that is idiopathic. It is less likely that there is an underlying congenital connective tissue disorders or infection. The causes of death are hemoperitoneum due to traumatic rupture of urinary bladder and acute ethanol intoxication.

THE EFFECTIVENESS OF FREQUENT USER SYSTEM ENHANCEMENT IN THE PREVENTION OF ED VISITS BY HOMELESS INDIVIDUALS SUFFERING FROM CHRONIC PAIN

Jeffrey Johnson; Jacqueline Dauch; Philip Bystrom

WMU Homer Stryker M.D. School of Medicine, Medical Students Class of 2018

INTRODUCTION: Frequent User System Enhancement (FUSE) targets homeless individuals who are suffering from chronic pain that are high users of the emergency department (ED). Multiple community organizations, including Bronson and Borgess ED personnel, the Kalamazoo police department, housing and social work services have come together to collaborate on this opportunity to diminish ED visits from frequent users by providing them with housing and integrated social services.

PURPOSE: To evaluate the effectiveness of the Frequent Users System Enhancement (FUSE) program.

MATERIALS & METHODS: The FUSE program's initiative will be carried out by providing for the selected frequent users housing, primary care, social work, and various other opportunities to improve quality of life as well as decrease unnecessary hospital resource utilization. The model closely reflects Assertive Community Treatment (ACT) in that its functionality and success depends on a variety of independent community bodies. This study will analyze the methods of the FUSE program and strive to determine their use in meeting the success indicators outlined by the FUSE team.

DISCUSSION: The participants selected for the program have a track record of frequent utilization of emergency medical services for complaints that are not emergent in nature. This places a burden on emergency medical resources and personnel which has been shown to reduce quality of care for all persons utilizing emergency medical services including those with a legitimate medical emergency. The FUSE program endeavors to reduce unnecessary EMS utilization in this population by providing participants with appropriate social and financial resources that will make them less dependent on emergency services. This could potentially lead to improved quality of care for patients with a legitimate medical emergency and reduced costs to EMS providers.

CONCLUSION: FUSE has potential to benefit individuals suffering from chronic pain who are homeless. Likewise, there is also potential for ED budgets to save money and bed space. Providing housing for frequent user of the ED who meet the FUSE criteria can be beneficial for all parties involved.

PROGNOSTIC FACTORS OF MORTALITY IN PATIENTS WITH NECROTIZING FASCIITIS OF THE ABDOMINAL WALL

Jeffrey Johnson; Christian Ertl, MD; Leandra Burke; Nicole Carpp

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of General Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Clinical Research; Michigan State University College of Human Medicine, Medical Student Class of 2019

INTRODUCTION: Necrotizing Fasciitis (NF) is a devastating and rapidly progressive infection of the deep subcutaneous tissue and fascia. NF causes widespread tissue necrosis and may ultimately result in patient death. The mainstay of treatment involves early and rapid intervention with surgical debridement and broad-spectrum antibiotics, and often requires long hospital stays and intense medical management. Significant mortality, estimated at 10-16%, exists among infected patients. Limited clinical data exists linking the effects of suspected risk and prognostic factors associated with NF involving the abdominal wall and peritoneum.

OBJECTIVE: This study is a continuation of a 2012 study by the Principal Investigator and aims to assess prognostic factors associated with mortality in subjects suffering from NF of the abdominal wall. A better understanding of mortality predictors and prognostic factors may help guide future treatment decisions.

MATERIALS & METHODS: A database inclusive of all adults ages 18 and older with confirmed NF of the abdominal wall, at two local teaching hospitals, from 2000-2014 was created. The investigators identified 61 subjects with NF of the abdominal wall during this time period. The medical records were reviewed retrospectively and demographic and clinical data were abstracted. The subjects were divided into two groups: those who survived the infection and those who did not. The groups were compared to assess differences in demographic factors, comorbid conditions, days of care, number of debridement procedures, use of parenteral nutrition, antibiotics used, BMI, admission vitals, laboratory risk indicator for necrotizing fasciitis (LRINEC) score, and lab findings. Statistical analysis was then performed, with significance level $p = .05$.

DISCUSSION: We observed a significant difference in bilirubin ($p=.035$) and BUN ($p=.002$) levels, as well as hours to debridement ($p = .013$), when comparing the two groups. Similar to our 2012 findings, C-reactive protein was not tested in the majority of subjects in our study, limiting our ability to calculate LRINEC scores or Wall et al. criteria. It is estimated that only 1000 cases of NSTI occur per year nationally, and NF of the abdominal wall represents only a small percentage of these cases. In this iteration of our local study, we observed that 13% of subjects died, which is equal to our 2012 findings and consistent with 10-16% mortality rate noted nationally.

CONCLUSION: In this study sample, subjects with NF of the abdominal wall who died had significantly higher bilirubin and BUN levels, and significantly shorter time to debridement, than subjects who survived.

USING NARRATED-ANIMATED VIDEOS IN MEDICAL EDUCATION

Jeffrey Johnson, Kelly Quesnelle, PhD; Maria Sheakley, PhD; David Riddle, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences

An ever-increasing amount of medical science content is being delivered to students electronically (e-learning), both in medical school curricula and via online learning resources used by medical students. One of the problems with e-learning is keeping students focused and engaged. Recall frequency increases from 10% (audio alone) and 20% (visual alone) to over 60% over a three-day period when both audio and visual media are employed in teaching. NAV's are a form of e-learning where students listen to and watch a recording of an instructor drawing free-hand images and text on a screen while discussing a topic. One primary advantage of this type of instruction is its ability to captivate learners by unfolding a story piece-by-piece through the use of drawings and text. The audiovisual format is proven to increase recall of material from traditional written mediums, while the conversational approach to narration increases it even further. Another advantage is its ability to allow instructors to customize complex graphics with ease. Drawing customized equations, curves, and complex anatomical structures can be prohibitively difficult using traditional programs. With NAV's, it is easy for any instructor to customize content to meet student needs. NAVs are becoming more prolific in the setting of medical education. This subjective analysis discusses the educational benefit of NAVs and compares the creation and capture of animated videos using Wacom tablets and Camtasia screen capture software with the hand-written tutorial version utilizing a Wolfvision classroom projection device and associated software.

**A COLLABORATION BETWEEN MEDICAL STUDENT AND PRE-MEDICAL AMSA CHAPTERS IN
KALAMAZOO COUNTY TO POSITIVELY IMPACT STUDENTS' INTEREST
IN HEALTHCARE CAREERS**

Jennifer Kim; Sulin Wu; Jean Shelton; Mark Loehrke, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Admissions and Student Affairs; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

The AMSA Chapter at the Western Michigan University Homer Stryker M.D. School of Medicine (WMed), the newest medical school in Michigan, was founded in 2014. As a new AMSA chapter, we have already recognized its importance in fostering mentorship with the pre-med community in Kalamazoo, MI. Unique to the area, the Kalamazoo Promise program allows high school students to be fully funded in obtaining higher education in participating schools, which include Western Michigan University (WMU). With this strong educational support system in place for this community, our AMSA chapter aims to bridge the connection between pre-med undergrads of nearby universities and WMed medical students to provide first-hand guidance and perspectives on medical education. Already, WMed has hosted "Pre-Med Information Nights" in its first two years, seeing 27 pre-med students in attendance in 2014 and 36 students in 2015. These numbers have affirmed the Kalamazoo pre-med community's interest for pre-med guidance and directs our AMSA chapter to formally establish a collaboration with undergraduate AMSA chapters and assess the specific needs of the community. Some of our future events would include: a medical student panel, "A Day in a Medical Student's Shoes", a suture workshop, community service, and informal mentoring sessions between pre-med and medical students. We also hope to influence the pre-medical student group at Kalamazoo College to establish their own pre-medical AMSA Chapter. This would help foster an alliance between WMed and the two undergraduate institutions (WMU and Kalamazoo College) through AMSA resources. Overall, we see the great potential WMed has in inspiring and guiding pre-med students in the area to achieve success as they pursue medical or other health profession schools.

A NATIONAL SURVEY OF PEDIATRIC MEDICATION DOSING TRAINING, PRACTICES AND ERRORS IN THE PREHOSPITAL SETTING

John Hoyle, MD

WMU Homer Stryker M.D. School of Medicine, Departments of Emergency Medicine and Pediatrics

BACKGROUND: Weight-based calculations create a challenge for accurate pediatric medication dosing. Scant research exists regarding pediatric medication dosing in the prehospital setting.

OBJECTIVE: To describe training, practices, and errors related to administering drug doses to pediatric patients among paramedics.

MATERIALS & METHODS: An electronic questionnaire was sent to a random sample of nationally certified paramedics. Only practicing, non-military paramedics were included. Descriptive statistics were calculated.

RESULTS: There were 922 (9.8%) responses and 898 paramedics met inclusion criteria. Over half (58.5%) believed their initial paramedic program did not include enough pediatric training and three-fourths (77.2%) attended a pediatric course within the past year. Two-thirds (66.0%) administered a pediatric drug dose within the past year. When estimating the weight of a pediatric patient, about half (54.2%) used a length-based tape, while one-third (35.8%) asked the parent or guardian, and few (2.5%) relied primarily on a smart phone application. Nearly half (43.0%) were familiar with a case where EMS personnel delivered an incorrect pediatric drug dose. Further, 7.7% reported that the layout of their drug boxes caused problems delivering accurate drug doses either frequently or always, while 15.2% believed drug packaging frequently caused problems. Only 19.8% said their agency had a system to report errors anonymously and 50.7% believed they could report an error without fear of disciplinary action. Less than one-fourth (21.4%) said their agency routinely distributes information about errors to improve patient care. With regards to tools to help ensure delivery of accurate pediatric drug doses, 89.0% believed an EMS-specific Broselow tape would be helpful, followed by drug dosing cards with milliliters for specific weights (83.0%) and changing the content of standardized pediatric courses to be more relevant to practice (77.7%).

CONCLUSION: Most paramedics attended pediatric training within the past year. Most relied on length-based tape devices or weight provided by a parent to calculate medication doses. Nearly half of paramedics knew of a pediatric drug dosing error. Few had systems to report errors anonymously and few agencies used errors for patient care improvement.

PEDIATRIC PREHOSPITAL DOSING ERRORS: A MIXED METHODS STUDY

John Hoyle, MD

WMU Homer Stryker M.D. School of Medicine, Departments of Emergency Medicine and Pediatrics

PURPOSE: to identify barriers and enablers to correct pediatric prehospital drug dosing and possible solutions through a qualitative study. Pediatric prehospital dosing errors affect approximately 56,000 US children yearly. To decrease these errors barriers, enablers and potential solutions from the EMT-P standpoint need to be understood.

MATERIALS & METHODS: We conducted a qualitative focus group (FG) study of EMT-Ps in Michigan. FGs were held at EMS agencies and a state EMS conference. Participants were identified by random number only. No identifying information was collected in order to protect anonymity. FGs were led by a trained moderator. Questions focused on the drug dose delivery process, barriers and enablers to correct drug dosing and possible solutions to decrease errors. Responses were recorded, transcribed and coded by 2 members of the research team for themes and number of response mentions. Participants completed a pre-discussion survey on pediatric experience and agency characteristics.

RESULTS: FG responses reached thematic saturation after 4 groups were completed. There were a total of 35 participants. Participants' EMS agency characteristics were: 26% public, 23% private not-for-profit, 49% private for-profit, 23% fire, 77% third service. All were transporting agencies. 43% of participants had been EMT-Ps >10 years, 11% had been EMT-Ps <1 year. 25% reported not having administered a drug dose to a child in the last 12 months. EMT-Ps who were "very comfortable" with their ability to administer a correct drug dose to infants, toddlers, school-aged and adolescents were: 5%, 7%, 10% and 54% respectively. FGs identified themes of: difficulty in obtaining an accurate weight, infrequent pediatric encounters, infrequent pediatric training with inadequate content and practice, difficulties with drug packaging/shortages, drug bags that weren't "EMS friendly", difficulty remembering drug doses/calculations and lack of dosing aids. Few enablers to correct dosing were mentioned. Simplification of dose delivery, an improved length based tape for EMS, pediatric checklists and dose cards in ml were given as solutions.

CONCLUSION: This qualitative study identified barriers and potential solutions to reducing prehospital pediatric drug dosing errors including improved training frequency/content as well as simplification of drug calculations and the addition of pediatric checklists.

IV HALOPERIDOL FOR THE TREATMENT OF PEDIATRIC HEADACHES IN THE ED

Kim Aldy, DO; Jessica McCoy, MD

WMU Homer Stryker M.D. School of Medicine, Department of Emergency Medicine

BACKGROUND: Emergency department treatment of acute benign headaches can be challenging in children. Haloperidol has previously been used for status migrainosis after other medication combinations have failed. Haloperidol has shown promising results in recent studies of its utility as an initial treatment for adults presenting with headache. However, this treatment has never been studied in the pediatric population.

OBJECTIVE: Our study seeks to further evaluate haloperidol at 2.5 mg vs placebo in the 13 to 17 year old age group in order to observe its effectiveness on pain reduction, reported side effects and the effect on QT interval as a measure of safety. In addition, recurrence of headache at >24 hours after discharge and patient overall satisfaction with their treatment outcome were reported.

MATERIALS & METHODS: Patients meeting the study criteria were randomized into two groups receiving either intravenous (IV) haloperidol 2.5 mg in 5 ml of normal saline or 5ml of normal saline alone. The patient was assessed through vital signs and the visual analogue scale of pain. Data was collected at time of administration, then at 30, 60 and 90 minutes. After 60 minutes, if the patient's headache persisted, they were given a rescue medication, 30mg IV toradol, and reassessed at 90 and 120 minutes. If they did not receive adequate headache relief at 120 minutes, the overseeing physician gave additional treatment. QT intervals were measured prior to the treatment dosing and at discharge. All patients were called back after their visit to discuss their side effects or headache outcome at >24 hours post treatment.

RESULTS: Three pediatric patients previously randomized into our study were analyzed. One received the control and two received haloperidol. They were all male and their ages were 13, 15 and 16 respectively. Reported pain was reduced an average of 93.75% within 30 minutes in the treated group. The control patient required a rescue medication (toradol) at 60 minutes and reported 100% relief at 90 minutes. QT interval changes were not statistically different with haloperidol administration. No side effects were reported, specifically no restlessness, agitation or sedation at discharge or 24 hours after treatment in the haloperidol group. Both of the patients that received haloperidol would want this drug if they were treated in the ED for a headache in the future.

CONCLUSION: This study presents new data that IV haloperidol is a novel, safe initial approach to managing benign pediatric headache in the ED.

INFANT VOLVULUS DUE TO INTESTINAL MALROTATION

Claire Cameron-Ruetz; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Intestinal malrotation refers to the abnormal development of the intestines such that they are not situated normally within the abdominal cavity; a frequent accompanying feature is improper or absent attachment sites. The condition predisposes to acute, potentially fatal volvulus.

PURPOSE: We present a case of a one-month-old baby due to volvulus, which was secondary to intestinal malrotation, with incomplete mesenteric attachment of the ascending colon, and cecum.

MATERIALS & METHODS: The case was selected from the case files of one of the authors (JP), a forensic pathologist.

CASE REPORT: A one-month-old infant was found unresponsive and covered in dark emesis in an infant bouncy seat. 911 was called, and EMS responded, but the infant was pronounced dead in the emergency department. The case was referred for medicolegal autopsy.

Autopsy of the infant presented several abnormalities, including an umbilical hernia, lack of mesenteric attachment of the cecum and ascending colon, malrotation of the intestines, and associated intestinal volvulus with evidence of ischemic bowel. A total of seven spleens were discovered; two of relatively normal size, and five much smaller structures. The liver also had an unusual appearance, with an enlarged left lobe. Though unobstructed, the upper airway contained gastric fluid indicative of aspiration of gastric contents. The cause of death was volvulus due to intestinal malrotation with abnormal mesenteric attachment and multiple associated congenital anomalies.

DISCUSSION AND CONCLUSION: The occurrence of intestinal malrotation is not uncommon, occurring congenitally in about 1 in 500 live births. Of those born with intestinal malrotation, approximately 80% will experience volvulus in the first month of life. Most patients born with intestinal malrotation are asymptomatic, until an acute event such as volvulus precipitates symptoms. This case study serves to remind physicians of the potentially lethal outcome of this relatively common congenital gastrointestinal anomaly.

DELAYED DEATH AFTER AORTA LACERATION

Diana Fidrocki; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Aortic lacerations are common in cases of severe blunt trauma, where blunt mechanical impact combined with sudden deceleration are frequently implicated as causative forces. Delayed manifestation of an aortic laceration is a less common, but well-known concern amongst those caring for trauma patients.

OBJECTIVE: We present a case of delayed death due to a small, clinically unrecognized descending aorta laceration following an all-terrain vehicle (ATV) accident.

MATERIALS & METHODS: The case is selected from the case files of one of the authors (JP).

RESULTS: A 37-year-old male presented to the Emergency Department (ED) after an ATV accident. Computed tomography (CT) found multiple anterior and lateral rib fractures, a left scapular fracture, a right pneumothorax, and subcutaneous emphysema, as well as a right femur fracture. The patient was intubated, a chest tube was placed, and he was mechanically ventilated. He underwent surgery to repair the femur fracture. Several hours post-surgery, he rapidly became hypotensive then unresponsive. Advanced cardiac life support measures were emergently initiated, during which a chest X-ray revealed left chest opacification; a chest tube was placed, releasing large volumes of fresh blood. After over an hour of resuscitative efforts, the patient was pronounced dead. The case was referred for medicolegal autopsy.

Autopsy disclosed multiple rib fractures, including posterior fractures of left ribs 1-7, a hemothorax with approximately 600 cc of clotted blood in the left chest cavity, and a previously undiagnosed 2mm full-thickness left lateral descending thoracic aorta laceration.

DISCUSSION: The patient's presentation indicated severe trauma. Despite initial work-up that did not suggest any aortic injury, the severity of the injuries should raise concern about a possible occult aortic injury. Aortic injuries have very high rates of mortality, with only approximately 15% arriving to the hospital alive¹. While most "delayed deaths" following aortic injury involve extensive periaortic soft tissue hemorrhage surrounding the injury², the current case is unusual in that this finding was lacking and the area of aortic injury was quite small. This case serves to make emergency and trauma specialists aware of this potentially lethal manifestation of blunt force chest trauma.

REFERENCES:

1. Bruno VD, Batchelor TJP. Late Aortic Injury: A Rare Complication of a Posterior Rib Fracture. *The Annals of Thoracic Surgery* 2009;301-303.
2. Shkrum MJ, McClafferty KJ, Green RN, et al. Mechanisms of aortic injury in fatalities occurring in motor vehicle collisions. *J Forensic Sci* 1999;44:44e56

LOW VACCINATION RATES FOR THE HUMAN PAPILLOMA VIRUS (HPV) IN KALAMAZOO, MICHIGAN

Diana Fidrocki; Jessica Ramsay; Nina Sadigh

WMU Homer Stryker M.D. School of Medicine, Medical Students Class of 2018

INTRODUCTION: Nearly 1 in 4 people in the United States are currently infected with the human papilloma virus (HPV) which is almost 100% preventable with the HPV vaccine. The vaccine is recommended for all males and females ages 9-26, however Michigan rates remain low, being only 40-49% for males and 50-59% for females.

OBJECTIVE: The study focused on determining if there is a lack of awareness in patient populations concerning the HPV vaccine and if there are discrepancies between provider and patient perception of education about the vaccine.

MATERIALS & METHODS: From November 2015 to January 2016, surveys concerning their practice in recommending the HPV vaccine were distributed to providers (physicians, nurse practitioners, and physician assistants) at the Family Health Center (FHC) Patterson branch in Kalamazoo, Michigan. Patients ages 18-26 and parents of patients ages 9-17 were surveyed on their awareness of the vaccine and whether they had received it. Data was also pulled from medical records to look at vaccine rates.

RESULTS: Of the 45 provider surveys returned, 40 reported feeling “comfortable” or “very comfortable” discussing the vaccine with their patients and patients’ parents. 62.2% predicted that less than half of their patients received the vaccine.

Surveys were obtained from a total of 72 patients/parents of patients (55 females; 16 males). 69.01% reported having heard of the HPV vaccine. 43.06% stated they have received the vaccine compared to 30.56% who were “not sure” and 26.39% who had not received it. Of those who received the vaccine, 27.8% reported completing all 3 doses. There was no statistical significance between females and males for those who reported receiving, completing, or having heard of the vaccine.

Per medical records, the FHC sees 21,642 patients between the ages 9 and 26. 287 (1.3%) have started the vaccine, with 139 (0.6%) receiving only the first dose, 101 (0.5%) receiving 2 doses, and 47 (0.2%) completing all 3 doses.

CONCLUSION: Though providers feel comfortable offering the HPV vaccine to their patients, vaccination rates at the FHC remain lower than national averages. Further steps towards educating patients and parent on the benefits of the vaccine should be implemented to help improve vaccination rates.

REFERENCES

1. HPV Vaccine Coverage Maps - Infographic. Centers for Disease Control and Prevention 2015.
2. HPV Vaccine Information for Clinicians - Fact Sheet. Centers for Disease Control and Prevention, 8 July 2012.

DEATH DUE TO POSITIONAL ASPHYXIA RELATED TO UNDERLYING SEIZURE DISORDER

Garlen Yu; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Positional asphyxia occurs when a victim fails to remove themselves from a compromising position, leading to the restriction of respiration and death. Many cases involve an inverted body position with or without abnormal kinking of the neck. Victims are typically unable to recover from dangerous situations due to impaired consciousness. Furthermore, positional asphyxia is often accidental, stemming from conditions such as intoxication and varying neuronal disorders. We report a unique case of a death of a college student due to positional asphyxia related to an underlying seizure disorder.

OBJECTIVE: The purpose of this abstract is to present a unique case of accidental death from positional asphyxia related to an underlying seizure disorder in order to highlight the significant dangers that individuals with seizure disorders encounter.

MATERIALS & METHODS: This case is selected from case files of one of the authors (JP) a practicing forensic pathologist.

CASE REPORT: A 20-year-old white male with a known history of seizure disorder was found dead in his college dorm room. There was an empty container of oxacarbazepine found along with the body. The victim was last known to be alive three days previously. He was on his bed with only his legs and pelvic region on the bed, flexed at the waist, with his trunk region, upper extremities, and head and neck downward with his face on the floor. His neck was markedly kinked. The case was referred for medicolegal autopsy.

A complete autopsy failed to reveal an anatomic cause of death. No illegal drugs or alcohol were detected by urine and serum drug screens. Oxacarbamazepine was positive in the urine and blood, with the blood level measuring 6.9 mcg/ml. Death was attributed to positional asphyxia complicating underlying seizure disorder.

DISCUSSION: Sudden unexpected death in epilepsy (SUDEP) is the unexpected death in a victim with epilepsy, not caused by trauma, drowning, burning, choking, or toxicology. It accounts for 8-17% of deaths in those with epilepsy. The mechanism of SUDEP is poorly understood, but has been hypothesized to be the electrical shutdown of a brain causing autonomic dysfunction. In this case, given the lack of any toxicological or anatomic explanation, a cascade of events stemming from a seizure led the decedent to fatal positional asphyxia.

CONCLUSION: Positional asphyxia has multiple underlying processes that could cause victims to become unable to extract themselves from a fatal situation. The case illustrates that a seizure disorder is one such condition.

THE ROLE OF HYPERTENSION AND COCAINE USE IN BLOOD VESSEL FRAGILITY OF ARTERIOVENOUS MALFORMATIONS

Jacqueline Dauch; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Arteriovenous malformations (AVMs) are direct connections between arteries and veins that completely lack capillaries, ultimately resulting in a nidus of fragile blood vessels. Without the dampening effect of capillaries, the vessels of AVMs become extremely fragile due to direct connections between high-pressure arteries and low-pressure veins. Factors that cause an increase in intracerebral pressure, including hypertension and long-term and acute cocaine use, exacerbate the fragility of these blood vessels, often resulting in AVM rupture.

PURPOSE: The purpose of this study is to discuss the influence of hypertension and cocaine use on the fragility of AVM blood vessels.

MATERIALS & METHODS: The case reviews pertinent medical records of a Caucasian man first diagnosed with an AVM at 32 years of age by cranial computed tomography (CT), magnetic resonance imaging (MRI), and CT angiography (CTA). At 51 years of age, the patient suffered an AVM rupture, at which time toxicology tests were positive for cocaine metabolites.

CASE REPORT: A 32-year-old Caucasian man presented with a complex partial tonic-clonic seizure. T2-weighted MRI scans uncovered a refractile, hyperintense signal localized to the right fronto-parietal region. The CTA demonstrated a 7.0 by 3.2cm AVM feeding from branches of the right anterior cerebral artery and right middle cerebral artery and draining into the sagittal and straight sinuses. Over the next 20 years, the patient endured hypertension and intermittent seizures, with a pre-ictal aura consisting of headaches with phonophobia and photophobia. At 51 years of age, the patient suffered a cerebral hemorrhage localized to the AVM, resulting in death. Postmortem toxicology was positive for cocaine metabolites in plasma and urine screens.

DISCUSSION AND CONCLUSION: Blood vessels which make up AVMs are extremely fragile due to abnormal direct connections between arteries and veins. Exacerbation of the fragility of these blood vessels can be caused by factors that increase intracerebral pressure, including hypertension and cocaine use. The pathophysiological changes associated with hypertension and cocaine use include induced endothelial cell dysfunction, formation of arteriosclerosis and atherosclerosis, and increased intraluminal pressures, amongst other cardiovascular irregularities. Taken together, these changes exacerbate blood vessel fragility, increasing the likelihood of AVM rupture.

PERIVENTRICULAR HEMORRHAGE WITH MTHFR MUTATION

Grace Walter; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Hyperhomocysteinemia due to methyltetrahydrofolate reductase mutations is associated with intravascular coagulation, an increased risk for hemorrhagic stroke, neonatal death, and pregnancy complications¹ during the third trimester².

PURPOSE: We present a case of periventricular hemorrhage with organizing intravascular thrombosis in a newborn, associated with C677T and A1298C MTHFR mutations identified at autopsy.

MATERIALS & METHODS: This case is selected from the case files of one of the authors (JP).

CASE REPORT: A newborn, 3000 g, 41+ week gestational age female was born via emergency Cesarean section due to fetal distress following a relatively uneventful pregnancy. The neonate was declared dead following unsuccessful resuscitation and APGAR scores of 0 at one, five, ten, and 20 minutes.

Autopsy and genetic studies were requested by the mother. The body was that of a normal female with labor-related findings, including molding of the skull and focal subscalpular hemorrhage. The 410 g brain, had focal left periventricular hemorrhage and associated organizing intravascular thrombosis. Genetic studies revealed a 46XX karyotype and two heterozygous MTHFR reductase mutations-C677T and A1298C.

DISCUSSION AND CONCLUSION: The MTHFR enzyme is a major factor in the coagulation cascade, and is involved in the production of folic acid from homocysteine. C677T and A1298C MTHFR mutations can result in decreased function, leading to hyperhomocysteinemia and venous thrombosis, as well as neonatal death. Mutations cause a decrease in function and regulation of coagulation factors, leading to thrombosis. Hyperhomocysteinemia is also a risk factor for hemorrhagic stroke³, which can further contribute to thrombosis as the coagulation process becomes dysregulated⁴. The newborn in this case died due to complications from an MTHFR mutation resulting in left periventricular hemorrhage that developed late in pregnancy. The case serves to remind obstetricians and pediatricians of this important potential cause of neonatal morbidity and mortality.

REFERENCES:

1. Arpino C, et al. MTHFR C677T and A1298C polymorphisms and cerebral stroke in two twin gestations. *Child's Nerv Syst.* 2011;27(4):665-669.
2. Many A, et al. Third-trimester unexplained intrauterine fetal death is associated with inherited thrombophilia. *Obstet Gynecol.* 99(5):684-687.
3. Kang S, et al. Association of the C677T Polymorphism in the MTHFR Gene with Hemorrhagic Stroke: A Meta-Analysis. *Genet Test Mol Biomarkers.* 2013;17(5):412-417.
4. Isotalo PA, et al. Neonatal and fetal methylenetetrahydrofolate reductase genetic polymorphisms: an examination of C677T and A1298C mutations. *Am J Hum Genet.* 2000;67(4):986-990.

DEATH DUE TO ADENOVIRUS RESPIRATORY INFECTION

Patricia J. Choi; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

BACKGROUND: Adenoviruses are common causes of upper respiratory infections. They are frequently associated with cold-like symptoms that are mostly self-limiting. Occasionally, adenovirus infections can incur devastating effects on people with preexisting respiratory or heart conditions and weakened immune systems.

PURPOSE: To present a case of death related to adenovirus respiratory infection in a middle-aged woman with multiple comorbidities.

MATERIALS & METHODS: The case is selected from the files of one of the authors (JP), a forensic pathologist.

RESULTS/CASE REPORT: A 40-year-old Caucasian female who was a chronic heavy smoker with a past medical history of COPD, asthma, type II diabetes mellitus, hyperlipidemia, hypothyroidism, neuropathy, past pulmonary embolism, seizure disorder, anxiety, schizophrenia and bipolar disorder presented by ambulance to the ED with worsening shortness of breath. Initial SpO₂ in the field was in the mid-70s; however, after Duoneb and BiPAP, her saturation returned to normal levels. Her physical exam showed sinus tachycardia, tachypnea, decreased breath sounds with severe bilateral wheezes and mild retraction. She denied any chest pain, back pain, or lightheadedness. A chest x-ray showed extensive patchy bilateral infiltrates. She was admitted to the ICU, with initiation of broad-spectrum antibiotic therapy (azithromycin and Rocephin). All microbiology testing performed prior to death was negative. However, a FilmArray Respiratory Panel was positive for adenovirus. Despite aggressive treatment, the patient expired a few days after admission. An autopsy was performed in order to better clarify the pulmonary pathology. At autopsy, the major bronchi had thickened walls, and there was extensive bilateral firmness of the lungs. Microscopically, there were areas of cytopathic changes which were consistent with adenovirus infection, as well as pneumonia and diffuse alveolar damage. The cause of death was determined to be pulmonary adenovirus infection with pneumonia and diffuse alveolar damage. The manner of death was natural.

DISCUSSION: While adenovirus related illnesses are fairly common, examples of cases with the classic histologic manifestations are not commonly encountered. This case emphasizes and advocates for the potential importance and benefits of performing autopsies on patients when a presumed underlying cause needs to be clarified. It also highlights the educational value of the autopsy.

SUDDEN DEATH RELATED TO HIP REPLACEMENT SURGERY: A CASE SERIES

Satya Dalavayi; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Hip replacement surgery has become a common procedure in adults with hip joint damage. Despite the surgical and technological advances, there are still possible complications that may arise.¹

PURPOSE: We present a case series of deaths related to hip replacement surgery.

MATERIALS & METHODS: The cases were selected from the case files of author JP.

CASE RESULTS: A 55-year-old male died during the surgical repair of a left hip fracture. Near the completion of the procedure, the patient's blood pressure dropped dramatically and he died. Autopsy revealed the following possible mechanisms of death: arrhythmia, fat embolism, idiosyncratic reaction to anesthesia.

An 83-year-old female died shortly during the surgical repair of the left femoral neck. At autopsy, there was evidence of recent cement application at the left femoral neck, fat embolism, and focal thromboembolism.

An 86-year-old female died during the surgical repair of the right hip. An autopsy disclosed several possible mechanisms of death, including bone marrow/fat embolism, a reaction to cement placement, and possible allergic reaction to antibiotics.

DISCUSSION: Multiple factors may play a role in complications during hip replacement surgeries, the most dramatic of which result in death. This paper explores the possible mechanisms involved in such deaths, including fat emboli, arrhythmias due to underlying cardiovascular disease, and reaction to cement, antibiotics or anesthesia. Evaluation of prior medical conditions and current health status are vital factors necessary to understand what precautions may be necessary to avoid complications and death in these patients.

REFERENCES:

1. Alfonso, D. T., Toussaint, R. J., Alfonso, B. D., Strauss, E. J., Steiger, D. T., & Di Cesare, P. E. (2006). Nonsurgical Complications After Total Hip and Knee Arthroplasty. *The American Journal of Orthopedics*, 35(11), 503-510.
2. Duncan, J. A. (1989). Intra-operative collapse or death related to the use of acrylic cement in hip surgery. *Anaesthesia*, 44(2), 149-153.
3. Issack PS, Lauerma MH, Helfet DL, Sculco TP, Lane JM. Fat embolism and respiratory distress associated with cemented femoral arthroplasty. *The American Journal of Orthopedics* 2009;38(2):72-76.
4. Weiss W, Bardana D, Yen D. Delayed Presentation of Fat Embolism Syndrome After Intramedullary Nailing of a Fractured Femur: A Case Report. *The Journal of Trauma Injury, Infection, and Critical Care* 2009;66(3):E42-E45.

NEW ONSET SEIZURE IN AN ADULT AS THE PRESENTING SYMPTOM OF CARDIOVASCULAR DISEASE

Nicholas Beam; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Seizure is a non-specific symptom of an underlying physiologic abnormality. It can be due to abnormal brain activity, as in epilepsy, or other causes. In adults who present with new onset seizure, it is well-described that trauma, neoplasm, and degenerative neurologic diseases are common causes. Here we describe a case of a man presenting with new onset seizure, with the underlying cause being advanced cardiovascular disease.

PURPOSE: This case highlights a clinically-significant etiology of new onset seizure in adults, and draws attention for its consideration in the evaluation of a patient presenting with unexplained seizure.

CASE DISCUSSION: A 47-year-old man presented to the emergency department after being found convulsing by his family. He was observed and discharged after three hours without seizure activity with referrals for workup of his seizure. Within hours of discharge he returned in full cardiac arrest. Resuscitation was attempted but unsuccessful. Upon autopsy, no underlying brain abnormality was found. However, mild to severe atherosclerosis was apparent in the coronary and cerebral arteries and the aorta. Cardiomegaly was also noted. Despite the severity of the atherosclerosis, the only cardiac medical history in this patient was untreated hypertension and cardiac risk factors of obesity and smoking. With these autopsy findings, it is likely that the seizure activity this patient presented with was the initial symptom of his underlying cardiac disease. There have been several case reports previously of patients misdiagnosed with epileptic seizures when the true cause of seizure activity was temporary cardiac asystole or another cardiogenic cause^{1,2}. These cases have demonstrated correlation of cardiac rhythm abnormalities, such as AV block, in concordance with seizure activity using simultaneous EEG and ECG monitoring³. In the present case, the cardiac abnormality was seen at autopsy, but no tests were performed in the hospital for heart disease.

CONCLUSION: Seizure activity as an indication of underlying cardiovascular disease is reported several times in the literature. The phenomenon is also seen relatively commonly in the forensic pathology community. As such, it is important to remind clinicians to consider cardiac causes for new onset seizure in an adult.

REFERENCES:

1. Chiesa, V. et al. (2015). Cardiac Asystoles misdiagnosed as epileptic seizures. *BMJ Case Reports*.
2. Mayor, L. et al. (2015). Cardiogenic syncope diagnosed as epileptic seizures. *Epileptic Disorders*. 17(2), 198-203.
3. Sahin, I. et al. (2014). Epileptic seizures secondary to high degree atrioventricular block without escape rhythm. *Turk Kardiyol Dern Ars*, 42(7), 555-557

ASPHYXIATION AS A CONSEQUENCE OF BODY STUFFING

Sheila Sullivan; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

BACKGROUND: The intracorporeal concealment of illicit substances presents clinical, legal, and ethical challenges. Body stuffing is a phenomenon in which substance dealers or abusers, when faced with imminent threat of arrest, conceal illicit substances to evade arrest or possession charges from law enforcement. Given the quick manner of concealment and poor wrapping of packages, body stuffers are at increased risk of medical complications including intestinal obstruction, acute poisoning, and asphyxiation. Medical personnel should be aware of these complications when managing individuals suspected of body stuffing.

OBJECTIVE: The objective of this case is to examine the death by asphyxiation on a foreign body as a consequence of body stuffing.

MATERIALS & METHODS: The case was selected from the case files of one of the authors (JP).

CASE REPORT: A 31-year-old male passed away from apparent asphyxiation on a foreign body. The subject had been fleeing from police, who eventually apprehended the subject and noticed that he was having difficulty breathing. EMS was called. The paramedics attempted intubation; however, they noticed an obstruction in the oropharynx and removed a foreign body appearing to be a piece of plastic containing a “green leafy substance”. The paramedics again attempted intubation but noticed there was still an obstruction. The subject was transported by EMS to the emergency department where continued attempts at ventilation proved difficult. A cricothyroidectomy was performed. Resuscitative efforts failed and the subject expired.

Internal examination at autopsy revealed a piece of plastic containing a foreign substance occluding the distal trachea and mainstem bronchi bilaterally. Autopsy was otherwise unremarkable. Serum drug screen was positive for ethanol, tetrahydrocannabinol (THC) metabolite, and cotinine, and negative for cocaine. Urine drug screen was positive for ethanol, cocaine, cocaine metabolite (EME), nicotine, cotinine, and THC metabolite. Substance analysis of the contents inside the plastic tested positive for cocaine. The cause of death was determined to be accidental asphyxia due to airway obstruction by foreign body.

DISCUSSION: This case describes death by asphyxiation as a consequence of body stuffing. Medical personnel should be cognizant of the risk of asphyxiation of foreign material when encountering individuals suspected of body stuffing. Although body stuffing is common, aspiration of cocaine packages has only been reported five times in the literature. Early recognition and management of asphyxiation due to airway obstruction may improve patient outcomes in future cases.

SUDDEN DEATH CAUSED BY BILATERAL DIAPHRAGMATIC EVENTRATION IN MYOTONIC DYSTROPHY TYPE 1

Sulin Wu; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Myotonic dystrophy, the most common muscular dystrophy observed in adults, is a multisystem and inherited disease. In addition to progressive muscle wasting and weakness, patients diagnosed with myotonic dystrophy type 1 (MD1) are often observed with pathophysiological variations in the cardiac, ocular, endocrine, and central nervous systems, caused by expansion of a CTG tri-nucleotide repeat in the non-coding region of the DMPK gene.

PURPOSE: We present a case of sudden death due to respiratory compromise caused by bilateral diaphragmatic eventration and associated restrictive lung disease in a 48-year-old woman with a clinical diagnosis of myotonic dystrophy type I.

MATERIALS & METHODS: The case is selected from the case files of JP, a practicing forensic pathologist.

RESULTS: A 48-year old woman was found unresponsive in a sitting position on her sofa at home. First responders declared her dead at the scene, and the case was referred for medicolegal autopsy. The decedent was a well-developed and mildly obese (BMI = 29.4) Caucasian woman with a clinical diagnosis of MD1 at the age of 13, although no genetic testing was performed. At the age of 39, the patient was hospitalized for a community-acquired pneumonia, followed by a diagnosis of chronic obstructive pulmonary disease (COPD) and restrictive lung disease with dyspnea and respiratory insufficiency (FEV1 of 37%). She had a history of sleep apnea and chronic shortness of breath.

At autopsy, the decedent's lungs appeared to be hypoplastic bilaterally (470 grams; normal >1000 grams). The diaphragm was intact; however, it was distended markedly upwards (with concomitant decrease in pleural cavity volume), and much of the diaphragm appeared to be parchment-thin and nearly translucent. Microscopic examination revealed deformation and degeneration of skeletal muscle with fat and fibrous tissue replacement and residual muscle fibers containing numerous central nuclei and rare cytoplasmic vacuolization. Autopsy also revealed hypertensive and atherosclerotic cardiovascular disease. The cause of death was ruled respiratory compromise due to restrictive lung disease due to bilateral diaphragmatic eventration due to myotonic dystrophy - type I, with underlying hypertensive and atherosclerotic cardiovascular disease.

CONCLUSION: This case presents evidence of abnormal diaphragmatic morphology with associated lung compromise in an adult with MD1, thus revealing the pleiotropic effect of this progressive and inherited disease.

THE CANE-SWORD: A CASE STUDY

Timothy Wysozan; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Although firearms injuries are responsible for a majority of homicides within the United States, those committed by stabbing remain one of the most common additional types. According to the Federal Bureau of Investigation, in 2013, nearly 1500 murders occurred in which the principle weapon involved was a knife or a blade.¹ One of the more unique blade-type weapons is seemingly innocuous cylindrical “cane” that releases at the handle and slides off to reveal a blade hidden within it, commonly known as a “cane-sword”. This type of weapon allows the user to conceal the blade inconspicuously within the body and hilt of the cane until such a time when the user decides to reveal the blade. Homicides committed using unique weapons such as the “cane-sword” look very similar to those committed by other blade-type weapons, and can be difficult for forensic pathologists, law-enforcement officers, and emergency medical personnel and physicians to identify.

PURPOSE: The purpose of this case-report is to present an interesting forensic pathology case involving a homicide committed using a unique weapon, the “cane-sword”.

MATERIALS & METHODS: The material presented in this case-report is derived the case-files of one of the authors (JP).

DISCUSSION: This case-report provides an overview of the injuries caused by a “cane-sword”. The victim of the case was found to have a stab wound in the left mid-back. This wound caused perforation of both the lower and upper lobes of the left lung, resulting in a left hemothorax. Additionally, the victim had other blunt force injuries to the face/head, trunk, and extremities. Upon autopsy, it was concluded that the patient died as a result of the stab wound to the back.

CONCLUSION: The significance of this case-report is that it will inform forensic pathologists, law-enforcement officers, and emergency medical personnel and physicians about a relatively rare and unique weapon type, the “cane-sword”.

REFERENCES:

1. The Federal Bureau of Investigation. Crime in the United States 2013. U.S. Department of Justice. 2014. Data Set. https://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2013/crime-in-the-u.s.-2013/offenses-known-to-law-enforcement/expanded-homicide/expanded_homicide_data_table_8_murder_victims_by_weapon_2009-2013.xls. Accessed 9 February 2016.

SUDDEN DEATH IN FOUR-DAY OLD WITH CONGENITAL AORTIC VALVE STENOSIS

Vina Tran; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Heart defects are among the most common birth defects, and congenital aortic valve stenosis is a rare condition accounting for a small fraction of these defects. The cause of the congenital abnormal aortic valve is unknown, but a newborn with critical aortic stenosis can develop heart failure in the first days of life.

PURPOSE: The purpose of this presentation is to present a case of sudden death in a four-day old with congenital aortic valve stenosis and interstitial pneumonitis.

MATERIALS & METHODS: The case is selected from the case files of one of the authors (JP), a practicing forensic pathologist.

CASE REPORT AND DISCUSSION: The decedent was reportedly found lying face-down on top of his mother's chest, unresponsive, when she awoke. The mother explained that her son had been having difficulty feeding, both from the breast and bottle, for the past day leading up to the incident. She further noted that during these feeding attempts, the decedent's breathing seemed to be "rough" as if he was "gasping". While trying to breastfeed, mother fell asleep with the decedent face-down on her chest with skin to skin contact, and woke up about 3 hours later. At this time, she attempted to breastfeed the infant again when she found him to be unresponsive and not breathing. 911 was called and medics quickly transported the decedent to the hospital, where he was pronounced dead. The case was referred for medicolegal death investigation.

At gross autopsy, the decedent was found to have significant aortic valve stenosis with a circumference measuring 1.4 cm, compared to the pulmonic valve that measured 3.2 cm in circumference. Furthermore, the aortic valve cusps appeared thickened and irregular, and there was biventricular dilatation. Microscopically, the lungs were found to have moderate to severe interstitial pneumonitis. Although the possible contribution of accidental asphyxia related to bedsharing could not be entirely ruled-out, based upon the anatomic findings found at autopsy, it was concluded that the decedent died of interstitial pneumonitis with underlying congenital aortic valve stenosis.

CONCLUSION: Although rare, congenital aortic valve stenosis is a serious condition that can cause mortality in the first days of life. In addition to presenting the details of the case, including discussion of the risks associated with bedsharing with infants, this paper will provide information regarding the incidence, etiology, diagnosis, and treatment of this rare congenital heart defect.

A CASE OF HEMOLYTIC UREMIC SYNDROME IN A 7-YEAR-OLD BOY CAUSED BY E. COLI O157 GASTROINTESTINAL INFECTION

Philip Bystrom; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

BACKGROUND: E. coli O157 is an enterohemorrhagic strain of the bacteria E. coli that infects the gastrointestinal tract and causes abdominal cramps with bloody diarrhea. Infection in young children may also result in hemolytic uremic syndrome (HUS).

PURPOSE: Herein we present the case of a 7-year-old boy who died of complications related to hemolytic uremic syndrome caused by disseminated E. coli O157 infection.

MATERIALS & METHODS: The case is selected from the files of one of the authors (JP), a practicing forensic pathologist.

RESULTS AND CASE REPORT: The patient presented to a small community hospital for five days of low-grade fever, emesis, and bloody diarrhea. He was transferred to a tertiary care center for worsening hyponatremia and dehydration. Upon admission he was noted having persistent dehydration, hyponatremia, acute renal failure, leukocytosis, and elevated CRP. The patient's condition deteriorated over the following days. On the third day his blood pressure and heart rate suddenly dropped. CPR was performed and he regained his vital signs. A CT scan of his brain showed diffuse edema and focal hemorrhage. The patient expired a few hours later. Autopsy revealed focal subarachnoid hemorrhage and multiple areas of intracerebral hemorrhage. The intestines showed extensive areas of serosal and mucosal exudate with red-brown discoloration. Laboratory culture and other tests indicated that he was infected with E. coli O157.

DISCUSSION AND CONCLUSION: E. Coli 0157 is transmitted via the fecal-oral route through the consumption of contaminated or undercooked foods. It is a relatively uncommon disease that is responsible for approximately 2,100 hospitalizations in the US each year. Most patients recover without treatment within 10 days but some patients benefit from fluid resuscitation. Antibiotic treatment has not been shown to improve the course of disease. A feared complication in young children and the elderly is HUS which can result in kidney failure. Diagnosis can be made through stool culture and other laboratory tests. In this paper, we discuss the various means of diagnosing E. Coli 0157 infection, and we present the characteristic pathologic features of a fulminant, lethal case related to gastrointestinal infection with subsequent HUS. Physicians must be aware of this relatively rare disease so that they can make a timely diagnosis and initiate appropriate therapy.

UNTREATED MULTIPLE MYELOMA, FIRST DIAGNOSED AT AUTOPSY

Nicole C. Foley; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Multiple myeloma (MM) is characterized by the malignant neoplastic proliferation of plasma cells, presenting with multiple lesions, often resulting in extensive skeletal destruction. Multiple myeloma is a heterogeneous disease with some patients progressing rapidly despite treatment and others not requiring therapy for a number of years. Common presenting signs and symptoms include anemia, bone pain, elevated serum protein, fatigue, and hypercalcemia. MM is a disease of older adults with the median age of diagnosis at 66-years-old¹. As the use of routine blood work has become more common, patients are being diagnosed earlier in the disease course. For this reason, it is uncommon for the initial diagnosis of multiple myeloma to occur at the time of autopsy.

OBJECTIVE: We present a case of untreated multiple myeloma, first diagnosed at autopsy.

MATERIALS & METHODS: The case is selected from the case files of one of the authors (JP).

CASE REPORT: An 80-year-old woman died in hospice after having been diagnosed with anemia of unknown origin (Hb 5.4 g/dL, Hct 16.2%) two months prior. At that time, the decedent chose not to undergo transfusion or a work-up. At the request of the family, autopsy was performed to establish the etiology of the anemia. Autopsy revealed multiple bone lesions, some with grossly gelatinous, red-brown contents. Histologic and immunohistochemistry confirmed the diagnosis of multiple myeloma. There was also evidence of amyloid deposition in multiple organs.

A postmortem serum protein electrophoresis revealed the presence of monoclonal protein, with an M-Spike (1.83 g/dL) in the gamma region. The patient's cause of death was determined to be multiple myeloma.

DISCUSSION: The diagnosis of multiple myeloma typically occurs following a work-up for the presenting symptoms. Without effective therapy, symptomatic patients with MM have a median survival of six months². The case serves as an example of an untreated case of MM, highlighting the potentially rapidly lethal natural course of this bone marrow malignancy.

REFERENCES:

1. Kyle, R. A., Gertz, M. A., Witzig, T. E., Lust, J. A., Lacy, M. Q., Dispenzieri, A., ... & Plevak, M. E. (2003, January). Review of 1027 patients with newly diagnosed multiple myeloma. In Mayo Clinic Proceedings (Vol. 78, No. 1, pp. 21-33). Elsevier.
2. Osgood, E. E. (1960). The survival time of patients with plasmocytic myeloma. Cancer chemotherapy reports. Part 1, 9, 1.

RUPTURED BERRY ANEURYSM WITH MINIMAL SUBARACHNOID HEMORRHAGE

Tyler Gardner; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Cerebral artery aneurysm rupture is usually associated with significant subarachnoid hemorrhage; however, there are rare cases where there is a lack of hemorrhage into the subarachnoid space. While subdural hemorrhage can occur with ruptured aneurysms, isolated subdural hemorrhage is more often associated with trauma.

PURPOSE: To present a case of a ruptured cerebral artery berry aneurysm with subdural hemorrhage, but minimal subarachnoid hemorrhage.

MATERIALS & METHODS: The case is selected from the case files of JP, a practicing forensic pathologist.

CASE REPORT: A 51-year-old obese woman, who recently visited an Urgent Care Center for elevated blood pressure, was found dead roughly a month later. She had been complaining of headaches, and received medication for her blood pressure at the visit. A medicolegal autopsy revealed that the cause of death was determined to be a ruptured cerebral artery berry aneurysm of the right anterior cerebral artery, with a contributing underlying cause of hypertensive and atherosclerotic cardiovascular disease. There was significant subdural hemorrhage overlying the right cerebrum. Subarachnoid hemorrhage was present only minimally and in a patchy distribution, with virtual absence of basilar hemorrhage. The ruptured berry aneurysm measured 1 cm in greatest dimension. An additional unruptured aneurysm was found in the left common carotid artery before the bifurcation. There was cardiomegaly (510 gm), and mild to moderate atherosclerosis in multiple vessels.

DISCUSSION AND CONCLUSION: The classic clinical presentation of a ruptured cerebral artery berry aneurysm involves the sudden onset of an excruciating headache.¹ While angiography provides the most conclusive image-based antemortem evidence of an aneurysm, CT scans are used frequently in an emergency setting to identify basilar subarachnoid hemorrhage, a very common associated finding, thus allowing for a diagnosis of probable ruptured aneurysm.¹ Depending on the circumstances of a given case, the presence of subdural hemorrhage with absence of subarachnoid hemorrhage on CT scan may suggest a different underlying process, such as trauma. The presented case serves to remind clinicians that ruptured berry aneurysms do not always produce significant subarachnoid hemorrhage.

REFERENCES:

1. Connolly ES, Rabinstein AA, Carhuapoma JR, et al. AHA / ASA Guideline Guidelines for the Management of Aneurysmal Subarachnoid Hemorrhage A Guideline for Healthcare Professionals From the American Heart Association / American Stroke Association. 2012. doi:10.1161/STR.0b013e3182587839.

SMITH-LEMLI-OPITZ SYNDROME

Michelle Walker; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

BACKGROUND: Smith-Lemli-Opitz (SLO) syndrome is a relatively rare congenital disorder in which an enzyme in the cholesterol synthesis pathway, 7-dehydrocholesterol reductase, is deficient.¹ As cholesterol is necessary for many aspects of growth and development, persons with this disorder typically experience a broad spectrum of signs and symptoms. These vary by person, but may include mental retardation, polydactyly, and microcephaly. Certain facial features are often commonly noted, including hypertelorism, micrognathia, cleft palate, and epicanthal folds.¹ Smith-Lemli-Opitz Syndrome often leads to miscarriage or death at a young age.

PURPOSE: The purpose of this poster is to present a case of Smith-Lemli-Opitz syndrome in order to highlight the lack of treatment options available that could help minimize the breadth of complications and reduce mortality in a person with this disorder.

MATERIALS & METHODS: This case was selected from the files of one of the authors (JP), a forensic pathologist.

CASE REPORT: We present the case of a 2-year-old child who died from complications related to underlying SLO syndrome. The patient experienced many complications as a result of her disease, with a primary difficulty of severe Gastroesophageal Reflux Disease (GERD) that led to feeding problems and eventual fundoplication surgery. Post-surgery, she contracted a urinary tract infection, which progressed to Systemic Inflammatory Response Syndrome (SIRS) despite antibiotic treatment. Following acute mental status change, the patient succumbed to bronchitis and bronchiolitis with interstitial pneumonitis.

DISCUSSION AND CONCLUSION: The lives of patients with Smith-Lemli-Opitz syndrome are typically fraught with obstacles, often leading to poor prognoses.² The outlook for a given patient is further impeded by the limited availability of therapy for those born with the syndrome, as well as the inability to correct the damage already accrued from cholesterol deficiency prenatally. The presentation serves to provide an overview of this rare disorder, including a discussion concerning how to rectify some of the deficits in Smith-Lemli-Opitz syndrome treatment options.

REFERENCES:

1. Porter FD. Smith-Lemli-Opitz syndrome: pathogenesis, diagnosis and management. *Eur J Hum Genet.* 2008; 16(5): 535-541. doi: 10.1038/ejhg.2008.10
2. DeBarber AE, Eroglu Y, Merkens LS, Pappu AS, Steiner RD. Smith-Lemli-Opitz syndrome. *Expert Rev Mol Med.* 2011; 13(e24): 1-19. doi: 10.1017/S146239941100189X

THE EFFECTS OF SYNTHETIC CANNIBINOIDS ON RESPIRATORY FUNCTION

Nina Sadigh; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Synthetic cannabinoids, also known as “K2” or “spice”, emerged in the early 2000s as designer drugs. They are synthesized by dissolving chemicals with a similar structure to tetrahydrocannabinol (THC) in a volatile solvent, which is then placed on herbs for use. No human dosing studies have been done to determine the effects of synthetic cannabinoids versus plant-based cannabinoids; as a result, their side effect profiles are still largely unknown. There has been a high incidence of adverse effects reported, such as tachycardia, paranoia, and hypertension.

PURPOSE: The purpose of this case is to illustrate potential correlations between the use of synthetic cannabinoids and emergent respiratory conditions.

MATERIALS & METHODS: Materials presented were retrieved from the case files of one of the coauthors (JP).

CASE REPORT: A 19-year old black male, with a history of both asthma and synthetic marijuana use, was found unresponsive at his residence after experiencing an asthmatic attack. EMS was called, but resuscitative efforts failed. The patient was known to be using synthetic marijuana almost daily for the past three years. The patient’s mother stated that he was prescribed albuterol and prednisone, but he was not receiving regular care for his asthma. She also believed that the drug use was worsening his asthma. The case was referred for medicolegal autopsy. Findings were significant for acute and chronic asthmatic bronchitis. The decedent tested positive for XLR-11, with a level of 0.21 ng/mL. The cause of death was determined to be acute and chronic asthmatic bronchitis, with a contributing factor being the toxic effects of XLR-11. The manner of death was an accident.

DISCUSSION AND CONCLUSION: This case demonstrates to health care workers the potential of synthetic cannabinoids abuse for exacerbating respiratory disease. Health care providers, especially those in the setting of the emergency department, should be aware of patient susceptibility to synthetic cannabinoid-induced toxicities. Awareness should also be raised for medical examiner and death investigators, as synthetic cannabinoid compounds are not identified on routine postmortem drug screenings. It is important to expand research into the physiologic effects of synthetic cannabinoids on respiratory function.

REFERENCES:

1. Davis C, Boddington D. Teenage cardiac arrest following abuse of synthetic cannabis. *Heart Lung Circ.* 2015;24(10):e162-3.
2. Dean S, et al. Acute Coronary Artery Thrombosis Associated with Synthetic Cannabinoid Intoxication. *Academic Forensic Pathology.* 2015; 5(1): 127-132.
3. Orsini J, et al. The Wide and Unpredictable Scope of Synthetic Cannabinoids Toxicity. *Case Rep Crit Care.* 2015;2015:542490.

UTILIZATION OF A 3-D PRINTED MODEL FOR PREOPERATIVE PLANNING AND OPERATIVE OSTEOTOMY OF A PEDIATRIC CUBITUS VARUS DEFORMITY

Jason Habeck, MD; Karen Bovid, MD; Peter A. Gustafson, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Western Michigan University, Department of Mechanical and Aerospace Engineering

INTRODUCTION: Cubitus varus is a common complication following pediatric fractures of the elbow. This is typically thought to occur secondary to malunion of the fracture or uneven growth resulting in varus at the elbow. This often causes cosmetic deformity and occasionally compromises function or results in a tardy ulnar nerve palsy. There are several types of corrective osteotomies described in the literature, and axial imaging has been used to aid preoperative planning, but there is little evidence in the literature describing pre-operative planning for cubitus varus deformity utilizing 3D printing.

RATIONALE: This study aimed to describe the novel use of advanced imaging and 3-dimensional modeling and printing for the pre-operative planning and operative execution of a supracondylar humerus osteotomy for cubitus varus.

MATERIALS & METHODS: A magnetic resonance imaging (MRI) study of the patient's elbow was performed. Segmentation was completed to convert the image to a 3D surface representation of bony anatomy. The surfaces were used to 3D print a physical representation of the deformity. A corrective osteotomy was then planned utilizing the computer model, and the simulated correction was performed in the lab using the 3D printed model. This allowed for a detailed preoperative plan that was then executed during the surgery using anatomic landmarks matching that of the patient's humerus anatomy.

RESULTS: The surgical correction was performed following the pre-operative plan made using the 3D model. The operation was conducted according to plan with appropriate correction of the deformity. There were no complications intraoperatively or in the immediate postoperative period.

CONCLUSION: The use of 3D printing has been a recent improvement in medicine and has multiple applications. Indications for its use are evolving rapidly. 3D printed models are a valid way to conduct comprehensive and accurate pre-operative planning, especially when performing corrective osteotomy for complex multi-planar deformity. It allows quantitative measurements and anatomic landmarks matching that of the patient's native anatomy to assist in surgical procedure.

EVALUATION OF A PHYSICIAN EDUCATION PROGRAM TO IMPROVE UNDERSTANDING OF PRE-EXPOSURE PROPHYLAXIS FOR HIV PREVENTION

Kevin Cates; Kelly Doyle; Cheryl A. Dickson, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; Community AIDS Resource and Education Serices (CARES); WMU Homer Stryker M.D. School of Medicine, Department of Health Equity and Community Affairs

INTRODUCTION: Novel biomedical HIV prevention strategies have recently become available in the form of Pre-Exposure Prophylaxis (PrEP) and Post-Exposure Prophylaxis (PEP). These HIV prevention methods rely on HIV-negative individuals utilizing antiretroviral medication in order to prevent the establishment of an HIV infection. We created and delivered a 60 minute lecture for continuing medical education credit updating physician participants on the US Public Health Service guidelines by teaching through a series of cases based on real patients. In order to assess the effectiveness of this teaching method, we distributed a pre- and post-test before and after each lecture.

OBJECTIVE: Our aim is to evaluate the effectiveness of pairing a traditional lecture format with case-based presentations in physician education regarding PrEP.

MATERIALS & METHODS: A brief 5-question anonymous survey was administered before and after each session. The survey was two-sided, allowing us to link pre- and post-test data without compromising anonymity of respondents. Survey questions were presented as a Likert scale, allowing participants to indicate their agreement or disagreement with statements about their familiarity with PrEP, their willingness to prescribe, their perception of HIV risk in their patient population, their familiarity with the US Public Health Service guidelines, and their comfort in discussing PrEP with inquiring patients.

RESULTS: Our preliminary results include 28 physician respondents with 1 additional response excluded due to failure to complete the survey.

In response to the item evaluating patient population's perceived HIV risk: There was no statistically significant change between pre-and post test.

In response to the item evaluating understanding of PrEP: there was a statistically significant increase in agreement, with a p value of 4.3×10^{-11} .

In response to the item evaluating familiarity USPHS guidelines: there was a statistically significant increase in agreement, with a p value of 2.1×10^{-11} .

In response to the item evaluating willingness to discuss PrEP: there was a statistically significant increase in agreement, with a p value of 7.9×10^{-5} .

In response to the item evaluating willingness to prescribe PrEP: there was a statistically significant increase in agreement, with a p value of 1.7×10^{-4} .

CONCLUSION: A combination of lecture and case-based presentation was effective in improving self-reported physician understanding of PrEP and its prescribing guidelines, and their willingness to discuss and prescribe PrEP.

A SUSPECTED CASE OF ALPHA-1 ANTITRYPSIN DEFICIENCY IN A PATIENT DECEASED 8 YEARS PRIOR

Kevin Cates; Joseph Prahlow, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pathology

INTRODUCTION: Alpha-1 Antitrypsin deficiency (AAT deficiency) is a rare genetic deficiency which results in disinhibition of neutrophil elastase and excessive breakdown of elastic tissue in the lung and liver. Common clinical signs include severe emphysema with or without liver cirrhosis before the age of 45, especially in the absence of factors known to produce emphysema or liver cirrhosis. We report a case of death in 2008 due to hemothorax due to ruptured emphysematous bleb due to severe emphysema in a 32 year old white woman who is negative for common AAT deficiency alleles which make up 95% of all cases.

PURPOSE: Because clinical suspicion for AAT deficiency was so high, we pursued further testing to account for the possibility of an uncommon variant of the SERPINA1 gene which causes AAT deficiency. If positive we will inform the decedent's surviving children who may have inherited the mutated allele responsible for this disorder, and connect them to testing.

MATERIALS & METHODS: The autopsy case file for the decedent was reviewed for possible indications of AAT deficiency, and preserved dried blood spot was used to conduct additional genetic testing. Photographs of the decedent were provided by the coroner who conducted the case. Tests performed on the decedent were reviewed, including a test for common variants of SERPINA1 which cause 95% of AAT deficiency, toxicology screen for alcohol, marijuana, and other drugs (all were negative except caffeine).

RESULTS AND DISCUSSION: Results of the analysis are pending. Whether test results are positive or negative, our discussion will focus on correctly identifying clinical signs and symptoms of AAT deficiency. If results are positive, we will discuss inheritance of AAT deficiency and notification of the surviving children. We retain high suspicion for an uncommon variant AAT deficiency. The autopsy file indicates no evidence of excessive cigarette smoking or alcohol abuse, leaving unanswered the question of why the decedent had emphysema and liver cirrhosis.

CONCLUSION: Our conclusion will center on the importance of considering uncommon genetic variants in suspected cases of AAT deficiency, and of providing genetic counseling and testing to children of a patient with SERPINA1 mutation.

ADAPTIVE IMMUNITY - A HISTORICAL PERSPECTIVE

Kevin Cates; Bonny Dickinson, PhD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences

The immune system has two arms, the non-specific innate arm and the highly specific adaptive arm, that work in concert to protect the host. Activation of the adaptive arm, through natural infection or vaccination, provides long-term disease-specific immunity in the form of immunological memory. Our modern concept of adaptive immunity through vaccination has its origins in the work of Edward Jenner, as detailed in his 1798 *An Inquiry into the Causes and Effects of the Variolae Vaccinae*. Jenner's work built upon the concept and practice of variolation, in which material from a smallpox lesion was used to induce a milder (but still dangerous) smallpox infection in a naïve host in order to generate immunity to the native virus. Interestingly, the practice of variolation was first recorded nearly 800 years before Jenner's successful vaccination experiments, and an understanding of immunity was expressed in writing as far distant as Thucydides *History of the Peloponnesian War* in 431 B.C. To better appreciate the prescience of early scientists and philosophers, we chart the historical depictions of immunity as they lead up to Jenner's successful invention of the smallpox vaccine. To explore the historical underpinnings of the concept of adaptive immunity, we reviewed historical documents and academic analysis of historical documents, including those from ancient Greece, China, Turkey, and Europe. We find the earliest depiction of adaptive immunity is by Thucydides, one of the great ancient historians, who described the preferential survival of physicians who had contracted and survived the "plague" of the Peloponnesian War. Thucydides observed that although these physicians did not contract the disease again, their survival did not provide protection against other ailments - indicating that immunity is disease specific. From here we describe early accounts of variolation in ancient Chinese medical texts, the export of the practice to the Middle East, as detailed in Voltaire's writings, and the appearance of the practice in Europe where it became common before the advent of vaccination in Jenner's time. In summary, the concept of specific and durable protective immunity has its underpinnings in the observations and practices of ancient physicians. The historical evolution of immunity and the prevalence of variolation practices provided the context in which Jenner was able to develop, test, and disseminate the concept of vaccination, which launched the development of modern vaccines to prevent infectious diseases and cell-based therapeutics to treat, and someday, prevent cancer.

TANAPOXVIRUS EXPRESSING INTERLEUKIN-2 REGRESSES HUMAN MELANOMA TUMORS BY A T-CELL INDEPENDENT MECHANISM IN MICE

Tiantian Zhang; Karim Essani; Dennis H. Kordish; Yogesh R. Suryawansh

Western Michigan University, Department of Biological Sciences

INTRODUCTION: Melanoma, one of the most common skin cancers, is known for its propensity of causing metastatic spread throughout the body with poor prognosis. Interleukin 2 (IL-2) is a pleiotropic cytokine that plays a key role both in innate and adaptive immune systems. It has been shown to be involved in the growth and differentiation of T cells, and the activation of natural killer (NK) cells. Oncolytic virotherapy has become an appealing addition to the current therapies of cancers, as it is able to specifically target and lyse tumor cells, and activate the host immune system to regress the tumor. Tanapoxvirus (TPV), which possesses a large genome and only causes mild and self-limiting disease in human, is an ideal candidate for virotherapy.

OBJECTIVES: In this study, we sought to generate a recombinant TPV expressing mouse IL-2 (TPV Δ 66R/mIL-2), where the 66R/thymidine kinase (TK) gene was replaced with mouse IL-2 transgene, and evaluate the oncolytic effectiveness of TPV Δ 66R/mIL-2 in regressing melanoma in nude mice.

MATERIALS & METHODS: Owl monkey kidney (OMK) cells, human lung fibroblasts (WI38) cells and human melanoma cell line SK-MEL-3 were used in this study. A plasmid derived from a commercially available cloning vector pBluescript II KS (+) was generated to include the mIL-2 open reading frame (ORF) in between the genomic sequences flanking the right and left sides of TPV-66R ORF. The recombinant virus TPV Δ 66R/mIL-2 was generated via the process of transfection and infection, using the parental virus and the plasmid containing mIL-2. Western blot was conducted for determining the expression of mIL-2. Melanoma tumors were induced in female athymic nude mice (CrI:NU(NCr)-Foxn1nu) by injecting SK-MEL-3 cells subcutaneously. When the tumor volumes reached 45 ± 4.5 mm³, mice were treated with intratumoral injection of viruses.

RESULTS: In cell culture, the replication of TPV Δ 66R/mIL-2 was less than that of both wild-type TPV (wtTPV) and TPV Δ 66R at a low multiplicity of infection (MOI) in owl monkey kidney (OMK) cells. However, TPV Δ 66R/mIL-2 replicated as efficiently as wtTPV and TPV Δ 66R in human melanoma SK-MEL-3 cells. The antitumor potential of TPV Δ 66R/mIL-2 was studied on xenografted nude mice carrying human melanoma tumors. Our results showed that TPV Δ 66R/mIL-2 significantly regressed these tumors. The IL-2 containing virus was even more effective than that of wtTPV and TPV Δ 66R.

CONCLUSION: Together, these results suggest that TPV Δ 66R/mIL-2 has potential for immunotherapy and oncolytic therapy of melanoma.

This work was partially supported by an NIH grant to KE.

“QUIZZO” AS A CUMULATIVE PHARMACOLOGY REVIEW FOR UNDERGRADUATE MEDICAL STUDENTS

Kelly Quesnelle, PhD; Shanna Cole, PharmD

WMU Homer Stryker M.D. School of Medicine, Department of Biomedical Sciences

INTRODUCTION: During the first two years of their curriculum, undergraduate medical students at Western Michigan University Homer Stryker M.D. School of Medicine (WMed) take three customized assessments and a comprehensive basic science self-assessment exam from the National Board of Medical Examiners (NBME) in order to evaluate their readiness to take Step 1 of the United States Medical Licensing Examination.

OBJECTIVE: In the present study, we sought to determine if using a popular type of live quiz trivia, “Quizzo”, was an effective means to improve student performance on the Pharmacology portion of the customized assessments.

MATERIALS & METHODS: An optional Quizzo review, where teams of 2-5 students answered approximately 100 pharmacology questions divided into ten rounds, was held prior to the second customized assessment. A questionnaire was used to assess student perception of learning following the Quizzo event. To objectively assess performance, both overall exam performance as well as specific performance on pharmacology content area questions was compared between students who attend the review and students who did not.

SUMMARY: Students who attended Quizzo felt strongly (mean score >4.0 on a 5.0 scale) that Quizzo helped them identify areas they personally needed to study for the exam. They had a positive overall impression of the event (mean score >4.0 on a 5.0 scale) and said that they were likely to attend future reviews (mean score >2.5 on a 3.0 scale). The mean score of students attending Quizzo (n=21) was 68.00 out of 100.0 on pharmacology content area items, compared to 62.63 out of 100.0 for students not attending Quizzo (n=32). A Wilcoxon two-sample rank sum test with a one-sided t-approximation was used to compare the two groups’ performance on pharmacology content items (p=0.0652). Students attending Quizzo scored 71.43 out of 100.0 on the overall exam, compared to 68.75 out of 100.0 for students not attending Quizzo (p=0.1157). Statistical analyses were performed by WMed Department of Biostatistics and Epidemiology.

CONCLUSION: The Quizzo review improved student perception of learning, and marginally improved performance on the pharmacology content items of the NBME customized assessment. This study suggests that Quizzo may be an effective tool to improve student performance on subsections of the NBME customized assessment exams. Further studies should be conducted to increase the sample size of the current study and improve the statistical power of the analyses.

BENZODIAZEPINE USE AND FALLS IN THE ELDERLY

Kendyll Erickson; Amanda Hult, PharmD

Ferris State University College of Pharmacy, Pharmacy Student; Bronson Methodist Hospital, Pharmacy Services

CONTEXT: It is well known that benzodiazepines have a side effect of dizziness and can promote falls in the elderly population. Bronson Methodist Hospital seems to have a number of geriatric patients whose prior to admission medications include a benzodiazepine, but it has not been shown whether this medication points to an association to increased fall risk.

OBJECTIVE: The primary objectives of this study are to evaluate the association of benzodiazepines on geriatric falls, as well as to evaluate the changes in benzodiazepine prescribing to these patients upon discharge from Bronson Methodist Hospital.

RESEARCH DESIGN: The study will be a retrospective chart review of geriatric patients presenting with a fall or fracture from a fall.

PRIMARY OUTCOME: The primary outcome is the incidence of benzodiazepine use in elderly patients presenting with a fall or fracture secondary to a fall.

IMPLICATIONS: The findings of this study could stress the importance of Bronson pharmacist intervention in benzodiazepine discharge prescribing.

IMPROVING COMMUNICATION AND PROVIDER SATISFACTION VIA IMPLEMENTATION OF A STANDARDIZED EMERGENCY DEPARTMENT HANDOFF

Kevin McKelvey, DO; Philip Pazderka, MD

WMU Homer Stryker M.D. School of Medicine, Department of Emergency Medicine

BACKGROUND: The time of communication between providers during transitions of care has been identified as a critical period where essential information regarding patient history, physical and emergency department course may be left out or misunderstood. The gaps in communication can cause serious breakdowns in the continuity of care, inappropriate diagnostics or treatment, and potential harm to the patient.

OBJECTIVE: In order to try to optimize patient care and improve provider satisfaction during this critical time of transition, a handoff template was designed to standardize the handoff process of patient care from the Emergency Department to consulting or admitting provider.

MATERIALS & METHODS: We developed an observational qualitative study in which referring and accepting resident physicians at two teaching hospitals were surveyed regarding elements of effective handoff both before and after implementation of this handoff tool. Responses in regard to understanding of patient ED course, immediate treatment plan, level of organization of information delivery, provider satisfaction with handoff process, and provider-perceived impact on patient care were quantified using a Likert scale.

RESULTS: Data revealed statistically significant increase in scores from all surveyed provider services as well as responses for each specific question.

CONCLUSION: We recommend standardized patient care hand off templates be used to guide the transition of care of patients in the emergency department to consultative and admitting providers as a means to improve national patient safety goals as outlined by the Joint Commission and to comply with ACGME's Common Program Requirements for structured hand over process.

COMMUNITY COLLABORATION - CHILDHOOD TOXIC STRESS AND RESILIENCE

Kristine Gibson, MD; Jeannette Lia Gaggino, MD; Jamie Harden, DO; Megan Sikkema, DO

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Bronson Healthcare Group, Bronson Rambling Road Pediatrics Oshtemo; Bronson Healthcare Group, Bronson Rambling Road Pediatrics Portage and Pediatric Referral Service; Bronson Healthcare Group, Bronson Rambling Road Pediatrics Portage and Pediatric Referral Service

BACKGROUND: Toxic stress and adverse childhood experiences (ACES) impact not only child health and development but are also highly correlated with poor health outcomes in adulthood. Mitigating ACES requires community collaboration and action and is often hindered by vertical professional silos.

OBJECTIVE: To create an event wherein medical and mental health professionals and leaders would be educated about toxic stress and ACES and systems would be explored to promote “horizontal integration” vs. professional silos.

MATERIALS & METHODS: A CME conference was created as part of an American Academy of Pediatrics Leonard P. Rome Visiting Professor CATCH grant in conjunction with the Kalamazoo Community Mental Health and Substance Abuse Services (KCMHSAS) Wraps System of Care Conference and supported by the Michigan Chapter of the American Academy of Pediatrics (MIAAP). Programming included formal didactic education on current state of childhood adversity in the community and state, toxic stress research and its impact on children and resiliency factors. A workshop was designed to create dialogue between medical and mental health professionals, educators and state leaders and to promote actionable steps within systems around the topic of toxic stress.

RESULTS: 94 participants from around Michigan attended the conference including primary care providers, mental health professionals from the private and public sector, educators, leaders from the Michigan Dept. of Community Health (MDCH) and the Dept. of Human Services (MDHS), Dean of the WMU Medical School, medical students, graduate psychology students, youth and parents. Workshop participants created actionable next steps. Although we had a small n=11 responders (physicians only applying for CME and did not include other disciplines or medical students and residents) 100% of responses indicated increased knowledge of toxic stress as a public health concern, 90% of responses were strongly in agreement that information presented in the collaborative format was helpful and additional attendee comments included both plans to incorporate ACES screening into practice and to identify community collaboration opportunities in their own regions. A poster presentation of the event was created in story form as a parable.

CONCLUSION: Medical professionals can promote interdisciplinary educational events to increase awareness about toxic stress and ACES and to explore system collaborations. Strategies to develop professional networks are effective in creating relationships.

HEREDITARY CHRONIC NEUTROPHILIA: A FAMILY WITH A PROBABLE CSF3R ACTIVATING MUTATION

Larry Lutwick, MD; Chintan Shah, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Borgess Inpatient Services

INTRODUCTION: Hereditary erythrocytosis and thrombocytosis with an autosomal dominant pattern are usually linked to activation mutations in the gene for the respective receptor. Only one European family has been described (in 2009) with a parallel mutation in the granulocyte colony-stimulating factor receptor (CSFR).

OBJECTIVE: To describe a Michigan family with hereditary chronic neutrophilia with a probable similar activating mutation in the CSFR gene,

CASE REPORT: A 76 year old Caucasian woman with COPD, aortic stenosis and CHF was transferred to our facility with a one week history of a URI-like illness progressing to acute respiratory failure requiring intubation. A chest radiograph revealed pulmonary edema. Her initial WBC was 20.9 and with broad spectrum antimicrobials and corticosteroids, she rapidly improved, was extubated and transferred to a medical floor. Despite improvement and slow taper of steroids, her WBC continued to rise to a peak of 54K without immature forms, without fever or symptoms of other focal infections and with an overall increase in her sense of well-being. After continued steroid taper and off of all antimicrobials, her WBC slowly decreased to 20-30K, she was discharged. A review of her WBCs during past health care visits revealed all WBCs between 20-30K without immature forms. By history, she had been evaluated in the past for neutrophilia with a normal bone marrow exam and knew that her WBC had been elevated “for as long as I can remember.” She revealed that her only child, a daughter, and both of her grandchildren also had high neutrophil counts. Additionally, she said that she thinks her mother had “a problem with her white cell count”.

DISCUSSION: The woman’s family clearly demonstrates a genetic pattern of an autosomal dominant transmission of neutrophilia without known hematologic problems and that the demargination of neutrophils by corticosteroids could exacerbate the abnormalities. Only one family has been described with a similar familial transmission and was found to have a T617N mutation of the CSF3R gene favoring dimerization of the receptor transmembrane domain and strongly promoting constitutive activation of the receptor and hypersensitivity to G-CSF leading to chronic neutrophilia that could mimic a myeloproliferative disorder.

CONCLUSION: A second family has been found with an autosomal dominant chronic neutrophilia which could be due to a similar, if not identical, mutation. The woman has been counseled regarding neutrophilia evaluation of illnesses in her and her family.

PENELOPE'S PURULENCE: A CASE OF AN INFECTED PET POT-BELLIED PIG BITE

Larry Lutwick, MD; Aness Al-Khateeb, MD

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

INTRODUCTION: Because of the close association between humans and both their companion and other animals, it is not surprising that bites occur from pets, livestock and feral animals that can result in infection. In addition to the usual dog or cat bite, bacterial or other infections can occur after bites from monkeys, ferrets, horses, sheep, snakes, reptiles, birds, and rodents. We report of an arm infection from the bite of pet pig that resulted in the need for hospitalization.

CASE REPORT: A 61-year-old woman sustained a single puncture wound on her left forearm from her 60-pound pet pot-bellied pig (*Sus scrofa domesticus*) Penelope, when she accidentally rolled over on the pig while they were sleeping in the woman's bed. Within an hour, she developed soft tissue swelling and erythema at the bite site without drainage, fever or chills. She was seen in an Emergency Department where a WBC count was 12.5K and she was prescribed oral amoxicillin/clavulanate. Because of progression of the cellulitic process to involve most of the left forearm but no fever, she was reseen in the ER and admitted. Her antimicrobial therapy was changed to iv ampicillin/sulbactam, a CT scan of her left forearm revealed no gas or focal fluid collections or bony changes, a WBC count was 11.8, swab wound and blood cultures were obtained and an ID consult was requested.

The antimicrobials were continued and the cellulitic borders rapidly stopped progressing and then began to recede with diminishing pain, erythema and soft tissue swelling. The woman was discharged to finish a 7 day course of the antimicrobials with amoxicillin/clavulanate and she and Penelope have remained well. Wound and blood cultures were negative perhaps due to previous antimicrobials.

DISCUSSION: In reviews of microbiology of pet, livestock and feral porcine bites to man, a variety of common and uncommon bacteria are described including both Group B and C streptococci, *E. coli*, *Proteus* species, *Actinobacillus suis*, *Bacteroides fragilis*, *Flavobacterium*, *Myroides odoratimimus* and *Pasteurella* species, especially *multocida*. Because of the rapid onset of symptoms after the exposure characteristic of *P. multocida*, we believe that this Gram negative bacillus was the likely pathogen here.

CONCLUSION: We present a case of a woman with an infected bite from her pet pig. It is important for clinicians to be aware of the microbiology of infected pig bites of man.

THE FIRST REPORTED CASE OF MYCOBACTERIUM PARAENSE SP. NOV. IN NORTH AMERICA

Larry Lutwick, MD; Elizabeth Kluka, DO

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences;
Borgess Pulmonary & Sleep Medicine

INTRODUCTION: The mycobacteria related to *Mycobacterium simiae* constitute the largest group or complex within the *Mycobacterium* genus. In 2015, another member of this complex was characterized and named *Mycobacterium paraense* species nova. We report the first known North American infection due to *Mycobacterium paraense* sp. nov., this newly characterized organism previously only reported to occur in Brazil and Italy.

CASE REPORT: An 82-year-old native Michigan Caucasian woman with no travel outside of the country was hospitalized after being found to have a 2.5 cm cavitory left upper lobe lesion associated with pulmonary hyperinflation after evaluation for worsening of her baseline cough over several months. She reported increasing production of yellow sputum over the previous two months and weight loss and anorexia without fever, chills or night sweats. She reported that, as a child, in the pre-therapeutic era, her mother had been diagnosed with tuberculosis but the patient's tuberculin skin testing had always been non-reactive. Two sputum samples had many acid fast bacilli on staining and she was placed in tuberculosis isolation and begun on anti-tuberculosis therapy with isoniazid, rifampin, ethambutol and pyrazinamide. Within 14 days, in liquid media, acid fast bacilli was first isolated and suspected to be *M. tuberculosis* but specific gene probes were negative for *M. tuberculosis* complex and a tuberculosis interferon release assay was negative.

Because she reported constitutional improvement on the anti-TB therapy, her TB isolation was discontinued and she was discharged with ID and pulmonary followup. The Michigan State Laboratory reported that the isolate was not identifiable and the isolate was then sent to National Jewish Hospital in Denver, CO where it was identified as *M. paranese*. Because of plateauing of her symptoms, her therapy was switched to azithromycin, ethambutol and rifampin. On this regimen, her weight stabilized, her cough lessened, her dyspnea improved and a follow-up chest CT revealed decreased cavitory size and repeat sputum AFB cultures, while still positive revealed only few AFB on stain. She continues to improve.

DISCUSSION: Fusco da Costa and colleagues in Brazil and Italy recently characterized this organism named for the Brazilian northern state of Para. In communications with Dr. Fusca da Costa, she was unaware of any other cases from North America.

CONCLUSION: This is the first reported case of *M. paranese* in North America and the patient is improving on therapy.

IMPORTED DENGUE WITH PROMINENT HEPATITIS AND NEUTROPENIA

Larry Lutwick MD, Sandra Koehn DO; Emily Cordes, DO

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

INTRODUCTION: Dengue virus infection is not uncommonly imported into the USA related to travel in endemic areas. We present a case complicated with profound neutropenia and elevated AST and ALT.

CASE REPORT: A 25 year old graduate student was admitted to the hospital in September with fever, headache and thigh pain. She became ill 8 days after returning from a 2 week trip to El Salvador, receiving numerous mosquito bites and after her return, her illness began with significant leg muscle aches without joint pains with the development of severe headache, fever and chills without frank rigors and a sunburn like rash initially on her torso spreading to her extremities. On admission, she was febrile to 103.1 F, non-toxic and had a centrifugal blanching macular rash. There was no hepatosplenomegaly. Her initial WBC was 2.1, ANF 1.6, platelet count 129K and her AST and ALT were normal. A serological workup was done and CSF findings were unremarkable.

She became afebrile on day 4 with decreasing leg myalgias, rash and headache. Despite her clinical improvement on hospital day 3, her WBC and ANC had dropped to 1.3 and 0.4 respectively and her AST & ALT were 69 & 30. Over the rest of her 6 day stay, her ANC dropped to a nadir of 100 on day 5 and AST/ALT rose to 883/661 on day 6. Her hemoglobin was always normal and the lowest platelet count was 91K. Her WBC, ANC and AST/ALT all normalized after discharge and she remains well 5 months later.

Her blood Dengue NS1 antigen was positive, diagnostic of acute dengue virus infection. Tests for malaria, Chikungunya, Lyme borreliosis, enteroviral infection, arbovirus infection, acute viral hepatitis and HIV were all negative as were all bacterial cultures.

DISCUSSION: Our patient was diagnosed with acute dengue virus infection, an Aedes mosquito-borne Flavivirus. Unlike the more recent Western Hemisphere importations of the Chikungunya and Zika viruses, it has been endemic in tropical and semitropical areas of the Americas since 1981. Profound neutropenia and prominently elevated aminotransferases are uncommon but occurred together in this case. The pattern of AST/ALT with more elevated AST is thought to be due to combined muscle and liver involvement.

CONCLUSION: A young woman with dengue virus acquired in Central America is presented who developed profound neutropenia and prominent elevations in serum aminotransferase levels. Being aware of these complications is important for clinicians.

PROSTHETIC HIP INFECTION DUE TO PASTEURELLA MULTOCIDA

Larry Lutwick, MD; Mona Sonbol; Nancy Luethy, PA

WMU Homer Stryker M.D. School of Medicine, Departments of Medicine and Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Medicine

INTRODUCTION: The zoonotic Gram negative bacillus *Pasteurella multocida* is commonly associated with bite wound infections from dogs and cats. Involvement of bones or joints are unusual especially prosthetic joints. We present a case of a bacteremic left prosthetic hip infection due to *P. multocida* associated with canine non-bite, non-lick exposure in a paraplegic man with a decubitus ulcer.

CASE REPORT: A 57-year-old man was admitted to a hospital ICU related to fever, hypotension and diarrhea. 41 years previously, he suffered a farm-related T7 spinal injury with paraplegia with neurogenic bladder. 9 months previous to this admission, he had treatment and skin-grafting of a sacral decubitus which grew only methicillin-resistant *Staphylococcus aureus*. That decubitus had healed but a left-sided hip ulcer developed that was not malodorous or grossly infected. Broad spectrum antimicrobials were administered (vancomycin and piperacillin-tazobactam). He became afebrile with lower but persistent leukocytosis and elevated CRP. Two initial blood cultures grew *P. multocida* and followup cultures were negative. No ulcer cultures were obtained. His antimicrobial therapy was changed to ceftriaxone. By history, he lived in his family's farmhouse and reported only non-lick, non-bite contact with the family dogs and no contact with the family cats.

Because of persistent leukocytosis and elevated CRP, a CT pelvis was done and revealed rarefied left acetabulum and left femoral head with a large enhanced air-containing left hip effusion associated with a collection extending subcutaneously to the left thigh. The following day, the prosthetic hardware was explanted and a Girdlestone procedure done. Operative cultures also grew *P. multocida* and he was discharged to receive intravenous ceftriaxone followed by oral suppressive therapy.

DISCUSSION: Prosthetic joint infections occur in 1-2% of all joint replacements. Gram positive cocci such as *Staphylococcus aureus* and coagulase-negative staphylococci account for a great majority of the pathogens. In a 2015 report, Lam and colleagues reviewed 31 documented cases, all previously reported as individual cases. Of the group, 7 (22.6%) were hip-related and 24 (77.4%) (2 cases were bilateral) were knee-related. Additionally, the zoonotic contacts were 11 (35.5%) canine (2 bites, 7 lick or scratch and 2 casual) and 20 (64.5%) feline (11 bites, 9 lick or scratch). None of the cases were associated with a previous decubitus ulcer.

CONCLUSION: A unique case is reported of a paraplegic man with a left prosthetic hip infection due to *P. multocida* associated with a hip decubitus ulcer and non-bite, non-lick or scratch canine exposure.

PNEUMOCOCCAL SEPTIC HIP BURSITIS: TWO CASES OF A RARE INFECTION

Larry Lutwick, MD; Deepak Garg, MD; Kevin Cates

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018

INTRODUCTION: Bursitis, a common, painful musculoskeletal syndrome, may be divided into septic and nonseptic causes and superficial or deep in location. Most septic bursitides are superficial, caused by *Staphylococcus aureus* or *Streptococcus pyogenes*. Infections of the deep bursae are rare. We present two cases of hip bursitis caused *Streptococcus pneumoniae*, an uncommon etiology of septic bursitis in a just as uncommon location.

CASE REPORTS:

CASE 1: A 49 year old woman, HIV/HCV co-infected and non-adherent to antiretroviral therapy with bilateral hip replacements was admitted to an outside hospital with left hip pain/swelling with fever, rigors and cough. A CXR was negative but blood cultures grew *S. pneumoniae*. She remained febrile on broad spectrum antimicrobials and was transferred. L hip imaging studies revealed an enlarged and inflamed iliopsoas bursa which, on aspiration, showed purulent fluid, culture negative on antimicrobials but with PMNs and Gram positive cocci in pairs on Gram stain. She slowly recovered on antimicrobials.

CASE 2: A 60 year old male was admitted to a hospital ICU with high grade fever, confusion and acute respiratory failure with radiological evidence of pneumonia. He was treated for a severe community acquired pneumonia with ceftriaxone/azithromycin. Blood cultures were positive for *S. pneumoniae*. As part of an initial workup, an abdominal/pelvic CT scan revealed a fluid collection in the area of the right trochanteric bursa containing a small amount of gas and a right hip arthroplasty. IR-guided aspiration/drainage of the bursa revealed purulent fluid which grew *S. pneumoniae*. He completed a 28 day course of ceftriaxone without incident.

DISCUSSION: Deep septic bursitis is an uncommon clinical entity and hip bursitis caused by *S. pneumoniae* is distinctly unusual. Septic bursitis of any site caused by the pneumococcus is rarely reported and has only involved the olecranon, subdeltoid and prepatellar superficial bursae. We believe that these cases are the first two deep bursal infections due to *S. pneumoniae* to be reported, both involving hip bursae in individuals with previous hip arthroplasty. Neither had clear-cut involvement of the joint or hardware.

CONCLUSION: Two cases of bacteremic pneumococcal deep septic bursitis of the hip are described, one involving the iliopsoas bursa and the other the trochanteric bursa. One patient clearly had a primary lung focus. Both cases were in individuals who had had remote hip arthroplasty which could have been a predisposing factor.

PNEUMOCOCCAL HIP BURSITIS: TWO CASES OF A RARE INFECTION

Larry Lutwick, MD; Kevin Cates; Deepak Garg, MD

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

INTRODUCTION: Bursal inflammation is a common cause of painful musculoskeletal syndromes and is divided into septic and nonseptic etiologies and superficial or deep. Superficial bursitides are quite common and when due to infection are usually caused by *Staphylococcus aureus* whereas deep bursal infections are much less common and have a more varied microbiology. We present two cases of hip bursitis caused *Streptococcus pneumoniae*.

CASE REPORTS:

CASE 1: A 49 year old HIV/HCV co-infected Hispanic woman with bilateral hip arthroplasties due to osteonecrosis was transferred from an outside facility for fever and left hip pain. A blood culture was positive for *S. pneumoniae*. A chest x-ray did not show pneumonia. A CT pelvis found a fluid collection in the left iliopsoas bursa. Aspiration of the bursa revealed culture negative fluid but revealed many PMNs and Gram positive cocci in pairs on Gram stain. She slowly recovered with ceftriaxone therapy.

CASE 2: A 60 year old Caucasian man with a history of osteoarthritis and right hip arthroplasty was admitted to an ICU related to 2 days of high-grade fevers, rigors, confusion and progressive respiratory failure. Endotracheal intubation was required and chest imaging revealed bilateral infiltrates. He was begun on ceftriaxone and azithromycin for community-acquired pneumonia and blood cultures grew *S. pneumoniae*. An abdominal/pelvis CT revealed a fluid collection with gas in the area of the right trochanteric bursa and IR guided aspiration and drainage revealed purulent fluid from which pneumococcus was isolated. He slowly recovered with ceftriaxone therapy.

DISCUSSION: The major deep bursae of the hip are the iliopsoas, trochanteric and ischial. Infection of these bursae are rare. Pneumococcal bursitis is a very rare infection and when reported has affected only superficial bursae (prepatellar, subdeltoid, and olecranon) and has not been reported in deep bursae such as those of the hip. Two cases of pneumococcal bursitis of the hip, one trochanteric and one iliopsoas, are described, both associated with bacteremia and one of them associated with pulmonary infection. Both had had arthroplasty of the bursa's affected hip without overt involvement of the joint itself or the hardware.

CONCLUSION: Deep septic bursitis is a quite uncommon entity and deep hip septic bursitis is even more uncommon. We describe the first two reported cases of deep hip bursitis caused by *S. pneumoniae*, both associated with bacteremia. Both had had a remote arthroplasty which could have been a predisposing factor.

THE BASIC SCIENCE OF HIV ELITE CONTROL - A CASE AND VIROLOGIC REVIEW

Larry Lutwick, MD

WMU Homer Stryker M.D. School of Medicine, Departments of Internal Medicine and Biomedical Sciences

INTRODUCTION: It became clear early in the HIV pandemic that some infected individuals had a mild course. The patients, about 5% of infected persons, were able to maintain high CD4 levels for years in the absence of antiretroviral therapy (ART), referred to as long term non-progressors (LTNPs). LTNPs have been found to be quite heterogeneous, including those with defective viruses, high neutralizing antibody titers, and efficient HIV-specific CD4 and CD8 responses. Quantification of plasma HIV RNA found quite variable levels and most of the LTNP group with detectable HIV RNA eventually had a decline in CD4 levels. One subgroup of the cohort, however, ~5% of LTNPs, consistently maintained undetectable viral loads (VL) for years. This group, referred to as elite controllers (ECs), can persist for more than a decade despite having proviral DNA in their blood mononuclear cells. The significance and prognosis of such controllers are discussed.

CASE: A 51-year-old Kalamazoo African-American sex worker was found to be HIV antibody positive in 1992 with CD4 count 1575. A HIV VL in 3/1996 was 589, 58,127 in 9/1996 and 448 in 6/1997 without ART. After that, she was followed without ART, maintaining CD4 counts of >1200 and viral loads no higher than 67, mostly undetected, until 2006 when she moved to the UP. She continued without ART and returned to Kalamazoo in 2016, remaining well with an undetectable VL and CD4 count 1404 24 years after diagnosis and still HBV/HCV non-infected.

DISCUSSION: The natural history of EC is unclear. Leon and colleagues (2016) report that despite past control, 23.7% of the ECs lost viral control and 44.5% suffered a decline in CD4 cells. 3.5% of ECs developed an AIDS-related event. Variables linked to control loss were shorter follow up length, sexual HIV risk, low nadir CD4 count and HCV co-infection. The probability of progression in ECs was 70% with the highest risk factor score and 13% with the lowest. The number of VL+ “blips” in ECs is also a progression risk, reflecting chronic inflammation/immune reactivation. Cardiovascular hospitalizations occur at a higher rate than those HIV infected ART-controlled persons as well, perhaps from the chronic inflammation necessary to maintain EC.

CONCLUSION: The basic science literature of EC reveal that loss of control is common and ECs have a high risk of cardiovascular disease. Discussions of the need for pre-emptive ART in some ECs is occurring.

COMMUNICATION IN THE PATIENT INTERVIEW

Leah Omilion-Hodges, PhD; Autumn Edwards, PhD; Chad Edwards, PhD

Western Michigan University, School of Communication

Even though many physicians are attempting to use more collaborative communication with patients, they may still be unsuccessful in facilitating accurate information exchange prompting shared decisions to be made based on inaccurate or incomplete data. Regardless of the impetus for withholding potentially relevant medical information, this is problematic for a number of reasons, the most obvious being that the medical provider is then positioned to make recommendations based on incomplete information leading to the possibility of negative drug interactions. Other negative outcomes include inability to uncover the true cause of an ailment and nonadherence to physician recommendations. Therefore, we explore how use of robots during the medical interview may facilitate more accurate health information disclosure. Two studies will be conducted: 1) In the first study (N = 100), students will be asked to rank health-related behaviors in terms of what would be most comfortable and easiest in terms of ability to articulate during a traditional physician-patient medical interview. 2) In the second study (N = 300), participants will take part in an experiment where they deliver a fictional medical history to either a “physician” (undergraduate research assistant) or to a robot.

RUDOLF LUDWIG CARL VIRCHOW: FATHER OF MODERN PATHOLOGY

Dominik Ochocinski; Luis H. Toledo-Pereyra, MD, PhD

Michigan State College of Osteopathic Medicine, Medical Student Class of 2017; WMU Homer Stryker M.D.
School of Medicine, Program in Medical Ethics, Humanities, and Law

INTRODUCTION: The field of pathology in seventeenth and eighteenth century Europe depended upon early anatomical descriptions of organ and tissue changes, but failed to associate these changes with clinical findings. Rudolf Ludwig Carl Virchow (1821-1902), German pathologist, combined the developments of early anatomy, biology, and technology to examine cellular pathology. Virchow determined that cellular level alterations produced changes in function at the tissue, organ and organism levels. Virchow is the founder of modern pathology because his theory of cellular pathology served as a model for the development of modern studies rooted in understanding cellular changes that drive disease.

RATIONALE: The purpose of this investigation is to determine how Virchow's studies revolutionized and shaped the field of pathology. Virchow's contributions helped us understand the progression of pathology as a medical science from circumstantial findings on autopsies to more complex investigation involving fields of biology and medicine.

REVIEW OF LITERATURE: The literature review was conducted utilizing PubMed and Scopus databases specifically searching the terms: Virchow, pathology, medicine, autopsy and history. Fifty-four records were utilized.

RESULTS: The early etiology of disease explained by humoral imbalance, a concept introduced by Hippocrates and expanded upon by Galen, constituted the conventional understanding of pathology up to seventeenth century. Anatomic studies by Giovanni Battista Morgagni and Xavier Bichat, physiologic studies by Johannes Mueller, and microscopy invention by Antony von Leeuwenhoek expanded understanding of pathology between the late eighteenth and early nineteenth centuries. In the nineteenth century, Virchow applied anatomic and physiological principles and used microscopy to describe pathological findings at the cellular level, developing a systematic approach to pathology. He created a comprehensive theory of cellular pathology allowing him to connect cellular damage, tissue and organ disease, and clinical presentation of the patient. Virchow refined postulates of cellular division, formulated Virchow's triad for thromboembolism, and linked hypercoagulability with cancer to characterize changes in systemic proinflammatory states. Virchow created the framework for pathological investigation, enabling his successors to develop research questions about inflammation and cellular injury in the context of molecular and cellular derangements underlying disease.

CONCLUSION: Rudolf Karl Virchow was the father of modern pathology based on his incorporation of advancements in biology and technology into an elegant theory of cellular pathology. Virchow's contributions marked a rapid development in pathology, which allowed progression of pathological investigation in other branches of medicine and opened the door for development of fields such as molecular biology and genetics.

DOPING AMINES

Sala Sadaps, MD; Mark Kanzawa, DO; Sarah Myer, DO

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

Patients taking medications or substances may experience akathisia, which is an overwhelming feeling of inner restlessness. It can compel the body to be in a constant state of motion, and has been linked to an increased likelihood of developing suicidal ideation and behavior.¹ Akathisia is suspected to be a result of dopamine deficiency in the basal ganglia.² A study on Baboons/ squirrel monkeys demonstrated that oral amphetamine caused significant reductions in striatal dopamine.³ Human PET scans suggest that bupropion occupies 15% of striatal dopamine transporters causing a small increase of dopamine in the basal ganglia.² One case in the literature discusses how a patient's prior phencyclidine use may have increased his sensitivity to develop akathisia.⁴ Our case is the first to propose that past chronic methamphetamine use can predispose one to develop akathisia with subtle changes in medications subsequently decreasing dopamine in the striatum.

This case examines a 41 year old female with bipolar disorder with a remote history of 5 years of daily methamphetamine use from age 17. This may have caused permanent depletion of dopamine in her basal ganglia. Her self-imposed reduction of her dose of bupropion may have lowered dopamine in her striatum so that she experienced 3 days of akathisia with her most severe Barnes Akathisia Rating Scale, BARS, 4 subjective/objective score of 9 and global score of 4. The patient's akathisia continued despite discontinuing quetiapine 300 mg which she had been consistently taking before and during hospitalization. In an attempt to replenish dopamine stores, the patient was started on ropinirole, which acts as a D2/D3/D4 receptor agonist.² Her BARS scores improved within 4 days to a subjective/objective score of 1 and global score of 0.

We speculate that several years of prior methamphetamine use depletes the human striatum of dopamine and akathisia may develop even when small changes in dopaminergic medication are made.

REFERENCES:

- 1 Forcen, Fernando Espi, Akathisia: Is restlessness a primary condition or an adverse drug effect? *Current Psychiatry*, 2015 January, 14 (1) 14-18
- 2 Stahl's essential psychopharmacology: Neuroscientific basis and practical application (4th ed.). Cambridge: Cambridge University Press; 2013
- 3 Higgins ES, George MS. *Neuroscience of Clinical Psychiatry, The Pathophysiology of Behavior and Mental Illness*. Lippincott Williams & Wilkins; 2013.
- 4 Chin, T. S. (2006). History of Substance Abuse and Risk of Extrapyrmidal Side Effects. *Psychiatry (Edmont)*, 3(6), 18.
- 5 Barnes TR, A rating scale for drug-induced akathisia. *British Journal of Psychiatry* 1989;154(5):672-676.

A COMPLEX CRASH COURSE

Sarah Myer, DO; Mark Kanzawa, DO; Sala Sadaps, MD; John Cochrane

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; Michigan State University College of Osteopathic Medicine Class of 2017

Partial Complex Seizures (PCS), previously known as Temporal Lobe Epilepsy, have been frequently associated with mood disorders. The negative feedback cycle of depressive symptoms, including sleep deprivation, medication non-compliance, and substance use, as well as the fundamental pathophysiologic changes seen in depression can lower seizure threshold.

A 47-year-old Caucasian female was jailed with charges of driving under the influence and leaving the scene of an accident after crashing her car into a dumpster. Her sister discovered a suicide note in the patient's home, which led to the patient being hospitalized on the psychiatric unit, where she displayed high energy, pressured speech, flight of ideas, and impulsivity. Quetiapine was initially prescribed, with an improvement of symptoms, however the patient was very resistant to her diagnosis of Bipolar Disorder type II along with quetiapine. The patient was evaluated medically to rule out organic and chemical causes for her episode of altered consciousness, with an unremarkable MRI and a negative urine drug screen. The patient's history was concerning for previous similar episodes, lasting for several minutes. An EEG was done to further evaluate these episodes, showing intermittent sharp waves in the left temporal region congruent with Partial Complex Seizures in the temporal lobe. Per the neurologist's recommendation, the patient was prescribed lamotrigine, which has been shown to reduce glutamate release through the blockade of voltage sensitive sodium channels (VSSC). This allows it to be used as an anticonvulsant and a mood stabilizer.¹

This patient had many risk factors of PCS that would lead a clinician to ascribe her behavior and presentation exclusively to PCS, including poor sleep, and taking amitriptyline and hydrocodone from an unmarked pill bottle, as well as suspected excessive alcohol and benzodiazepine use. However her presenting symptoms of hypomania and a significant family history of Bipolar allowed us to accurately identify comorbid Bipolar Disorder type II. This influenced the neurologist's choice of medication for her PCS.

The patient initially had poor insight into the progression of her PCS, substance use, and Bipolar Disorder. This complex case underscores the importance of piecing together her presenting symptoms and history with collateral information to validate a diagnosis. An accurate diagnosis guides a more individualized and effective treatment plan.

REFERENCES:

1. Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Application (4th ed.). Cambridge: Cambridge University Press; 2013

LURASIDONE-INDUCED MANIA: A CASE REPORT

Olga Hadden, MD; Mark Kanzawa, DO

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: Most of the atypical antipsychotics have the FDA approval to treat bipolar mania. An atypical characteristic that distinguishes them from the older typical antipsychotics is their ability to block 5HT_{2A} receptors which causes an increase of dopamine in the striatum and the forebrain.

This increase of dopamine is theorized to be the cause of unintentional switching of some patients into mania. The receptor binding profile of lurasidone at 5HT₇, 5HT_{1A}, and alpha₂ receptors may explain its antidepressant effects. Lurasidone's high affinity for blocking 5HT_{2A} receptors and moderate affinity toward partial agonism of the 5HT_{1A} receptor increases dopamine and norepinephrine in the prefrontal cortex. Reviews of the literature have identified 36 cases of olanzapine induced switch to mania, 44 cases by risperidone, 27 cases of ziprasidone, and 15 cases by quetiapine but no reports on lurasidone induced mania.

PURPOSE: We believe we are reporting the first case of lurasidone induced mania after a dose increase, and how it remained treatment resistant to co-medication with both olanzapine and divalproex sodium.

DISCUSSION: Our case involved a 23 year old male with a history of bipolar disorder hospitalized for worsening symptoms of depression where he had unrelenting feelings of worthlessness, guilt and delusions over having sexual relations with 8 partners making them all pregnant. He felt the room was bugged. His suicidal ideations included electrocuting himself. He was re-started on lurasidone 20 mg. His depression and paranoia continued, so we increased lurasidone to 60 mg. Over the next three days he developed high energy, a decreased need for sleep, and increase in goal directed activity where he wanted to place his family in witness protection. He was more talkative and admitted to racing thoughts. On the third day of taking 60 mg of lurasidone he was striking the walls, threatening to attack peers, requiring 1:1 staffing and injections of olanzapine. We started divalproex sodium 2000 mg, however there was no improvement. We then reduced his lurasidone to 40 mg and over the next three days his irritability and agitation subsided.

CONCLUSION: We were suspicious of lurasidone's role in prompting this switch into mania even while co-medicated with divalproex and olanzapine. This may underscore the importance of monitoring the patient's response to changes in doses or additions of medication. If a patient's behavior becomes worse after an intervention, it is important to scrutinize the diagnosis or consider a medication adverse event has occurred.

URGENT RELEASE OF SEVERE PSYCHOMOTOR RETARDATION WITH INTRAMUSCULAR LORAZEPAM

Beena Premkumar, MD; Mark Kanzawa, DO

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

Psychomotor retardation (PMR) is a significant symptom of a major depressive episode in mood disorders. PMR can include slowed speech, thinking, and body movements. Speech may be decreased in volume or inflection and may have increased pauses to the extreme of mutism.¹ Mutism is also a symptom of catatonia.¹ Electroconvulsive therapy (ECT) and amobarbital were utilized to promptly reverse catatonia.² Fricchione reported reversal of neuroleptic-induced catatonia using intravenous (IV) lorazepam.³ A review of PMR in depression discussed improvement after weeks of antidepressant therapy and repetitive transcranial magnetic stimulation (rTMS).⁴ One study compared oral lorazepam to oxazepam in alleviating PMR.⁵ Deep vein thrombosis (DVT) may appear early in catatonia,³ and patients with severe PMR may cease eating and drinking. Our review of the literature did not find a case in which IM lorazepam was utilized to urgently treat PMR.

A 53-year-old Caucasian male with severe bipolar depression overdosed on medication. His speech was monotone and barely audible. He had a 10 second delay in responses. He knew only the month and year. He complained of confusion and was unable to check off selections on his menu. He was not drinking fluids or eating. His risk for DVT and for developing catatonia were concerning, as 20% of bipolar episodes are associated with catatonia.³ We therefore administered 2mg of intramuscular (IM) lorazepam.

One hour after receiving IM lorazepam, he was more spontaneous and interactive, asking, "What's the medication you gave me?" He requested soap and towels to shower, and asked to shave. He walked to the lounge to retrieve dinner and telephoned his mother.

We felt an urgency in treating this patient's PMR with IM lorazepam. Indications for the use of IM lorazepam to reverse catatonia may also apply to PMR. Fifty percent of catatonic patients carry a diagnosis of bipolar disorder³ and PMR is a robust feature distinguishing bipolar from unipolar depression.⁵

REFERENCES:

1. American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders: DSM-5. Washington, D.C: APA.
2. Fink, M and Taylor, MA. Catatonia: A Clinician's Guide to Diagnosis and Treatment. Cambridge University Press, 2003.
3. Fricchione GL. IV lorazepam in neuroleptic-induced catatonia. J Clin Psychopharmacol. 1983 Dec; 3(6):338-42.
4. Bennabi, D. Psychomotor retardation in depression: A systematic review of diagnostic, pathophysiologic, and therapeutic implications. BioMed Research International, 2013
5. Schmider J. A Double-Blind Comparison of Lorazepam and Oxazepam in PMR and Mutism. Biol Psychiatry. 1999; 46:437-441.

QUETIAPINE: A DOUBLE AGENT

Nauman Khan, MD; Mark Kanzawa, DO; Andrea Landesman, MD

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: A review of the literature describes 15 cases of paradoxical switching into mania when exposed to quetiapine. Some patients are co-medicated with antidepressants or antipsychotics but not multiple mood stabilizers. Most of these patients require several days to weeks to recover from this new episode of mania by discontinuing the quetiapine and then substituting a mood stabilizer. A minority of the cases have an abrupt improvement with its discontinuation. We present the first reported cases of quetiapine induced mania while co-medicated with multiple medications for the treatment of bipolar disorder. Both of our cases had an abrupt resolution of mania when quetiapine was discontinued shortly after it was initiated.

PURPOSE: Presented here are two cases where the introduction of quetiapine paradoxically incited mania in two patients who were already treated with two to three mood stabilizers. Their mania appeared suddenly during the dose titration of quetiapine, and resolved just as abruptly once it was discontinued.

DISCUSSION: Our first case involved a 33 year old Caucasian female with a 14 year history of bipolar disorder, depressed type with psychotic features. She was on risperidone 2 mg, divalproex sodium 1000 mg, lithium 1,800 mg when she abruptly developed mania on 200 mg/day of quetiapine. The appearance of mania at a low dose of quetiapine may be explained by 5HT_{2A} antagonism increasing dopamine in the forebrain by removing GABA inhibition of dopamine release. However, our second case required a dose of 400 mg to incite psychotic mania in a 46 year old male with a 20 year history of schizoaffective disorder, bipolar type. His baseline medications included lamotrigine 200 mg, lithium 1,500 mg and quetiapine 100 mg. His mean arterial pressure and pulse rate increased with the increase of quetiapine. This may support the theory of norquetiapine, an active metabolite of quetiapine, causing 5HT_{1A} partial agonism, norepinephrine reuptake inhibition, and 5HT_{2C} antagonism increases the action of dopamine and norepinephrine. None of the baseline medications on either case shared the same mode of metabolism or excretion with quetiapine and the abrupt onset of mania was not attributed to a drug interaction.

CONCLUSION: Perhaps our cases may engender other clinicians to suspect quetiapine as a probable cause of an abrupt appearance of mania, especially when this occurs with co-medication with multiple medications that treat bipolar disorder. Their suspicion and prompt removal of quetiapine may decrease the recovery time from mania for their patient.

A RARE CFTR MUTATION ASSOCIATED WITH SEVERE DISEASE PROGRESSION IN A 10-YEAR-OLD HISPANIC PATIENT

M. Myrtha Gregoire-Bottex, MD; Katherine Soe; Polly Hollenbeck

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Creighton School of Medicine, Medical Student Class of 2016; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics

BACKGROUND: Cystic Fibrosis (CF) is a multisystem disorder affecting mostly Caucasians. Pancreatic insufficiency causes malabsorption of fat and fat-soluble vitamins. Progressive bronchiectasis and ultimately respiratory failure ensue from cycles of infection and inflammation. Six types of mutations affect the production and function of the cystic fibrosis transmembrane regulators (CFTR). Knowing the type of mutation has implication for treatment in the age of CFTR correctors and potentiators. Ethnic variation of CFTR mutations has been reported (Schrijver 2005). Many of the mutations identified in the U.S. Hispanic population are not detected in the standard ACMG/ACOG-recommended 23-mutation screening panel. We report the case of a 10-year-old Hispanic boy diagnosed with CF by positive sweat chloride, who was found to have a rare CFTR gene mutation, reinforcing the recommendation for a wide mutation-screening panel for CF patients in ethnic populations.

CASE REPORT: The patient's newborn screen showed an elevated Immunoreactive Trypsinogen (IRT) without identified mutation. At two months of age, CF with pancreatic insufficiency was diagnosed after failure-to-thrive, sweat chloride of 94 mmol/L, abnormal chest x-ray, and fecal elastase below 200 µg/g. Bronchodilators, dornase alfa, airway clearance, vitamins and pancreatic enzyme replacement were started. At six months of age, he was admitted for his first CF exacerbation due to *Pseudomonas*. CT scan showed significant bronchiectasis, and persistent right middle and lower lobes consolidations. Bronchoscopy and lavage failed to resolve the mucous plugging resulting in RML and RLL lobectomies at age 2. At the age of four, persistent right upper lobe infection and 3% pulmonary perfusion measured by VQ scan lead to right completion pneumonectomy, resulting in chronic chest wall deformity and scoliosis. He is currently being evaluated for transplant. Comorbid conditions include chronic sinusitis CF-related diabetes, and CF-related liver disease.

CFTR gene sequencing identified a novel mutation, c.233dupT (p.Phe77fs, 360_365insT) and 1756G>T (p.Gly542Ter) and 7T/12TG polymorphism. His parents have yet to be tested to assess for hemi- or homozygosity.

DISCUSSION: This is only the second case of C.233dupT described in the literature, five others are listed in the Clinical and Functional Translation of CFTR (CFTR2) database. This case of a Hispanic child with a rare CF-causing c.233dupT mutation and severe disease emphasizes the need for broad CFTR mutation analyses and genotyping in the Hispanic population.

REFERENCES:

1. Schrijver I, Ramalingam S, Sankaran et al. J Mol Diagn 2005; 7(2):289-99
2. Schrijver, I. Clin Chem 2011; 57(6):799-801.

CASPOFUNGIN RESISTANT DISSEMINATED CANDIDIASIS IN T CELL LYMPHOMA

Manasa Josyula, MD; Michael Schmalz, MD; Arthur Feinberg MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics

INTRODUCTION: *Candida albicans* is the most prevalent fungal species in the human microbiota and asymptotically colonizes many areas of the body, particularly the gastrointestinal and genitourinary tracts of healthy individuals. Alterations in host immunity, stress, resident microbiota, and other factors can lead to *C. albicans* overgrowth and a wide range of presentations from superficial mucosal infection to disseminated candidiasis. We report a case of treatment-resistant disseminated candidiasis in an immunocompromised patient.

CASE: A 7-year-old female with mediastinal T-cell lymphoblastic lymphoma on consolidation chemotherapy per AALL 1231 protocol with severe neutropenia was admitted to PICU for neutropenic typhilitis diagnosed by CT of abdomen/pelvis after persistent fevers and abdominal pain. She received 10 days of zosyn, vancomycin and caspofungin resulting in resolution confirmed by repeat CT scan. She continued to remain febrile intermittently. Her caspofungin was changed to voriconazole, as her fungitell became positive. After 15 days of therapy, her bronchoalveolar culture grew *C. albicans*. She was then re-started on caspofungin for 15 days. The patient remained intubated for most of her course with waxing and waning respiratory status. She was also on dialysis for renal failure diagnosed during this hospital stay. Despite treatment with voriconazole and caspofungin, on hospital day 46 she died of cardiorespiratory failure. Her autopsy showed disseminated candidiasis in lungs, heart, kidneys and spleen. Microscopic sections demonstrated both yeast and pseudo hyphae-like structures, most suggestive of *Candida* species.

DISCUSSION: Candidemia and disseminated candidiasis are often associated with immunodeficiency. Chronic disseminated candidiasis (CDC) is almost exclusively found in hematologic oncology patients with recovering neutropenia. Mortality rates can be as high as 35.6% in treated cases. *C. albicans* is the most common species implicated, however, infections with other *Candida* species are increasing in prevalence. IDSA guidelines suggest that liposomal amphotericin or echinocandins are first line treatments, however, resistance has been reported in only a few case studies. In this case, treatment options were limited given her evolving multiorgan failure. Cases of CDC that fail treatment with liposomal amphotericin, azoles, and caspofungin, have responded to micafungin and posaconazole with favorable side effect profiles. Considering resistant *Candida* strains in future cases of CDC and knowledge of alternative agents could improve survival in these patients, especially in patients limited by multi-organ failure. Faster susceptibility testing and culture would be helpful in more expedient treatment.

IT'S ALWAYS LUPUS: AN ANA NEGATIVE PATIENT WITH LUPUS NEPHRITIS

Manpreet Narwal, MD; Kanika Jaggi, MD; Larry Mann, DO, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine

INTRODUCTION: Systemic lupus erythematosus (SLE) is a multisystemic inflammatory disease. ANA is positive in virtually all cases. ANA-negative SLE is rare, representing approximately 5% of SLE population. It usually presents as ANA-negative early in the disease process or if patient has been on chronic treatment and has decreased ANA reactivity. They have been known to have a higher prevalence of anti-Rho antibodies. The ACR and SLICC criteria are used for classification.

HOSPITAL COURSE: 22 year old male initially presented with bilateral pleural effusions requiring chest tube placement and VATS procedure for persistent left loculated hydropneumothorax. Had an extensive work-up ruling out infectious, malignant and autoimmune processes. This admission presented with 2 day history of worsening dyspnea, productive cough, and lower extremity edema. Had pleuritic chest pain not exacerbated with exertion and recurrent fevers with night sweats. Bilateral pleural effusions still present. Failed thoracentesis due to potential loculated fluid. Subsequently had fevers and tachycardia. Echo showed pericardial tamponade. He required a left sided thoracotomy with pericardial window. Had worsening kidney injury and hyperkalemia. Kidney biopsy showed characteristics of type 4 lupus nephritis WHO class 4 diffuse proliferative. He had elevated anti-dsDNA and anti-Rho antibodies and low complement levels although a negative ANA. Started on prednisone and mycophenolate as per the Aspreva protocol.

DISCUSSION: ANA-negative SLE accounts for about 5% of the SLE population. According to the CDC found in 4 to 12 females for every 1 male. It does not differ in terms of age of onset or female predominance to its ANA-positive counterpart. ANA-negative SLE tends to have elevated anti-Rho antibodies. Patients specifically with lupus nephritis may present as such for years after diagnosis. It appears that as the renal injury improves the patient may become seropositive. Our patient had multisystem symptoms. SLE was discounted as patient was ANA-negative and did not have a reflexive lab test to anti-dsDNA and anti-Smith antibodies. Additionally had low complement and positive anti-RHO antibodies. It is possible that he is still early in his disease process as his symptoms began about 7 months prior. As he continues treatment and his renal injury improves he may become ANA positive. He met the SLICC criteria for SLE.

CONCLUSION: This case report is to remind clinicians that ANA-negative SLE although rare should not be discounted as a differential especially with a patient presenting with the constellation of SLE symptoms. Further testing is indicated.

MENINGITIS RETENTION SYNDROME: A RARE CASE OF SADDLE ANESTHESIA AND MOTOR DYSFUNCTION

Courtney Barrett, DO; Mark Schauer, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

Herpes Simplex virus has a predilection for causing mucocutaneous infection and is a neurotropic virus. HSV-1 causes encephalitis while HSV-2 is a leading cause of viral meningitis (and the primary etiology of recurrent viral meningitis). We present a case of what has been called Elsberg Syndrome in an immunocompetent patient with HSV-2 infection.

An otherwise healthy 42-year-old female presented with thigh and groin pain that began after a UTI treated with trimethoprim/sulfamethoxazole (TMP/SMX). It progressed to involve her lumbosacral area, then thoracic and cervical spine over the previous week. Repeat urinalysis was negative, but she subsequently developed fever and malaise. One day prior to presentation, she developed severe frontal and occipital headaches with nuchal rigidity. Physical exam was significant for tachycardia, low-grade temperature, and restricted neck flexion. Initial neurological exam was negative for papilledema and cranial nerve dysfunction; there were no sensory, motor, or reflex deficits.

Serum was significant for normal WBC. Lumbar puncture (LP) revealed cloudy CSF, 230 RBCs, 895 WBCs with 94% mononuclear, glucose 30mg/dL, and protein 388mg/dL. She was initiated on vancomycin, ceftriaxone, and acyclovir. The following day she developed acute bilateral lower extremity weakness; MRI of the spine revealed an incidental finding of a nerve sheath tumor at T12-L1. She furthermore developed groin area numbness with tingling paresthesia in a “saddle” distribution. She also endorsed difficulty voiding and rectal tone was absent on exam. Neurology had been consulted pending further LP studies and a diagnosis of drug-induced aseptic meningitis secondary to TMP/SMX was proposed. Serology for HSV PCR resulted positive, but in context of LP findings, infectious disease recommended repeat LP to assess for TB, fungi, and neoplasm, all which returned unremarkable; however, repeat LP demonstrated H. influenza which was not evident on initial evaluation. By hospital day #7, she started to regain sensation and motor function of her perineum and bladder. Given the rapid improvement of her deficits, EMG and other neurological evaluation were not performed.

While HSV infections of the CNS may occur as isolated encephalitis or meningitis, there is possibility of additional nerve involvement. The term Elsberg Syndrome has been used but the newer description Meningitis-Retention Syndrome is more precise. Our patient presented with back pain and headache and developed evidence of ganglion involvement. Our case illustrates the need to maintain a high index of suspicion in light of confounding clinical data, especially when physical exam reveals sequelae which can mimic other etiologies.

SELF-POISONINGS BY KALAMAZOO COMMUNITY MENTAL HEALTH PATIENTS

Matthew Radler, MD; Catherine L. Kothari, PhD; Michael Liepman, MD; Kathleen A. Gross; Suzanne Suchyta; Alyssa Woodwyk

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics; WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Clinical Research; WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology & Biostatistics

INTRODUCTION: The patients of Kalamazoo Community Mental Health and Substance Abuse Services (KCMHSAS) have severe, chronic mental illness with intermittent decompensations that may lead to suicidal thoughts and attempts.

RATIONALE: This study investigates the frequency among KCMHSAS patients of emergency department and inpatient hospitalizations for poisoning, whether intentional or unintentional, a significant risk of morbidity and mortality.

MATERIALS & METHODS: This is a retrospective study using a previously constructed integrated database that captured records of emergency department visits and inpatient medical hospitalizations of all 5,906 KCMHSAS patients age 21 or older in 2009. The data spans a 6-year interval from 1/1/05 to 12/31/11. In particular, we investigated visits and hospitalizations related to poisonings, identified by ICD-9 diagnostic codes.

RESULTS: At least one episode of poisoning was recorded for 655 patients (11%), of which 470 patients (72%) had only one poisoning episode, and 185 patients (28%) had multiple poisoning episodes, and 351 (54%) required inpatient medical hospitalization.

CONCLUSION: These data document a significant subset of patients with multiple poisonings. Data from the National Hospital Ambulatory Medical Care Survey 2008-2011 reports an average ED visit rate 35.4 per 10,000 persons for self-poisonings, with 24.5% of self-poisoning ED visits resulting in hospital admission. Data from the KCMHSAS population corresponds to an average ED visit rate of 284 per 10,000 persons, or about 8 times greater, with 54% resulting in hospital admission, or about 2.2 times greater. Thus, not only are KCMHSAS patients more likely to have an ED visit for self-poisoning, but also the self-poisoning is more likely to be severe enough to warrant inpatient hospitalization. These data suggest the need for ED visit triggered case-management intensification to reduce risk of morbidity and mortality and healthcare expenditures. Reports of ED visits could provide an opportunity to review the treatment and case-management plan, apply evidence-based motivational enhancement techniques to motivate changes in underlying risk behaviors, and engagement of the family or other social supports.

SUCCESSFUL USE OF ACELLULAR DERMAL MATRIX VIA A SINGLE STAGE PROTOCOL FOR VOLAR FINGER SOFT TISSUE LOSS: A CASE REPORT AND REVIEW OF THE LITERATURE

Matthew Jaykel, MD; Todd Ruiter, DO; Tyler Snoap, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics; WMU
Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery

INTRODUCTION: The inability to close wounds primarily necessitates another method to cover a soft tissue defect. The use of Acellular Dermal Matrix (ADM) has been described as a way to provide coverage as a bridge to more definitive options. The downside is the need for secondary skin grafting procedures. The use of ADM has been described for fingertip injuries without the use of secondary skin grafting. We report our novel use of ADM in a single stage for a large volar finger wound with a successful result.

CASE REPORT: A 52-year-old left hand dominant male sustained traumatic amputations at the level of the middle phalanx to digits 3, 4, and 5 and nearly complete volar soft tissue loss to digit 2 of his right hand. Surgical irrigation, debridement, and revised amputations were made to digits 3, 4, and 5 at the level of the middle phalanx. Because of the extensive volar soft tissue loss to digit 2, ADM was applied. He was counseled that he may need a second stage surgery. Based on serial clinical exams of the volar wound to digit 2, it was deemed that he did not require the second stage procedure. Six weeks after the procedure the patient was fully healed and back at work with no restrictions.

DISCUSSION: ADM is most commonly used for coverage of burns in forearm, wrist, and hand reconstruction. Typically the use of ADM involves two stages. In the first stage, the wound is debrided and the synthetic is applied to the wound to allow for preparation of an appropriate wound bed. The patient is brought back several weeks later and an autologous skin graft is applied. There have been reports of using ADM in a one-stage reconstruction for fingertip injuries. The description of a finger tip injury included area distal to the insertion of the flexor digitorum profundus or the flexor pollicis longus and included the nail apparatus and the finger pulp.

CONCLUSION: We present a novel application of ADM over a broader area of injury in the hand than previously described in the literature using a single stage technique. Our indication for use was an otherwise healthy patient with intact underlying bony and ligamentous anatomy. With successful application he was able to avoid the morbidity of the second procedure and was able to return to work without any restrictions six weeks after his injury.

EPIDEMIOLOGICAL MONITORING OF OPIOID DRUG USE, ABUSE, AND OVERDOSE DEATHS IN SOUTHWEST MICHIGAN

Achilles Malta; Michael Liepman, MD; Ashley Bergeon; Mindie Smith

Southwest Michigan Behavioral Health; WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry;
Southwest Michigan Behavioral Health; Southwest Michigan Behavioral Health, Substance Use Disorder Services

INTRODUCTION: Opioid overdose deaths in the US and Michigan have increased over the last decade. Efforts to determine the reasons for this have led to monitoring a number of risk factors.

MATERIALS & METHODS: For the 8 county SW Michigan region, we have collected annual data on admission to addiction treatment programs, number of opioids prescribed, number of doses per household, opioid deaths, and unused drugs returned to drug collection boxes.

RESULTS: In 2014, 25% of substance abuse treatment admissions were primarily for opioids. Nearly 200,000 prescriptions were filled for 13.7 million doses of opioids, representing 72% and 78% of all schedule II & III prescriptions and pills, respectively. These represented an average of 138 opioid doses/household. In Kalamazoo County, 6013 pounds of medicines were disposed of in unused medications boxes in 2015. Overdose deaths reported in Kalamazoo County in 2014 were 4 heroin and 27 opioid (31 total) compared to 3 and 10 (13 total) in 2009, respectively.

DISCUSSION: The overdose deaths attributed to opioids in Kalamazoo County has increased nearly 3-fold over the last 6 years whereas heroin deaths have remained relatively stable. This may be a result of a combination of the following:

1. Misperception of prescription drugs being safer than heroin.
2. Household availability of prescription drugs in unlocked storage, the most common source of drugs for adolescent experimentation.
3. Liberal prescribing practices of opioid analgesics.
4. Insufficient community options for unused drug disposal, and the tendency of many to save unused drugs indefinitely for later use.

TREATMENT FOR BATH SALTS ADDICTION: TWO CASES

Matthew LaCasse, DO; Michael Liepman, MD; Matthew Radler, MD; Nauman Khan, MD

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: Bath Salts have been sold legally under various aliases as “not for human consumption” to avoid the fairly strict federal Drug Enforcement Administration (DEA) scheduling rules that would consider these dangerous “designer drugs” as schedule I with no medical indication. They have been associated with a variety of grizzly behaviors as manifestations of acute psychosis. No reports suggest pharmacotherapies to prevent relapses.

CASE 1: 38-year old employed, married Caucasian father of 2 young children. Substance history included heroin, marijuana, cocaine, mescaline, alcohol and LSD. History of bipolar disorder, ADHD, several aborted inpatient detoxifications, methadone maintenance, then buprenorphine maintenance. Over 10 months, he had 6 psychiatric admissions. Each time he presented with psychosis including delusions, visual hallucinations, sleep deprivation, after ingesting bath salts initially by snorting or smoking, and later intravenously. Spouse reported bizarre paranoid behavior, verbal aggression, hiding in bushes, ideas of reference, and spending \$10,000 of family savings on drugs. He expressed guilt, shame, and suicidal ideations without plan. He was prescribed olanzapine, quetiapine, venlafaxine, mirtazapine, hydroxyzine, gabapentin and buprenorphine/naloxone throughout this interval, but dopamine antagonists were taken only when sober. Two years later he is sober and functioning normally.

CASE 2: 43-year old employed, married Caucasian father of daughter. History of abusing prescription stimulants since age 14, extending into adulthood with caffeine, cocaine, synthetic cathinones (Bath Salts), and ephedrine/pseudoephedrine. He also abused opioid medications, sedative-hypnotics, alcohol, cannabis, and synthetic marijuana. Buprenorphine/naloxone maintenance reduced opioid cravings, but for 8 months he used Bath Salts during which he developed a new symptom that lingered after months of sobriety: systematized paranoid and persecutory delusions of surveillance by police and child protective services. Although quetiapine did not eliminate the delusions, it reduced reward from the stimulants; mirtazapine appeared to decrease cravings and relapses and promote sobriety.

DISCUSSION: As amphetamine like cathinones derivatives, Bath Salts can cause psychotomimetic effects. Although there are no studies, there are several case reports in the literature suggesting that dopamine antagonists, benzodiazepines, and bupropion might have utility in managing the acute psychosis associated with Bath Salts. Use of dopamine antagonists to treat psychotic symptoms and to block reward, and use of antidepressants for the withdrawal related or underlying depression seem logical ways to help patients addicted to Bath Salts. These two cases suggest their efficacy when adherence was established.

THREE CASES OF INTERACTION BETWEEN BUPRENORPHINE AND NALTREXONE

Michael Liepman, MD

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: Buprenorphine is a partial mu-agonist/kappa-antagonist of the opioid receptor that has been FDA approved for detoxification of opioid addicted persons. Naltrexone is a mu-opioid receptor antagonist that is FDA approved for maintenance treatment of opioid addicted persons to prevent relapse by blocking the euphoric effects and reducing craving. Both drugs tightly bind to the same opioid receptors in the nucleus accumbens and ventral tegmental area of the brainstem. Since naltrexone can precipitate the opioid withdrawal syndrome in persons dependent on opioid agonists, it is recommended that 7-10 days of opioid agonist abstinence occur before initiating naltrexone. Three cases in which naltrexone followed buprenorphine are presented with lessons learned.

CASE 1: A 47-year old female heroin addict was detoxified with buprenorphine tapered over 10 days. Four days after the last dose, after a negative naloxone challenge, she was given 25mg of oral naltrexone resulting in a severe precipitated opioid abstinence syndrome.

CASE 2: A 53-year old male heroin addict was detoxified with buprenorphine tapered over 5 days. Four days after the last dose, he was given 25mg of oral naltrexone resulting in a severe precipitated opioid abstinence syndrome. Buprenorphine and clonidine reversed the withdrawal syndrome.

CASE 3: A 45-year old female methadone/heroin addict was detoxified with buprenorphine tapered over 6 days. After 6 days of abstinence, she was given 12.5mg of oral naltrexone resulting in moderate withdrawal symptoms that were treated with clonidine, gabapentin and buprenorphine 8mg. Two additional doses of 12.5mg were administered over the next 24 hours, followed by naltrexone 380mg long-acting-injectable without adverse effects.

DISCUSSION: In the first case, the naloxone challenge was unsuccessful because buprenorphine has much higher affinity to the opioid receptor than naloxone. In the second case, the clonidine may have reduced withdrawal symptoms via its effect on presynaptic alpha receptors of endorphin secreting neurons; and buprenorphine agonist action, with roughly the same mu-receptor affinity as naltrexone, may have reduced the withdrawal severity. In the third case, the early initiation of small doses of oral naltrexone followed by a single dose of buprenorphine and assisted with clonidine and gabapentin seemed to permit gradual binding to the mu-opioid receptors rather than sudden massive binding. When the injection occurred, many of the receptors were likely filled either with buprenorphine or naltrexone, so the withdrawal was milder and tolerable. Understanding the neurobiology of the opioid receptors in the brainstem helps with pharmacotherapy innovation.

HENOCHE-SCHONLEIN PURPURA INDUCED RENAL FAILURE AND BOWEL PERFORATION IN AN ADULT PATIENT

Monoj Kumar Konda, MD; Sandeep Patri, MD; Hardik Chhatrala, MD; Prince Sidhu, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Bronson Healthcare Nephrology Center

INTRODUCTION AND CASE: Henoch Schonlein Purpura (HSP) is a form of leukocytoclastic vasculitis that is rarely seen in adults. It is mostly a self-limiting condition with a benign course in children but often has a complicated course in adults. We report a case of HSP in an adult patient with multiple organ involvement and difficult clinical course.

A 49-year-old man presented with acute onset skin rash, arthralgia, abdominal pain and vomiting for 3 days. Examination was notable for non-blanching, spotty, palpable purpura distributed over all extremities, buttocks and lower abdominal area. Initial labs showed normal CBC, CMP, urinalysis and complement levels. A CT scan showed duodenitis. His symptoms improved in 48 hours with opioid analgesics, fluid resuscitation and empiric antibiotics. On day 3 he developed dark colored urine, facial swelling and repeat labs revealed acute kidney injury (AKI). Skin biopsy reported small vessel vasculitis with leukocytoclasia and empiric IV steroids were initiated. His renal function worsened with a Cr 5 mg/dL and GFR 12 mL/min on day 5. Urinalysis showed 1+ proteinuria and serum complements levels decreased. Immunologic work up for other vasculitis syndromes was negative. The kidney biopsy (day 7) showed immune mediated kidney injury with IgA deposits. He received high dose intravenous steroids followed by oral steroids with restoration of kidney function by day 12. Patient was discharged in improved condition but returned to hospital 3 days later with bowel perforation that was managed conservatively.

DISCUSSION: The presentation of HSP in our patient was notable for many reasons. With decreased fluid intake prior to admission and having received IV contrast, the etiology for AKI in our patient posed a diagnostic dilemma. But given the palpable purpura, joint and gastrointestinal symptoms along with small vessel vasculitis on skin biopsy, HSP was high on our differential. Additionally he did not have a typical upper respiratory infection or other triggers preceding the rash which is seen in about 50% of HSP cases. A skin biopsy with immunofluorescence studies should be performed in adults to distinguish HSP from other forms of vasculitis. Unlike children, adults have been reported to have atypical presentations, delayed renal complications, recurrence of the disease and an overall more complicated course, as seen in our patient. Corticosteroids are effective for joint and gastrointestinal symptoms but has no effect on the rash. There is controversy regarding its efficacy in renal failure and long term outcome.

ACUTE RENAL FAILURE FROM INTERSTITIAL NEPHRITIS RELATED TO PROTON PUMP INHIBITORS IN A 39-YEAR-OLD PATIENT

Monoj Kumar Konda, MD; Sumaiya Ansari, MD; Yashwant Agrawal, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

CASE: A 39-year-old female presented to PCP office with 4-week history of worsening generalized fatigue, excessive sleepiness, nausea, metallic taste in mouth, excessive thirst and dyspnea on exertion. Laboratory work showed a serum creatinine of 10.7 mg/dl with a normal value 5 months ago and was referred to ED. Other review of systems was negative. Her past medical illnesses included chronic back pain, depression, morbid obesity and severe reflux disease. Home medications include meloxicam, tramadol, citalopram, rabeprazole and omeprazole with omeprazole being the newest drug, started 4-5 months ago. Physical exam including vitals was unremarkable. Laboratory tests showed creatinine 11.2 mg/dl, GFR 4 ml/min, BUN 91 mg/dl, bicarbonate 15 mmol/L with normal electrolytes and CBC. Urinalysis showed 1+ protein, 1+ hemoglobin, 1 RBC, 8 WBC and no eosinophils or casts. Fractional excretion of sodium was 12.6% and 24-hour urine protein was 1,269 mg/day. Renal ultrasound, immunologic work up and protein electrophoresis were normal. Meloxicam was initially thought to be the culprit and was discontinued without improvement in renal function which prompted a renal biopsy on day 5 that showed severe acute interstitial nephritis (AIN) without evidence for immune complex-mediated glomerulonephritis. PPIs were also discontinued and steroids were started on day 7. Patient required 2 sessions of dialysis on day 6 and day 8. Her kidney function improved over a week to a point where she did not require dialysis and was discharged on oral steroid taper for 3 months.

DISCUSSION: 70 to 75 % of cases of AIN are related to drugs. Virtually any drug can cause AIN but commonly reported ones include NSAIDs, penicillins, cephalosporins, sulfa drugs, ciprofloxacin, PPIs, cimetidine and 5-aminosalicylates. In our patient it was likely from the new medication omeprazole. Common indications for biopsy include uncertainty in clinical features or offending agent, patients who do not improve following cessation of offending agent, new onset renal failure (within last 3 months) and in whom glucocorticoids for AIN is being considered. There are retrospective studies which showed improvement in kidney function with glucocorticoids and also studies that reported no benefit. Due to potential benefit and relative safety of short term therapy patients who do not respond to conservative management are usually started on steroids for 2-6 months. Limited literature is available for treatment of steroid dependent and steroid resistant cases which reported use of mycophenolate, cyclosporine and cyclophosphamide.

HEPATOCELLULAR CARCINOMA PRESENTING AS HEART FAILURE DUE TO RIGHT ATRIAL METASTASIS AT THE TIME OF DIAGNOSIS

Monoj Kumar Konda, MD; Christopher Di Felice, MD; Hardik Chhatrala, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

CASE: An 83-year-old gentleman presented to the emergency department with shortness of breath, fatigue with worsening scrotal and bilateral lower extremity swelling for one-month duration. Patient also reported 40 lbs of unintentional weight loss over past year despite his edema. He had diabetes mellitus and hypertension. He was previously evaluated for these symptoms with an exercise stress test which was negative. Vitals were stable with exception of mild hypoxia supplemental oxygen. Physical exam revealed bibasilar crackles, grade 2/6 holo-systolic murmur, 1+ bilateral lower extremity edema extending to thighs and scrotum and a positive abdomino-jugular reflux. Laboratory results included: Hemoglobin 9.4 mg/dl, MCV 72.9 FL, Sodium 132 mmol/L, AST 70 IU/L, ALT 28 IU/L, alkaline phosphatase 515 IU/L, pro-BNP 1446 pg/ml and normal troponin. A chest x-ray demonstrated cardiomegaly with increased pulmonary vascular markings. A transthoracic echocardiogram showed a 7.0x5.3 cm mass in the right atrium suggestive of metastatic tumor in transit. Follow-up CT of the chest, abdomen and pelvis with contrast revealed 19 cm hepatic mass replacing the entire right hepatic lobe with bilateral pulmonary emboli. Alpha-fetoprotein level was 2,669 ng/ml. A CT guided biopsy confirmed poorly differentiated HCC. Cardiothoracic surgery deemed patient as a poor operative candidate while hematology oncology felt he would be intolerant of chemotherapy. The patient was transitioned to hospice care and passed away two months later.

DISCUSSION: HCC is the fifth most common neoplasm with 5.5-14.9% incidence. It is an aggressive tumor with median survival of 6-20 months following diagnosis. Extrahepatic metastases at the time of diagnosis is seen in 5-15% of cases occurring more commonly when tumor size is >5 cm and common sites are lung, intra-abdominal lymph nodes, bone and adrenal glands in that order. Metastasis to heart is relatively rare with an incidence of 0.67-3%. In cases of cardiac metastasis cancer spreads through hepatic veins, inferior vena to the right atrium and can involve other chambers of heart. A right atrial mass can cause significant hemodynamic instability, pulmonary emboli from the friable tumor, systolic murmur due to tricuspid valve dysfunction and can lead to sudden death in severe cases with large obstruction or pulmonary embolism. Standard treatment is resection of primary tumor and intra-cardiac mass; however, prognosis was reported to be poor with only 12-39% 5-year survival even with surgical treatment. It is important to recognize the possibility of HCC when a patient with clinical features of malignancy presents with heart failure.

CYSTIC ABDOMINAL MASS SECONDARY TO DISTAL OBSTRUCTION OF NEOVAGINA MIMICKING BOWEL OBSTRUCTION.

Monoj Kumar Konda, MD; Sandeep Patri, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

CASE: A 59-year-old hermaphrodite patient with history of vaginal reconstruction using sigmoid colon 30 years ago and chronic pain syndrome on opioid analgesics presented to emergency department with worsening constipation and lower abdominal pain x 2 weeks. Family history was significant for colon cancer. She underwent a surgical repair for neovaginal prolapse 3 years prior to the presentation. Past history relevant for of ambiguous gender requiring surgery to restore patency of urethra soon after birth and had gender reassignment surgery to female at 30 years age.

The patient also complained of difficulty emptying bladder and decreased appetite for past 2 weeks. Pertinent physical exam findings included lower abdominal distention, suprapubic tenderness with guarding, sluggish bowel sounds, completely obstructed vaginal introitus and palpable bulge anterior to rectum. CT of abdomen and pelvis revealed a 20 x 8 cm fluid filled tubular mass arising from vaginal cuff extending into lower abdomen. Labs were remarkable for elevated carcinoembryonic antigen (CEA) of 203.5 ng/ml. CT guided drainage of the mass yielded 40 ml of clear viscous fluid with no cells or bacteria and negative cultures. Her pain resolved rapidly after the procedure and she underwent colonoscopy which was normal. Considering there were no signs of infection, no alternative explanation on imaging or fluid analysis and the tumor markers for gynecologic malignancy being negative, the cause of her cystic mass was considered likely from a mucocele or post-operative seroma from repair of neovaginal prolapse. She was discharged to follow up with her surgeon for a more permanent repair/reconstruction of neovagina.

DISCUSSION: Common indications for vaginal reconstruction are genetic or developmental defects, defects from treatment of gynecologic cancer or non-gynecological cancer invading or in close proximity of vagina and gender reassignment surgeries. Several techniques are reported in literature including reconstruction using split-thickness and full-thickness skin flaps or bowel segments from sigmoid colon or cecum and multiple modified laparoscopic and open techniques. Long term complications reported include dyspareunia, vaginal stenosis, ulcerations, rupture, excess mucus production and rarely malignant transformation. Rate of complications varied with each technique and use of bowel segment is shown to have fewer complications. To the best of our knowledge there is only one case report describing mucus filled abdominal mass secondary to neovaginal stenosis. Although exact screening recommendations are evolving, American College of Obstetricians and Gynecologists recommended all women with neovagina should undergo routine gynecologic care; however, vaginal cytologic screening is not indicated.

CHIARI NETWORK OF THE HEART

Monoj Kumar Konda, MD; Vishal Gupta, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Borgess Cardiology Group

CASE: A 68-year-old man with history of COPD, HTN and ischemic cardiomyopathy presented with altered mental status and generalized weakness. On exam he appeared emaciated, somnolent, dyspneic, oriented only to person and absent breath sounds over entire right hemithorax. Initial vitals BP 137/92 mm Hg, pulse 112 bpm, afebrile and respiratory rate of 24/min and was hypoxic to 84% on room air. He required endotracheal intubation and transfer to critical care unit due to worsening respiratory failure. Initial labs significant for WBC $30.9 \times 10^9/L$, pro BNP 2147 pg/ml. Urinalysis showed >100 RBC/HPF, >100 WBC/HPF and 4+ bacteria. Urine and blood cultures were negative.

A CXR showed near complete opacification of the right lung. A malignant effusion was strongly suspected and a chest tube was placed. The pleural fluid analysis revealed an exudative effusion with cytology negative for bacteria or malignant cells and negative cultures. A CT scan of chest reported a hypodense filling defect in the right atrial appendage consistent with thrombus but no pulmonary embolism. A venous duplex ultrasound showed acute DVT of right femoral vein. Patient was started on heparin drip and an echocardiogram revealed a mobile echo-dense structure in right atrium highly suggestive of a chiari network and less likely a thrombus. A CT abdomen pelvis showed thickened urinary bladder and metastatic lesions in liver and bones and a biopsy of bone lesion showed metastatic carcinoma with non-specific immunoprofile. Patient was extubated on day 3 and decided to be comfort care and passed in few hours.

DISCUSSION: Chiari network (fenestrated Eustachian valve) is a congenital malformation that exists in 2% of the population. A majority of Right Atrial masses are either tumors or thrombi. Chiari network is a mobile, net-like structure found infrequently and usually an incidental finding in the right atrium. It is a remnant of right valve of sinus venosus and is important in utero to direct blood from IVC to fossa ovalis. It is often misdiagnosed as an intra atrial thrombus or vegetation or intraatrial adhesions. A TEE is the best way to diagnose and differentiate between different right atrial masses but chiari network poses a diagnostic dilemma between Eustachian valve, mobile/type A atrial thrombus, flial tricuspid chordae tendineae or vegetation and histopathology is the confirmatory test. Identifying a mobile right atrial thrombus is crucial as it is associated with high mortality of over 30 to 42%.

LOCULATED EMPYEMA CAUSED BY STREPTOCOCCUS CONSTELLATUS

Monoj Kumar Konda, MD; Jason Lam, DO; Mark Schauer, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

INTRODUCTION: *Streptococcus constellatus pharyngis* is an oral commensal which belongs to the streptococcus anginosus group (SAG), a subgroup of viridans streptococci. SAG is an uncommon cause of empyema and has chronic indolent clinical course. We report a case of pleural empyema caused by *S. constellatus pharyngis* in a 55-year-old healthy man.

CASE: A 55-year-old man presented with gradually worsening dyspnea, productive cough and pleuritic chest pain for 2-3 weeks. He reported weight loss of 15 lb. over one month and had a dental procedure a month ago. Social history significant for 40 pack year smoking and daily alcohol consumption. Physical exam revealed normal vitals and absent breath sounds over right hemithorax.

Laboratory tests showed leukocytosis and elevated acute phase reactants. A chest CT showed large right-sided loculated empyema with adjacent consolidation and was followed by thoracentesis with chest tube placement. Pleural fluid analysis revealed exudative effusion and cultures grew *S. constellatus pharyngis*. The patient continued to have purulent chest tube drainage despite intravenous antibiotics which prompted cardiothoracic surgery consultation and extensive decortication. He had 2-week hospital stay and a total of 3 weeks of antibiotic course.

DISCUSSION: SAG includes three species i.e. *intermedius*, *constellatus*, and *anginosus* and are well known for their tendency to cause abscess formation, commonly in liver, thoracic cavity and brain, among immunocompromised patients. Infection in immunocompetent patients is rare. Male gender (4:1), alcohol use (risk of aspiration) and poor oral hygiene are considered major risk factors for thoracic cavity infections which relate to our patient. Clinical course is often indolent with chest pain, shortness of breath and weight loss being main features without signs of toxicity which leads to delayed presentation. Fever is seen in only 36% of cases.

A strong association between pyogenic SAG infections and bacteremia following dental, gastrointestinal or respiratory tract procedures was demonstrated in literature. Around 60% patients with SAG related pneumonia develop empyema and almost all patients require surgical exploration. Penicillin or ceftriaxone are the mainstay of antibiotic therapy.

CONCLUSION: SAG streptococci are of special clinical interest due to their tendency to cause loculated abscesses leading to protracted hospital stay with considerable morbidity and mortality. Thoracic infections are characterized by strong male predominance, nonspecific symptoms (without toxicity) and pleural loculation. Clinicians should be mindful of the need for thoracic cavity exploration for successful elimination of infection and protracted hospital stay in patient with SAG related empyema.

ACUTE TRIPLE VALVE INFECTIVE ENDOCARDITIS INVOLVING NATIVE VALVES

Monoj Kumar Konda, MD; Yashwant Agrawal, MD; Jagadeesh Kalavakunta, MD

WMU Homer Stryker M.D School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D School of Medicine, Department of Medicine Pediatrics; Borgess Cardiology Group

INTRODUCTION: Infective endocarditis continues to be a serious illness with a mortality rate of 30% which is higher than several cancers. The overall incidence and mortality have not changed over past 2 decades but the epidemiology and microbiologic trends varied with mean age shifting from mid 40's to mid 70's with an increased incidence in female gender. Staphylococcus emerged as most common cause eclipsing streptococci and other bacterial causes. Multi-valvular endocarditis involving 3 native valves is less frequently reported. We present a case of immunocompetent patient with triple native valve infective endocarditis involving Mitral, Aortic and Tricuspid valves.

CASE REPORT: A 57 year old male with history of Hepatitis C and active intravenous drug use (IVDU) presented with 4 day history of productive cough, left sided pleuritic chest pain, shortness of breath and night sweats associated with subjective fevers and myalgias.

Initial vitals were normal except for temperature 35.6 C. Physical exam revealed a 4/6 pan-systolic murmur over left sternal border. Labs showed leukocytosis, elevated lactic acid and troponin with new T wave inversions in anterior and lateral leads on EKG. A chest X-ray showed cardiomegaly and pulmonary edema.

Within 2 hours into admission he was transferred to medical intensive care unit for severe sepsis, intubated and Vasopressors initiated. A stat ECHO showed vegetations on Mitral, Aortic and Tricuspid valves. Patient progressively became bradycardic and went into asystole. ROSC achieved in 15 minutes with ACLS interventions but patient remained dependent on high doses of vasopressors. Repeat labs showed severe lactic acidosis (15 mmol/L). Patient again suffered cardiac arrest that was refractory to standard medical interventions and was declared deceased. Blood cultures revealed Group D alpha hemolytic streptococci.

DISCUSSION: It is well-known that IVDU increases the risk of native valve infective endocarditis and is one of the minor criteria for diagnosis of IE. At least 2 retrospective studies showed a predominance of younger male population in IVDU IE group and Staphylococci was most common cause. One study showed high association with HIV seropositivity and a higher rate of multi-valvular IE and in-hospital mortality in IVDU patients who had left sided endocarditis compared to those who had right sided endocarditis. Multi-valvular involvement is also an independent predictor for in-hospital mortality. Most common valves involved in the reported cases of 3 valve IE are aortic, mitral and tricuspid valves and the organisms varied from the common staphylococcus to rare organisms like *Erysipelothrix rhusiopathiae*.

AORTO-RIGHT VENTRICULAR FISTULA FOLLOWING PERCUTANEOUS TRANS-CATHETER AORTIC VALVE REPLACEMENT

Monoj Kumar Konda,, MD; Jagadeesh Kalavakunta, MD; Vishal Gupta, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Borgess Cardiology Group;
Borgess Cardiology Group

INTRODUCTION: Trans-catheter aortic valve replacement (TAVR) is a safe and effective procedure for patients with severe aortic stenosis who are high risk for surgical valve replacement. Several cardiac complications related to TAVR were reported but development of aorto-right ventricular fistula is a rare complication. We present a 88-year-old female who developed this complication following TAVR. To the best of our knowledge there are only 3 such cases reported in literature.

CASE: A 88-year-old woman with past medical history of coronary artery disease, hypertension and known severe aortic stenosis presented to our cardiovascular clinic with features of severe congestive heart failure (CHF). Patient had a balloon valvuloplasty 6 months ago. An echocardiogram showed critical aortic stenosis with mean gradient of 62 mmHg and a valve area of 0.27 cm². Pre-procedural cardiac catheterization showed dilated aortic arch but no aneurysm of aortic root/sinus of Valsalva (SOV). She underwent successful TAVR, with a 26 mm Edwards SAPIEN valve. Post procedural Transthoracic echo showed good positioning and functioning of prosthetic valve but also showed a small fistula connecting the SOV to right ventricle (RV). This was not seen on the immediate post procedure transesophageal echo or on the imaging/interventions prior to procedure.

Post-TAVR patient's symptoms and activity tolerance improved with good cardiac function and a decision was made monitor closely. After 3 months, patient was hospitalized with symptomatic gallstones and worsening CHF symptoms. Repeat echo showed worsening of the fistula with a velocity of >4 m/sec, EF was diminished to 30-35% with moderate dilation of RV. Patient elected to proceed with medical management for both cholelithiasis and heart failure.

DISCUSSION: Aorto-right ventricular fistula can be due to ruptured SOV aneurysm (congenital or traumatic), secondary to endocarditis or secondary to complication of cardiac surgeries such as repair of VSD, Ross procedure or surgical aortic valve replacement. The exact mechanism of fistula formation was unknown but was thought to be related to trauma from displacement of calcified tissue, usage of larger prosthesis and depth of prosthesis implantation. Symptomatic fistulas, particularly in young patients, need to be treated due to high risk of worsening heart failure secondary to RV overload owing to high pressure differences. Surgical repair is the treatment of choice but transcatheter closures were also well reported. Being a relatively new procedure the rare complications of TAVR are largely unknown and the management of such complications is often driven by experience from previous case reports.

INTRAVASCULAR LEIOMYOMATOSIS PRESENTING AS RIGHT ATRIAL MYXOMA.

Monoj Kumar Konda, MD; Jagadeesh Kalavakunta, MD; Vishal Gupta, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Borgess Cardiology Group;
Borgess Cardiology Group

INTRODUCTION: Intravenous leiomyomatosis (IVL) is a rare form of leiomyoma that can originate from uterine leiomyoma or smooth muscle cells of blood vessels. Even though histologically benign, the tumor can behave aggressively spreading to right sided cardiac chambers and lung. We report an interesting case of IVL presenting as right atrial myxoma.

CASE: A 65-year-old Caucasian woman presented to PCP office with complaint of “flip flopping” sensation in her chest for 2-3 months. Associated features included intermittent chest pressure during these episodes, mild exertional dyspnea unrelated to the episodes but no light headedness or syncopal episodes. Physical exam was significant for diastolic murmur and trace pedal edema. An outpatient transthoracic echocardiogram showed right atrial mass and patient was admitted for cardiothoracic surgery. A preoperative transesophageal echocardiogram (TEE) revealed 4x2 cm lobulated mass attached to crista terminalis. The patient was taken to operating room; put on cardiopulmonary bypass and right atrium was explored but no mass was found. Surgery was terminated and an intraoperative TEE re-demonstrated the mass but originating at the level of renal veins. An emergent computerized tomography (CT) chest/abdomen/pelvis with contrast revealed extensive filling defect of inferior vena cava (IVC) and multi-lobulated uterus of 10.3x7x9.9 cm size. The patient was transferred to Mayo clinic and underwent complex surgery with multidisciplinary team (hepatobiliary, vascular, gynecologic oncology and urology specialists) involving removal of uterus, bilateral fallopian tubes and ovaries, ovarian veins, resection of iliac veins and partial resection of IVC for tumor extraction. The final pathologic diagnosis was IVL involving left uterine vein, right ovarian vein, iliac veins and multiple (10) leiomyomata of uterus.

DISCUSSION: IVL is very rare form leiomyoma which can involve right sided cardiac chambers and lung. The tumor spreads via uterine veins, iliac veins, IVC and to cardiac chambers in around 50% cases and via ovarian veins, renal veins and IVC in 25% cases and in a combined manner in 5%. A standard test to diagnose IVL remains a topic of debate and a combination of CT angiography, MRI and ultrasound are used for diagnosis. Surgical treatment is mainstay and involves one stage versus two stage (cardiac surgery followed by abdominal surgery). Follow up screening with CT scans is important as there is a 30% risk of recurrence with incomplete removal of tumor.

ACUTE HYPERSENSITIVITY PNEUMONIA IN THE DISGUISE OF COMMUNITY ACQUIRED PNEUMONIA IN A YOUNG EXTERMINATOR

Monoj Kumar Konda, MD; Sumaiya Ansari, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

CASE: A 39-year-old healthy man presented to emergency department worsening shortness of breath and productive cough with black colored sputum for four days. Associated features included subjective fevers and chills. Occupational history notable for extermination with exposure to multiple chemicals and was working without mask recently. Physical examination significant for fever of 102.8 F, 87% oxygen saturation on 5-liter nasal cannula, diffuse crackles and diminished breath sounds over right lower lobe. Laboratory work including CBC, CMP, lactic acid and procalcitonin were unremarkable. A chest x-ray showed bilateral peri-hilar streaky multinodular opacities. He was admitted to general medical floor and treated initially for community acquired pneumonia but clinically deteriorated in 24 hours requiring endotracheal intubation and mechanical ventilation. A high resolution CT chest showed multifocal groundglass pulmonary opacities. A bronchoscopy showed normal bronchial mucosa and testing of bronchoalveolar lavage (BAL) suggested the diagnosis of acute hypersensitivity pneumonitis (HP) most likely related to his occupation as exterminator. There were 5596/cmm nucleated cells with 87% polymorphonuclear cells and 13% mononuclear cells and 3954/cmm RBCs. Blood and BAL cultures were negative. Patient improved clinically with elimination of offending agent and ventilator support and was extubated in 72 hours. The combination of negative cultures and other infectious markers, clinical improvement with removal of offending agent and absence of other explanatory findings made acute HP most likely diagnosis and a lung biopsy was not performed.

DISCUSSION: Epidemiology of acute HP is mostly unknown and varies considerably. Farmers lung is most commonly studied form of HP and prevalence varies from 420 to 3000/100,000. It is commonly mistaken for viral or bacterial infection as occurred in our patient. Most classic form occurs after heavy exposure to inciting agent. Removal from exposure to the inciting agent results in resolution of symptoms within 12 hours to several days and radiologic recovery takes several weeks. Scattered multinodular, interstitial opacities in lower and middle lung zones on chest x ray and presence of ground glass opacities on high resolution CT confirms the presence of pneumonitis in the right clinical scenario. The cell counts and differential on BAL is helpful in suggesting the diagnosis. Histopathology confirms the diagnosis and can differentiate between acute versus subacute or intermittent HP. Systemic glucocorticoids are only occasionally required as all categories of HP improve with removal from exposure to inciting agent. Repeated exposures can result in chronic fibrosing lung disease.

IMPACT OF EDUCATIONAL INTERVENTION ON DISCUSSION OF ADVANCED DIRECTIVES IN AN ACADEMIC OUTPATIENT CLINIC

Monoj Kumar Konda, MD; Anusha Surender, MD; Matthew T. Siuba, MD; Karthik Kannegolla, MD;
Sourabh Aggarwal, MD; Craig Swanson, Thomas A. Melgar, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine, WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; University of Nebraska Medical Center; Department of Cardiology; Michigan State University College of Osteopathic Medicine, Medical Student Class of 2016; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

INTRODUCTION: The Patient Self-Determination Act in 1991 brought attention to Advanced Directives (AD). However, most discussions only occur when patients are critically ill. Outpatient AD discussions are ideal as individuals are free of acute illness and can make appropriate decisions. Our objective was to determine the impact of an educational intervention on AD discussions with older adults in an Academic outpatient clinic.

MATERIALS & METHODS: Internal medicine (IM) and Medicine-Pediatrics (MP) patients aged above 55 years old who presented to clinic from 01/01/2015 to 06/30/2015 were included in this study. A 15-minute educational intervention on AD discussions was presented to the IM and MP residents (n=48) prior to the study period and was followed by monthly email reminders.

ICD 9 codes for AD discussion (V49.86, V49.89, V65.49) were used to determine the percentage of patients with AD discussion encounters during the intervention and comparison pre-intervention time period (01/01/2014 to 06/30/2014). The prevalence was calculated and statistical significance determined using the Chi-square test of independence or Fisher's exact test.

RESULTS:

- Post-intervention, 20 AD encounters out of 962 clinic visits were noted ($p=0.0910$; Statistical significance if $p < 0.05$) (Table 1).
- IM clinic - 8/833 pre-intervention and 14/782 post-intervention clinic visits had documented AD discussions ($p = 0.1505$)
- MP clinic - 3/150 pre-intervention and 6/180 post-intervention clinic visits had documented AD discussions ($p = 0.5183$)
- The Chi-Square test of independence was used for total and IM clinic visits analyses. Due to small sample size, a Fisher's exact test was used for MP data.

CONCLUSION: The percentage increase in AD discussions post-education was 200% and 175% in the MP and IM clinics respectively; however the result for total clinic visits was not statistically significant. Reasons why is outside the scope of this study. Considering under ICD 10, a scheduled clinic visit for AD discussion is billable, including a scheduled visit for AD discussions for appropriate patients as a standard clinic practice and compulsory Intern AD education may improve our patient care. In conclusion, efforts should be made to have AD discussions with our patients prior to hospitalization as it can simplify and ease the burden on patients and families to make life-altering decisions.

A RARE CASE OF CORYNEBACTERIUM STRIATUM ENDOCARDITIS IN AN IMMUNOCOMPETENT PATIENT

Alexander Witte, MD

WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine

Corynebacterium striatum is a gram-positive rod that is a common colonizer of the skin and mucus membranes in humans. It is a rare cause of infection and often is considered a blood or sputum culture contaminant.

An 83-year-old man presented to the emergency department with diarrhea. He had a medical history significant for atrial fibrillation, sick sinus syndrome, chronic obstructive pulmonary disease (COPD) and congestive heart failure with a preserved ejection fraction. He was recently admitted to an outlying hospital due to diarrhea with concern for a *Clostridium difficile* infection after he completed a course of antibiotics for lower extremity cellulitis. Upon admission, blood cultures were performed and both initial cultures were positive for *Corynebacterium striatum*. Three subsequent sets of blood cultures were performed that positive for the same organism. The patient was started on vancomycin for the blood cultures and transesophageal echocardiogram was performed, which showed a 1 cm x 1 cm irregular lesion on the anterior mitral valve leaflet, consistent with vegetation. He completed 25 days of vancomycin therapy before he had an acute decline and was brought back to the ICU for intubation. Chest X-ray was performed showing a dense lower lobe infiltrate. The patient's antibiotic regimen was broadened to include cefepime with the suspicion of co-existing pneumonia. The patient's lactic acid on admission was 2.2 mg/dL and he had an elevated white blood cell count. Both quickly improved but clinically the patient did not improve and we were unable to wean the patient from the ventilator. A repeat transesophageal echocardiogram showed peri-aortic root and peri-mitral valve abscesses. Ultimately it was decided that the patient was a poor surgical candidate and his family elected to transition the patient to comfort care.

Infective endocarditis from *Corynebacterium* spp. is rare, especially in an immunocompetent patient. Our patient's comorbidities were chronic conditions that should not lead to immunodeficiency. Additionally, he was not taking any medications that would be considered immunosuppressive. In conclusion, this case shows the importance of not dismissing any evidence during diagnosis, even a suspected contaminant on a bacterial blood culture. This proves that all bacteria, even suspected contaminants, can be pathogenic in the right clinical situation.

STRUCTURE AND FUNCTION OF ROTAVIRUS NON-STRUCTURAL PROTEIN 6

Nafiseh Jandaghi Jafari; Blair Szymczyna, PhD

Western Michigan University, Department of Chemistry

Rotavirus is a member of the Reoviridae family and is the main cause of acute viral gastroenteritis in children and young animals. Worldwide, about 500,000 children die every year as a result of this virus. Rotavirus is composed of 6 structural proteins (VPs) and 6 non-structural proteins (NSPs), which are believed to play regulatory roles in the replication cycle. The NSP6 protein localizes to the viroplasm, which is the site where viruses replicate and assemble, and interacts with both the NSP5 protein and nucleic acids, but the role of NSP6 in the replication cycle of Rotavirus is currently unknown. We hypothesize that NSP6 assembles into a macromolecular complex that is required for its functional properties. To obtain an insight into the function of NSP6, structural and biophysical studies are being conducted. Dynamic light scattering, NMR spectroscopy, native gel electrophoresis, fast protein liquid chromatography (FPLC) and other biophysical methods are being employed to determine the stoichiometry and organization of NSP6 proteins within the complex it adopts. Our recent unpublished results from these studies will be presented. The structure of the NSP6 complex will provide an insight into the nucleic acid binding mechanism of NSP6 and its role within the rotavirus replication cycle.

ENHANCING AFTER SCHOOL PROGRAM FOR MINDFULNESS

Nicole Baker; Samuel Yost; Timothy Truong

WMU Homer Stryker M.D. School of Medicine, Medical Students Class of 2018

INTRODUCTION: Mindfulness is described as the practice of maintaining a state of complete awareness of one's thoughts, feelings, and emotions. It is a mental state achieved through an effort to be present and in the moment, with an emphasis on acknowledging one's feelings. Many studies have shown mindfulness to have a tremendous impact on attention span, social skills, and selective attention. Teaching children and adolescents to be mindful provides them with tools to control their emotions, build good habits, improve concentration, self-regulate, and ultimately be more successful in the classroom. For these reasons, Communities in Schools (CIS) has been eager to implement mindfulness programs in the Kalamazoo Public Schools.

RATIONALE: Working with CIS, we set out to construct and implement a program designed to train volunteers of the after-school program in the practice of mindfulness as a tool to control impulsive behavior. The purpose of the study was to collect data on both the efficacy of training volunteers to teach these skills to children and their reception to this training. This information is important in order to convince school administrators and future volunteers of the potential applicability. Our hypothesis was that given concise, usable lesson plans and background on the science, the volunteers delivering the information to the children would be more engaged in their work and more confident that it would have an effect.

MATERIALS & METHODS: Our study is a pre/post-test study of a train-the-trainer curriculum. We have developed a standardized mindfulness curriculum that can be taught to inexperienced volunteers of the CIS after school program by a CIS employee with a strong background in these practices. Our goal was to lay a foundation for future training of inexperienced volunteers to conduct effective and competent mindfulness teachings and to increase volunteers' understanding of the potential benefits of the practice.

RESULTS: Our results showed statistically significant increases in (1) the volunteers' overall understanding of the purpose of doing mindfulness exercises with children, (2) their comfort level of explaining the concept, and (3) their confidence in teaching mindfulness lessons.

CONCLUSION: Hopefully the increased understanding and comfort level of the trainers through the curriculum will translate to increased access to mental health development as measured through improved attention and social skills. We anticipate that evidence of the success of the reception of this preliminary program will allow it to be used as a model to be implemented more widely throughout KPS.

A RARE CAUSE OF NECK PAIN IN A PEDIATRIC PATIENT: SPONTANEOUS SEPTIC ARTHRITIS OF THE CERVICAL FACET JOINT

Oro Enaohwo, MD; Aaron Lane-Davies, MD

WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Pediatric and Adolescent Medicine

Septic Arthritis of a spinal facet joint (SAFJ) is a very rare condition and less than a 100 cases have been reported, with very few of them involving children. A severe skeletal infection with complications that include destruction of the joint and contiguous structures, and neurological deficits if not properly managed. Although most cases involve the lumbar spine, we report the case of a 4 year old boy with a spontaneous septic arthritis of a cervical joint due to methicillin sensitive *Staphylococcus aureus* (MSSA). He presented with a 1 week history of atraumatic left sided neck pain and intermittent fevers without any neurologic or hemodynamic changes. He was diagnosed by magnetic resonance imaging (MRI) which revealed left C2-C3 facet joint effusion. Magnetic resonance imaging is the preferred modality for diagnosis SAFJ and demonstrating the extent of infection and the sequelae of the infection which includes epidural abscesses.

The diagnosis of SAFJ is likely to increase with availability of MRI, and increased awareness of the condition, especially in cases of refractory unilateral spinal pain. This report aims to increase awareness of SAFJ, its clinical presentation, and to illustrate an alternative management course for severe skeletal infections. We aim to illustrate the successful outpatient management of a rare and highly complicated disease in an otherwise healthy child with transition to oral antibiotics instead of the conventional long term intravenous course.

Our patient responded quickly to a 6 day course of IV nafcillin and was transitioned to oral cephalexin to complete 4 week course of antibiotics, he has since recovered from the illness without evidence of recurrent disease.

A FINITE ELEMENT ANALYSIS OF THE EFFECTS OF LATERAL MENISCUS POSTERIOR ROOT AVULSIONS ON TIBIOFEMORAL CONTACT MECHANICS

Erika Fojtik; Peter A. Gustafson, PhD; Andrew G. Geeslin, MD

Western Michigan University, Mechanical and Aerospace Engineering; Western Michigan University, Mechanical and Aerospace Engineering; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery

PURPOSE: The effects of lateral meniscus posterior root avulsions have been studied in combination with meniscomfemoral ligament (MFL) deficiencies. This submission updates progress on efforts to validate a set of biomechanical finite element analyses against previously reported experimental results.

MATERIALS & METHODS: A finite element model in development examines intact and deficient knees with the following conditions: (1) intact, (2) lateral posterior root avulsion, (3) deficient MFLs and lateral meniscus posterior root avulsion. The model of each condition will maintain a fixed flexion angle of 0° under a 1000 N compressive load. The model outcomes include contact area and pressure across the knee articular surfaces.

RESULTS: The current state of model development will be reported. This will include discussion of MRI segmentation and surface model creation using 3D slicer. Computer aided drafting will be demonstrated for anatomic manipulation. Finite element conversion and initial finite element model results will be presented.

CONCLUSION: Development of musculoskeletal finite element models, especially those validated with laboratory experimentation, are critical to describe the biomechanics of dynamic axial loads, rotational loads, and shear stress incident upon the knee. The current models will help describe the contact mechanics of intact and structurally deficient knee joints. The clinical relevance of this work is that orthopaedic surgeons will have improved knowledge of the biomechanical consequences of the available repair techniques, and thus improved capability for surgical decision making.

FAILURE OF A UNICONDYLAR KNEE ARTHROPLASTY: A RARE FRACTURE OF A METALLIC PROSTHESIS

Peter Howard, MD; Bernard Roehr, MD; David Christ, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Bronson Orthopedic & Joint Specialists; Bronson Orthopedic & Joint Specialists

Unicondylar arthroplasty is a frequently performed and well established procedure for single compartment osteoarthritis of the knee. Progression of arthritis in adjacent compartments, component loosening, polyethylene insert wear or “spin out” in mobile bearing designs, and other technical errors can lead to revision. We present a case of failure of a unicondylar knee arthroplasty due to fracture of the metallic component. Fracture of a metallic component in any modern knee arthroplasty design is rare, and only a small number of reports exist on fractured unicondylar components. We hope that reporting the presentation and treatment of this case can add to the existing knowledge surrounding a rare mechanism of failure.

THE AGE OF RESILIENCE

Anusuiya Nagar, MD; Peter Longstreet, MD

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: Geriatric patients suffer a tremendous amount of losses yet there is substantial evidence that this population can be resilient in the face of adversity.

CASE: An 86 year-old widowed Caucasian female was admitted in the context of depressive symptoms and active suicidal intent. Approximately two years ago, her husband of sixty-four years had died and she was his primary caretaker throughout his illness. During her grieving, she experienced intense waves of depression and sadness. However, after having grieved her loss over several months, she found that she was capable of experiencing joy again. A few months prior to her admission, she fell in her home and incurred minor injuries. As a result, her family considered her to be unsafe to live alone. While in the hospital, she spoke of her “empty existence” in the nursing home which she felt was devoid of meaning or purpose.

In 2010, approximately 50 million people in America were over the age of sixty five. Currently, with the commensurate advances in medicine, life expectancy in this country is dramatically longer than before. However, of those additional years, the issue is one of quality over quantity. That is, would most people wish to live longer just for the sake of living longer? In a continuous series of losses, the majority of senior adults maintain a healthy emotional state as compared to the general adult population.

Currently, more than 1.5 million people are estimated to be displaced in nursing homes. Further, the seniors who suffer from this institutionalized existence have a higher prevalence of mood disorders compared to those seniors in the general population. The hypothesis is that most nursing homes create an environment devoid of purpose for these seniors which is correlated with higher prevalence of depression and anxiety.

Studies have demonstrated that there is a lower prevalence of mood disorders among older adults than younger adults in the general population. Meanwhile, studies comparing the elderly population in long-term facilities versus other settings demonstrate a significantly higher prevalence of mood disorders in those living in long-term facilities.

CONCLUSION: Neuroscientific studies have demonstrated many brain changes which contribute to resilience. Other factors such as temperament as well as family or community involvement have also been identified as influencing an individual’s capacity for resilience. In various studies however, it has been found that having purpose and meaning in one’s life contributes most to resilience.

CONTRASTING A CASE OF PARANOIA USING FREUD'S SCHREBER CASE, BIO-REDUCTIONISM, AND JASPERIAN PHENOMENOLOGY

Priya Mahajan, MD; Peter Longstreet, MD; Anusuiya Nagar, MD

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: Our case describes a patient who developed a depressive disorder with paranoia along with the expression of homosexual behaviors in the context of psychosocial stressors. In an effort to understand this patient, we have formulated this case using three different models: 1) Psychoanalytic 2) Bio-Reductionistic 3) Phenomenological/Jasperian.

CASE PRESENTATION: The patient is a 59-year-old married Caucasian male who presented as distressed due to prominent homosexual fantasies in the context of a depressive disorder. Following his mother's death one year earlier, he had become increasingly depressed and began sodomizing himself with a phallic object. These behaviors began to increase in frequency and intensity, approximately 6 weeks prior to admission. He believed that photographs of his sexual proclivities were being taken by a neighborhood boy and distributed to the patient's coworkers and fellow church members. He became convinced that people at his church and in the community were treating him differently by shunning and covertly berating him. He admitted to neuro-vegetative symptoms of depression for 4 weeks prior to admission. As a youth, he described a sexually permissive home environment as his "bisexual" father encouraged him to view pornographic movies and to "sexually experiment". While in his twenties, the patient described having engaged in several brief homosexual experiences. Subsequently, he felt immense guilt and engaged in parasuicidal acts of burning himself with cigarettes. After this, in an effort to suppress his homosexual desires, he married a woman whom he described as a sexually demanding "nympho". He coped with this marriage with heavy alcohol consumption. In contrast, his second marriage was to a woman who suffered from multiple medical illnesses; it was never consummated. He reported "flare-ups" of urges to participate in homosexual acts during this marriage. Nevertheless, he portrayed himself as a heterosexual male and engaged in an active social life in which he believed he was well-regarded by his colleagues, as well as by patrons at the church.

CONCLUSION: Currently, in many psychiatric residency programs, there appears to be a lack of emphasis on incorporating other perspectives, when formulating patients. In this project, we have outlined a case of paranoia using three different models: psychoanalytic, bio-reductionistic and phenomenological. We have contrasted these models to demonstrate the power of explaining and understanding. Our purpose is to encourage psychiatric programs to broaden the educational experience of their residents to include understanding patients so as to enhance treatment approaches and options.

DIAGNOSING TRACHEOESOPHAGEAL FISTULA-H TYPE

Rasha Kazi, MD; Joseph Fakhoury, MD; Andrea Scheurer-Monaghan, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Southwest Michigan Neonatology, P.C.

INTRODUCTION: Tracheoesophageal fistula (TEF) is a defect in embryogenesis which causes communication between esophagus and trachea. This anomaly may be associated with VACTERL or CHARGE syndromes. Of the 5 types, type E (also known as H-type as the fistula shape looks like an H) is known to cause less than 4% of TEFs. Symptoms associated with H type are coughing, choking and respiratory distress.

CASE: 38-week old male was born via normal spontaneous vaginal delivery to G4 P3213. He was vigorous at birth and did not require post- natal resuscitation. At 12 hours of age, he was noted to be tachypneic, retracting and grunting following a bottle feed. Pulse oximetry showed SpO₂ of 90% on room air. He was immediately started on 100% blow by oxygen and SpO₂ went up to 100%. Chest x-ray revealed small pneumothorax. He was then transferred to the Neonatal Intensive Care Unit (NICU) for further evaluation and management. He was placed on 2 L NC 50% oxygen. He was made NPO and started on IV fluids. Echocardiogram was ordered which showed small patent foramen ovale and patent ductus arteriosus. Nasogastric tube was placed without difficulty and feedings slowly resumed. Two days later, repeat chest x-ray showed resolved pneumothorax. Patient continued to have difficulties with oral feeds. His lung examination was noted to be “course” and never sounded “clear” even while receiving NG feeds. Thus esophagram was ordered on Day 4 of life.

Esophagram findings showed fistulous communication between mid esophagus and the trachea at the level of the carina, which is consistent of H-type tracheoesophageal fistula. Immediate imaging of spine and kidneys were obtained for concern of VACTERL association, which were found to be normal. Results were discussed with mother and she then informed providers that she had TEF- H type and required surgical correction early in life. Patient was immediately scheduled for bronchoscopic placement of fistular stent and transcervical repair of H type tracheoesophageal fistula.

DISCUSSION: Tracheoesophageal fistula H type is a rare malformation of the esophagus and trachea. Its diagnosis is often hindered due to the patency of the esophagus and non-specific symptoms that can be seen in other disease processes. It is important for clinicians to be mindful that TEF cannot be ruled out simply due to successful passage of nasogastric tube, especially in the setting of recurrent respiratory distress that is associated with feeds.

A UNIQUE CASE OF NEUROLEPTIC MALIGNANT SYNDROME WITH MEDICATION WITHDRAWAL

Rasha Kazi, MD; Joseph Fakhoury, MD; Stephen Lee McGinnis, DO

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Bronson Internal Medicine Hospital Specialists, Pediatrics

INTRODUCTION: Neuroleptic Malignant Syndrome (NMS) is an extremely rare but life threatening phenomenon associated with certain medications. Prevalence is noted to be anywhere between 0.02%-3% Symptoms include fever, and autonomic instability, included diaphoresis and blood pressure fluctuation. Labs are associated with elevated creatinine kinase (CPK).

CASE: 17-year-old male with past medical history of paraplegic immobility syndrome following previous motor vehicle accident with subsequent spasticity, back pain, neurogenic bladder, autonomic and temperature instability was admitted to general pediatric floor for acute onset of hypotension, fever and hypoxia s/p open reduction and internal fixation (ORIF) of right femur fracture. Two hours' post-op, the patient acutely developed temperature of 105 F, tachycardia, hypotension, and hypoxia. He was alert, responsive and diaphoretic. Fluid resuscitation and anti-pyretic control was initiated with normal saline bolus and acetaminophen. Initial labs, ECG and chest x-ray were reassuring, and CT chest negative for pulmonary embolus. Upon arrival to the pediatric floor, patient was alert, warm to touch, diaphoretic, tachycardiac and with strong distal pulses, requiring no supplemental oxygen. He exhibited spontaneous clonus in bilateral lower extremities, noted as his neurological baseline. Upon further history, mother revealed that he did not receive any of his home medications, including Dantrolene and Baclofen, for two days prior to surgery. Due to concern for NMS, he was immediately given a one-time dose of IV Dantrolene. His home regimen of Dantrolene and Baclofen were then resumed. Lab work revealed CPK of 1097 with following CK 1547. Aggressive hydration and anti-pyretic control were initiated. He remained hospitalized for 48 hours with gradually improving symptoms and CPK trends.

DISCUSSION: NMS is an uncommon phenomenon, but when seen, it is often associated when initiating "typical" antipsychotic medications and anesthesia. The cause of NMS is not well understood. Few theories have been published, one of which suggests disruption of the sympathetic nervous system affecting thermal regulation. It is unclear if our patient's NMS was related to anesthesia, withdrawal from medication or a combination of both. Research proposes that his NMS was potentiated with his neurological dysautonomia.

CONCLUSION: Given the severity of symptoms and life-threatening nature of NMS, it is important for clinicians to be aware of its features. This case also demonstrates the importance of obtaining a thorough history when caring for a patient, as learning about his home medications prompted expansion of the differential to include NMS and ultimately initiation of proper care for the patient.

THE IMPORTANCE OF ROUTINE LABS

Nithin Natwa, MD; Robert Baker, MD, PhD; Allan Wilke, MD

WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine

INTRODUCTION: While exercise related chest pain in the adolescent athlete is most commonly is due to a musculoskeletal cause, in rare cases other causes can be identified. This case of Pulmonary Embolus (PE) in an adolescent weight-lifter demonstrates a life threatening condition. The infrequency with which it is encountered in an adolescent often silent presentation makes it a potential overlooked diagnosis.

HISTORY: 17 year old male presented for left sided chest pain acute in onset associated with exercise one day prior. He had recently started using protein supplements and biking 25 miles 4 to 5 times weekly around 1 month earlier. He also noted a bump and pain over his left mid-tibia 4 days ago that had resolved. He was afebrile with no recent illness or travel and was a one pack per day smoker for 2 years.

PHYSICAL EXAM: Normal BMI. Positive only for palpable pain of left sternum between 5th and 6th rib. Minor crepitus, swelling and a palpable step off. Heart and Lungs were normal.

DIFFERENTIAL DIAGNOSIS: Coronary artery anomalies, Hypertrophic Cardiomyopathy, Pneumothorax, Asthma, Vocal Cord Dysfunction, Mediastinal Mass, Pneumomediastinum, Rib fractures, and Pneumonia.

TESTS RESULTS: The EKG and Chest X-ray were normal. Troponins were negative. However, the D-Dimer was elevated at 1.7 (nl <0.50 mcg/mL). The Spiral CT showed a right lower lobe, anterobasal segment embolus. Doppler ultrasound showed left posterior tibial, popliteal, perennial veins deep vein thrombosis. Coagulation work up to be performed in March after completion of 6 month warfarin course.

FINAL DIAGNOSIS: PE secondary to exercise induced deep vein thrombosis (DVT.)

DISCUSSION: PE is a life threatening condition usually characterized by pleuritic chest pain, dyspnea, as well as cyanosis in severe cases. Fifteen percent of all cases of sudden death are attributable to PE. This case demonstrates the importance of awareness and advocacy of acutely life threatening conditions. Despite some signs of PE being present, the age of patient, the quality of the pain, and limited initial history pointed to more benign causes.

CONCLUSION: In presentations such as our adolescent weight-lifter with chest pain, the provider should consider a D-Dimer. This test can be especially helpful when clinical suspicion for a PE is low. The test carries a high sensitivity (95%), but low specificity (50%) of the d-dimer test. However, without the D-Dimer, his PE and DVT could have easily gone undiagnosed and caused a potentially catastrophic event down the road.

PRECONCEIVED NOTIONS ABOUT A “PARTIER”: THE KEY TO DIAGNOSING A TROUBLED MIND IS TO KEEP AN OPEN ONE

Julie Coyle, MD; Ruqiya Tareen, MD

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: The differential diagnosis for acute onset psychosis is large. Narrowing that differential requires a thorough history which is more difficult to acquire when the psychosis is severe. Collateral information can be difficult to obtain, especially when cultural barriers exist.

CASE REPORT: This case involved a 19 year old college student from Saudi Arabia who was here studying English grammar who presented with acute onset psychosis with catatonia. The patient was non-verbal and agitated and could not follow commands. A limited history was obtained from his roommates who reported that for the previous three or four days the patient had been intermittently agitated or catatonic. He was a heavy drinker on weekends and because of that he was misdiagnosed with toxic ingestion of illicit substances even though his roommates denied any drug abuse history and his urine drug screen was negative. It was believed he could have ingested bath salts or some other drug that does not show up on the standard screens. He responded to treatment with benzodiazepines and antipsychotics and his sensorium cleared. At that time a more thorough history was obtained and revealed the patient had been under tremendous stress prior to the onset of illness. He had not taken any drugs prior to this episode and in fact denied use of all substances but alcohol. He had no previous mental health diagnosis and no significant family history.

DISCUSSION: Brief psychotic disorder is believed to account for nine percent of cases of first-onset psychosis. It can be easily misdiagnosed in a young college male because drug abuse and experimentation are common at that age and it is also a typical age for the first psychotic episode in schizophrenia or bipolar disorder. Persons from other cultures who are learning the language and are away from home and their usual supports are particularly vulnerable to first psychotic break as the stress is enhanced in this circumstance. This case demonstrates the importance of keeping a wide differential until a more thorough history can be obtained.

OLANZAPINE INDUCED ACUTE HEPATOTOXICITY: DO WE OVERLOOK THIS POTENTIAL SIDE EFFECT?

Priya Mahajan, MD; Ruqiya Shama Tareen, MD; Anusuiya Nagar, MD; Kevin Kunzer, MD; Kathleen A. Gross

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Clinical Research

INTRODUCTION: Atypical anti-psychotics can cause isolated increases in hepatic aminotransferases. The aminotransferase elevations that occur with olanzapine are typically self-limited and rarely clinically significant. We report a unique case of a patient who presented with altered mental status (AMS) and elevated transaminases secondary to olanzapine.

CASE PRESENTATION: The patient is a 55-year-old non-smoking married Caucasian female with a long history of schizoaffective disorder and COPD who presented with a four week history of disorientation, visual hallucinations, incoherent speech, naked wandering inside her home, and decreased oral intake, as reported by her husband. Two days prior to admission, she had stopped using supplemental oxygen because she believed she had seen other people using her nasal cannula. She was hypoxic on admission (O₂ sat% reported to be in 20s.), but this quickly resolved with oxygen administration. Eight months prior to admission, she had experienced an acute exacerbation of psychosis, leading to a change in olanzapine dosing from 20mg to 40mg daily. Her other medications remained unchanged, including lithium carbonate 600mg/d and bupropion 150mg/d. She was followed by her outpatient psychiatrist and had remained stable until the onset of symptoms leading to this admission. Medications were administered to her by her husband. She had no history of abusing alcohol or illicit drugs and no history of using over the counter or herbal medications. There was no known pre-existing liver disease. On admission, CMP was normal except for elevated AST (754 U/L) and ALT (822 U/L). Hepatitis panel, lithium level and ultrasound of the liver were normal. UDS was negative. Available records from a local hospitalization fifteen months earlier indicated normal LFT's at that time. She was continued on her usual regimen of bupropion and lithium, but olanzapine was discontinued. Subsequently, her hepatic transaminases decreased dramatically, normalizing within 21 days of olanzapine discontinuation. Her mental status improved markedly during this time.

CONCLUSION: Olanzapine is widely used for the treatment of both thought and mood disorders and is generally well tolerated. This case highlights that AMS with elevated transaminases can be an insidious but serious side effect during treatment. We recommend that clinicians regularly monitor liver function tests and increase olanzapine dosage gradually to avoid any serious side effects. If a patient has done well on olanzapine previously, then the clinicians should consider re-challenging the patient on a lower dose, under close monitoring, prior to abandoning the drug.

PNEUMOMEDIASTINUM IN HIGH FLOW NASAL CANNULA USE FOR RHINOVIRUS BRONCHIOLITIS

Ryan F. Halas, DO; Christopher J. Schmeihil, MD; Jason Lam, DO; Sherry Pejka, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; Bronson Pediatric Hospitalist Service and Bronson Pediatric Referral Service

INTRODUCTION: Pneumomediastinum is a condition characterized by the presence of air in the mediastinal space. It can be spontaneous or due to trauma. Pneumomediastinum is uncommon in children and association with high flow nasal cannula is rare.

CASE: A 16-month-old female with a history of febrile seizures presented to the emergency department with respiratory distress and a two day history of fevers, rhinorrhea, and cough. On physical exam, she was hypoxic, tachypneic and retracting with diffuse crackles. A respiratory infectious disease PCR panel revealed rhinovirus infection. Her chest x-ray (CXR) was consistent with a viral process. She required support with high flow nasal cannula (HFNC) at 8 liters/min and a FiO₂ of 30%. Flow was gradually increased to 16 liters/min, 80% of the maximum for the patient's cannula size. She suddenly developed worsening respiratory distress with a respiratory rate greater than 100 breaths/minute. A repeat CXR revealed pneumomediastinum with soft tissue emphysema in the lower neck. Repeat labwork did not suggest superimposed bacterial infection. The patient was transferred to the pediatric intensive care unit where HFNC flow was increased to 20 liters/min and the patient's respiratory status stabilized. A repeat CXR the following day showed resolving pneumomediastinum. Respiratory support was gradually weaned and patient was discharged home.

DISCUSSION: Patients with pneumomediastinum typically present with chest pain, dyspnea, and dysphagia. Pneumomediastinum is due to increased alveolar pressure in the setting of weakened lung parenchyma that leads to over distention, rupture of alveolus, and leakage of air into the mediastinum. In this case, increased positive pressure from HFNC in the setting of abnormal lung parenchyma from viral bronchiolitis was the likely cause. Treatment for pneumomediastinum is generally supportive and surgical intervention is required in cases of tension pneumomediastinum. Although viral infections are known causes of pneumomediastinum, rhinovirus is an infrequent cause, and cases associated with HFNC are rare. At least three cases of serious air leakage with HFNC in pediatric patients have been reported. One patient developed pneumomediastinum and died from complications. The other two patients developed pneumothoraces, with one requiring mechanical ventilation and the other a chest tube.

CONCLUSION: HFNC has become a mainstay treatment in providing positive pressure support for pediatric patients with respiratory failure, especially from viral etiologies. Although HFNC is generally considered safe and effective, clinicians need to be aware that positive pressure support in setting of viral illness may increase risk of pneumomediastinum and pneumothorax.

MULTI-DRUG RESISTANT STREPTOCOCCUS PNEUMONIAE AS A PRESENTATION OF CYSTIC FIBROSIS IN A TWO YEAR OLD MALE

Ryan F. Halas, DO; Theotonius J. Gomes, DO; Bryan Corpus, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; Bronson Pediatric Hospitalist Service and Bronson Pediatric Referral Service

INTRODUCTION: Recurrent sinopulmonary infections, especially with multi-drug resistant organisms, are a common presentation of Cystic Fibrosis (CF). Recurrent infections in CF are due to thickened airway secretions, which cause poor mucociliary clearance and obstruction. Caucasians are most commonly affected and diagnosis is often made with newborn screening.

MATERIALS & METHODS: We present a case of a 2-year-old Caucasian male with history of fevers of unknown origin and multiple sinus and otitis media infections, who presented with sepsis from lobar pneumonia. Ceftriaxone and clindamycin were empirically started. Blood culture and urine antigen testing both revealed a *Streptococcus pneumoniae* infection. Chest ultrasound showed small to moderate pleural effusion. After two days without improvement in fever curve or respiratory status, a chest tube was placed to drain purulent material. Blood culture sensitivities revealed a multi-drug resistant strain of *S. pneumoniae* with resistance to ceftriaxone (MIC 4), clindamycin (MIC >1), tetracycline (MIC > 16), and macrolides (MIC > 8). His antibiotics were transitioned to levofloxacin and he began to show clinical improvement. An immunodeficiency workup was unremarkable. Sweat chloride testing confirmed a diagnosis of cystic fibrosis.

DISCUSSION: Cystic fibrosis is an autosomal recessive disease caused by mutations in the Cystic Fibrosis Transmembrane Receptor (CFTR) gene and affects approximately 1 in 3000 Caucasians. Diagnostic criteria include clinical features consistent with CF in at least one organ system plus one of the following: 1) sweat chloride ≥ 60 mmol/L (on two occasions), 2) presence of two disease-causing mutations in CFTR, one from each parent or 3) abnormal nasal potential difference. CF is often diagnosed on newborn screen and 63% of cases have been diagnosed since 2013. The disease leads to multi organ dysfunction most severely affecting the lungs. Manifestations include obstructive pulmonary disease, chronic bronchitis with acute exacerbations, and progressive bronchiectasis. The most common respiratory tract colonizing pathogens in patients with CF include *Staphylococcus aureus*, *Haemophilus influenzae*, *Pseudomonas aeruginosa*, and *Achromobacter xylosoxidans*. Drug resistant strains do not commonly develop in toddler years with the exception of MRSA. *S pneumoniae* has recently been discovered as a more common colonizing pathogen than previously recognized.

CONCLUSION: A high index of suspicion for CF should be maintained in patients with recurrent sinopulmonary infections. Although multidrug resistant *Streptococcus pneumoniae* is not well-documented sequela of CF, recent evidence suggests it is becoming a more common pathogen for these patients. In this case, it led to a more thorough workup resulting in the CF diagnosis.

INGESTION OF LIGHTBULB FRAGMENTS AS PRESENTATION FOR PICA ASSOCIATED WITH IRON DEFICIENCY

Ryan F. Halas, DO; Jason Lam, DO; Sherry Pejka, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Medicine-Pediatrics; Bronson Pediatric Hospitalist Service and Bronson Pediatric Referral Service

INTRODUCTION: Pica is an eating disorder characterized by repeated ingestion of non-food substances over at least one month that is not appropriate for developmental age and is not culturally supported. It is most commonly found in pediatric populations. Although ingested non-food substances (dirt, paper, string, hair, paint) in pica are often benign, it may also be life threatening. Glass pica, known as hyalophagia, has been reported but is exceedingly rare.

CASE: We present the case of a 27-month-old male with no past medical history who presented for glass ingestion. Mother found the patient with glass shards on his tongue and lips after his brother broke a lightbulb. Mother denied vomiting, pain and mouth lacerations. The patient had a habit of ingesting non-food substances including markers, crayons, dirt, and fabric. Abdominal x-ray revealed numerous radiopaque objects consistent with glass fragments in the stomach. Stomach contents were removed with emergent endoscopy which was limited secondary to large food content. During endoscopy multiple crayon fragments were discovered and generalized gastritis was visualized. Repeat x-ray was revealed interval removal of foreign bodies. Given the report of pica, laboratory evaluation for iron deficiency anemia was performed and the results confirmed our suspicion. He was placed on ranitidine and ferrous sulfate and discharged in good condition.

DISCUSSION: Accidental foreign body ingestion is common in pediatric patients. Initial management of radiopaque objects involves radiographic assessment of foreign body location and size. In cases of sharp objects likely to cause complications, such as glass, emergent endoscopy is performed if the objects have not passed through the duodenum curvature. While sporadic ingestion of non-food substances is common in toddlers, persistent ingestions are indicative of pica and suggests underlying psychiatric disorder, nutritional deficiency (e.g. iron, zinc), or neurodevelopmental disorder. Iron deficiency anemia is the most common nutritional deficiency associated with pica and should be evaluated for and treated if present. Pica related to nutritional deficiency resolves once those deficiencies are addressed.

CONCLUSION: Foreign body ingestion is a common problem in pediatric patients. While most cases are benign, some are life threatening. In this case of glass ingestion, thorough history revealed a prolonged pattern of ingestion of non-food items consistent with a diagnosis of pica. Patients should be assessed for any underlying eating disorder that may increase their incidence of non-food substances ingestions. Pica related to nutritional deficiency resolves once those deficiencies are addressed.

PERSISTENT HYPERINSULINEMIC HYPOGLYCEMIA OF INFANCY AS A SEIZURE TRIGGER IN A 21 MONTH OLD WITH PREVIOUS EPILEPSY

Ryan F. Halas, DO; Theotonius J. Gomes, DO

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

INTRODUCTION: Persistent hyperinsulinemic hypoglycemia of infancy (PHHI) is a rare condition characterized by dysregulation of insulin secretion, specifically in the setting of hypoglycemia. Multiple genetic causes have been identified and the prevalence is estimated at 1 in 30,000 births. Clinical manifestations include seizures in as many as 50% of patients as well as pallor, poor feeding, macrosomia and other signs of hypoglycemia. The age of presentation varies from within hours of life to later childhood.

MATERIALS & METHODS: We present a case of a 21 month old male with past history of mild developmental delay and intractable epilepsy who presented with four days of increasing seizure frequency which were inconsistent with previous morphologies. He had daily seizures including generalized tonic clonic seizure with cyanosis, multiple staring spells and partial myoclonic jerks lasting 10-30 seconds. In between these episodes he had periods of weakness and altered mental status (AMS).

RESULTS: Initial blood glucose (BG) level was 21 mg/dL with an insulin level of 29.8 uU/ml (reference range 0.0 - 22.7 uU/ml). Blood glucose remained low despite boluses of dextrose 25% and dextrose 5% maintenance fluids but stabilized after initiation of dextrose 10% infusion.

The patient did not exhibit any further seizure activity or AMS. Further workup was performed in a fasting state without dextrose containing fluids with a nadir of 20 mg/dL. Studies were once again consistent with inappropriate insulin secretion with normal cortisol, human growth hormone, lactic acid, and mildly elevated beta hydroxybutyrate. A glucagon stimulation test raised his BG by greater than 40 mg/dL refuting liver storage disorders. Diazoxide and chlorothiazide were started and BG gradually improved and dextrose was weaned over 5 days. An 18 hour fast was completed without hypoglycemia. He was discharged home with plans for confirmatory genetic testing.

DISCUSSION: PHHI is a rare endocrine condition which manifests as repeated hypoglycemia. Treatment involves diazoxide to inhibit insulin secretion and partial pancreatectomy for refractory cases. In some circumstances, undiagnosed PHHI can manifest as an intractable seizure disorder and may not be discovered until labs show hypoglycemia. This patient's epilepsy may have been caused by undiagnosed hypoglycemic events.

CONCLUSION: A high index of suspicion for metabolic derangements should be maintained with refractory seizures. In this case, a change in seizure frequency and morphology led to the diagnosis of PHHI. Over time anti-epileptic drugs may be weaned in an attempt to determine whether his epilepsy was solely related to hypoglycemic events.

BEARDED DRAGON EXPOSURE RESULTING IN SALMONELLA BACTEREMIA

Silpa Nadella, MD; Oro Enaohwo, MD; Aaron Lane-Davies, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Family Medicine; Bronson Pediatric Hospitalist Service and Bronson Pediatric Referral Service

INTRODUCTION: Non-typhoid Salmonella commonly causes a self-limiting gastroenteritis, although may lead to an invasive form of disease, such as bacteremia, septicemia, and meningitis, in susceptible individuals.

Salmonellosis causes approximately 1 million illnesses and 400 deaths annually in the United States for which children, immunocompromised individuals, and elderly are susceptible. Generally considered to be a foodborne illness, Salmonella contributes to normal intestinal flora of reptiles, causing asymptomatic shedding and subsequent development of reptile associated salmonellosis (RAS). Due to outbreaks, the FDA banned the selling of small turtles as home pets and the CDC continues to recommend avoidance of reptiles in the homes of young children. Despite this, RAS continues to occur, as in this case of an infant with salmonella bacteremia resulting from indirect exposure to a bearded dragon lizard.

CASE PRESENTATION: The 8-week-old male was initially evaluated by his pediatrician for a 4-day history of fever and non-bloody diarrhea. Blood cultures had grown gram negative bacteria and CRP was elevated at 8.2 MG/L for which he was admitted for further evaluation. The remainder of his laboratory evaluation was within normal limits and he had a normal physical examination. CSF studies were obtained, of which he had 2206 red blood cells, 5 white blood cells, protein 52 mg/dL, and glucose 56 mg/dL. He was started on IV Rocephin, and as blood cultures subsequently identified Salmonella enterica spp orannienburg, he was discharged to complete the course of IV antibiotics at home. His past medical history was non-contributory as he was born via spontaneous vaginal delivery at 40 weeks' gestation, with no peripartum complications. His growth and development had been appropriate. He lived with mother and father, and several animals at home, including a bearded dragon lizard.

CONCLUSION: Salmonella gastroenteritis tends to be self-limiting and clinically similar to other forms of gastroenteritis, although certain high-risk individuals may develop bacteremia which can lead to invasive disease. Despite the FDA ban of selling small turtles, young children continue to be affected by RAS. Salmonella carriage occurs in reptiles other than turtles, and when young children present with symptoms of gastroenteritis, insight should be taken into whether exposure has occurred. If so, blood cultures and antibiotic treatment should begin if high clinical suspicion. It is important to improve related public health measures in regards to RAS and for physicians to educate families of children who own high-risk pets.

BLUE TOE SYNDROME IN AN ADOLESCENT MALE

Silpa Nadella, MD; Sonia Joychan, MD; Saad Shebrain, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of General Surgery

INTRODUCTION: Blue toe syndrome (BTS) when seen in the pediatric population is caused by a wide range of etiology such as hair tourniquet syndrome, medication or more common causes such as an embolus. As there may be sudden onset of symptoms, it may be difficult to identify early in the youngest of patients. BTS occurs when there is blue or purple discoloration following impaired arterial perfusion, impaired venous outflow or abnormal circulation. It's seen with small vessel occlusion occurring in the absence of trauma, cold-induced injury or cyanotic disorders. As management is based on etiology, it's important to understand the underlying cause and treat early to prevent further tissue loss or possible amputation.

CASE: We report a case in a 16-year-old male who presented with left great toe ischemia. His toe had been dusky and swollen for several weeks, and he had later noted the toenail to be ingrown for which he was treated with a ten-day course of antibiotics. The toe continued to remain swollen, and the remainder of the toes on his left foot turned dusky, numb and painful. He had no problems with his other limbs, no prior history of color changes to his extremities or traumatic injury. He had no joint pain, fever, chest pain, or dyspnea. Physical examination revealed 5-6 scattered non-blanching circular macules over the dorsum of his foot, with duskiess over his toes. Partial removal of the left great toe nailbed was done, revealing no purulent material. CT angiogram demonstrated a segmental occlusion of his left anterior tibial artery. Hypercoagulable workup was unremarkable, following which treatment with cilostazol and clopidogrel led to clinical improvement.

DISCUSSION: Although BTS is often caused by an embolus, there is a broad range of differentials for which it is important to understand the extra-cutaneous features associated with various etiology as dermatologic signs are generally nonspecific. BTS has been reported after use of medication such as mixed amphetamine salts indicated for ADHD, ergotamine, and intra-arterial chemotherapy. It has been identified in easily missed diagnosis such as hair tourniquet syndrome. As cholesterol emboli is often seen in adults, it may be seen in children due to increasing rates of obesity. If workup is negative and symptoms persist, the patient should be diagnosed with chilblains. When caused by more serious etiology, it's essential to identify and treat early as BTS may require possible amputation due to repeated episodes or prolonged ischemia.

PULMONARY CAVITARY LESION IN A PATIENT WITH CYSTIC FIBROSIS: A CASE OF ASPERGILLUS OVERLAP SYNDROME

Sonia Joychan, MD; McKenzie J. Akers, M. Myrtha Gregoire-Bottex, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2018; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics

Aspergillus fumigatus (AF) clinical spectrum ranges from colonization to invasive aspergillosis (IA) based on the host's immune status. ABPA results from excessive Th2 cytokine response to AF antigens. Cystic fibrosis (CF) patients are often colonized with AF due to defective airway clearance. They frequently receive antibiotics and oral steroids all risk factors for chronic or IA. We present a case of overlap syndrome of ABPA and chronic aspergillosis (CPA) in a CF patient.

An 11-year-old with CF, pancreatic insufficiency, and known colonization with *Staphylococcus aureus* and *Stenotrophomonas maltophilia*, was admitted for worsening cough and sputum production. He had 2 prior admissions and received several courses of oral antibiotics for CF exacerbation. He had wheezing treated with oral steroid bursts for asthma exacerbation. He was afebrile, in no distress and had decreased aeration of the right lung field. His FEV1 declined from 94% to 67%. He had RLL opacity with lucencies. Chest CT showed 3x4 cm RLL cavity with air-fluid levels, mucoid impaction, reactive adenopathy and bronchiectasis. WBC, eosinophil count, and CRP were normal. PPD and QuantiFERON-TB Gold were negative. Total IgE increased from 104 to 517 IU. He had positive AF-specific IgE, negative AF IgG and intermediate Beta-D-Glucan. His cavitary lesion was still present after 2 weeks of broad-spectrum antibiotics. His sputum culture grew usual organisms. BAL/Brush biopsy were significant for scattered fungal hyphae, positive Galactomannan at 0.823 (normal <0.5) and growth of *Aspergillus*. Prednisone and voriconazole started for ABPA and CPA. Further chart review revealed multiple positive cultures for AF. Two weeks after prednisone and 4 weeks of IV antibiotics, his FEV1 was 84%, chest CT showed almost no cavitation. IgE two months later was 254 IU.

Diagnosis of pulmonary aspergillosis in CF is often delayed. ABPA manifests as poorly controlled asthma and should be suspected in CF patients with recurrent wheezing and declining lung function. Central bronchiectasis can be seen in ABPA but is also a hallmark of CF. In our patient, a cavitary lesion, positive Galactomannan and presence of hyphae in BAL suggest acute infection. Systemic steroids are the mainstay of therapy for ABPA. The aim is to suppress the inflammatory pathway to reduce further lung damage. Antifungals and omalizumab are considered steroid sparing measures.

BASAL GANGLIA CALCIFICATION IN NEWLY DIAGNOSED PSEUDOHYPOPARATHYROIDISM

Sonia Joychan, MD; Silpa Nadella, MD; Dilip Patel, MD; Daniel Fain, MD

WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Pediatrics; Bronson Neuroscience Center, Department of Pediatric Neurology and Helen DeVos Children's Hospital, Department of Neurology

INTRODUCTION: Pseudohypoparathyroidism is caused by end-organ resistance to parathyroid hormone. Patients with Type Ia, Albright's Hereditary Osteodystrophy, have distinct clinical features, including short stature, round facies, obesity, brachymetaphalangism, and developmental delay. Type Ib and Type II often lack these clinical features, thus requiring a higher index of suspicion to make the diagnosis.

CASE: A 13-year-old male with Asperger syndrome presented after participating in a "cold water challenge", leading to what was believed to be an episode of vasovagal syncope and mild traumatic brain injury. Computerized tomography revealed basal ganglia calcifications, and laboratory studies showed a serum calcium level 5.5 mg/dL. Based on history, it was believed his calcifications were secondary to another etiology, such as an intrauterine infection, so he was discharged with instructions for close follow-up of his calcium level.

Over the next month, the patient continued to have similar syncopal episodes, altered mental status, and impaired short-term memory for which he was readmitted. Physical examination was significant for positive Chvostek's sign, although no dysmorphic features were noted. Laboratory evaluation revealed serum calcium level 5.3 mg/dL, ionized calcium level 2.4 mg/dL, and phosphorus 9.4 mg/dL. Parathyroid hormone was elevated at 444.4 pg/mL. Endocrinology and neurology workup led to a diagnosis of pseudohypoparathyroidism. His calcium level normalized and symptoms improved after intravenous calcium replacement and calcitriol. He was instructed to continue taking oral calcium and vitamin D supplementation and return immediately if symptoms return or worsen.

DISCUSSION: In the setting of Type Ia pseudohypoparathyroidism, there have been cases of soft tissue calcifications, primarily in subcutaneous tissues. Rare cases of calcifications in deeper tissues, including the brain and cardiac septum, have also been reported. The pathogenesis of basal ganglia calcifications in hypoparathyroidism is unclear, although it may be associated with the calcium/phosphorus ratio, precipitation across the blood-brain barrier, mechanisms of calciphylaxis, and dystrophic calcification.

This case represents a new diagnosis of pseudohypoparathyroidism in a 13-year-old male, with strong differentials including Fahr's disease and TORCH infections. The presence of basal ganglia calcifications were put into light as a rare complication of hypoparathyroidism.

PHYSICIAN ATTITUDES TOWARDS CARE OF PATIENTS WITH OPIOID USE DISORDERS

Sonia Motin, MD; Kathleen A. Gross; Michael Liepman, MD

WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry; WMU Homer Stryker M.D. School of Medicine, Department of Clinical Research; WMU Homer Stryker M.D. School of Medicine, Department of Psychiatry

INTRODUCTION: Patients with opioid use disorders, can present challenges to physicians to solve. We sought out prevailing attitudes of resident and faculty physicians towards a variety of questions.

MATERIALS & METHODS: 36 faculty and 68 resident physicians at WMed (n=104) responded to a SurveyMonkey questionnaire. The questions were divided into 8 dimensional categories. The 4-point Likert scale was collapsed into Agree vs. Disagree.

RESULTS:

Question	Agree	Disagree
1. Opioid addiction is a habit of maladaptive voluntary use and not a physical illness.	25	66
2. I have received, or plan to receive, the required certification to prescribe buprenorphine for opioid addiction.	32	60
3. Diagnosing and treating opioid addiction in my patients is not my responsibility.	11	81
4. I feel uncomfortable seeing opioid addicted patients in my clinic.	47	45
5. Patients who abuse opioids are really not interested in getting help to stop using.	18	73
6. Pregnant women who are addicted to opioids are likely to be poor mothers.	35	56
7. People with opioid addiction and chronic pain may need to be maintained on methadone or buprenorphine in order to recover from addiction and safely manage their pain.	76	16
8. To recover from opioid addiction, a person must simply stop using opioids.	15	77
9. I would be comfortable prescribing a benzodiazepine(s) to patients who are in recovery from opioid addiction only after discussing alternatives and obtaining informed consent.	35	57
10. It is uncommon for healthcare professionals to become addicted to opioids.	12	80
11. Men who abuse opioids are likely to be poor fathers.	35	57
12. I feel like I'm working harder than my patients when trying to help them with their opioid addiction.	65	26
13. Lifelong abstinence from opioids should be a goal for ALL people trying to recover from opioid addiction.	57	34
14. Patients with active opioid addiction should not use full agonist opioids (e.g., morphine, hydromorphone, hydrocodone, etc.) for pain relief.	49	52
15. Involving family members in treatment plan is beneficial to opioid addiction recovery.	87	4

DISCUSSION: Most respondents consider diagnosis their responsibility. Yet most respondents feel uncomfortable treating such patients, and believe they are doing more of the work than the patient. Almost 2/3 consider lifelong abstinence from opioids to be the best strategy, yet they would make an exception for those with chronic pain. There is still room for more physician education about opioid addiction.

ANALYSIS OF SURVIVAL MOTOR NEURON PROTEIN EXPRESSION, STABILITY, AND VARIABILITY OVER TIME IN WHOLE BLOOD USING A QUALIFIED SMN-ECL IMMUNOASSAY

Phil Zaworski; Steven Weber, PhD

PharmOptima, Biochemistry; PharmOptima, DMPK

Spinal muscular atrophy (SMA) is caused by defects in the Survival Motor Neuron 1 (SMN1) gene that encodes survival motor neuron protein (SMN). SMA patients have at least one copy of a similar gene (SMN2) that produces SMN protein, although in reduced amounts. The majority of therapeutic approaches in clinical development aim to increase expression of SMN protein, so there is a need for sensitive methods able to quantitatively assess increases in SMN protein, and thus therapeutic efficacy. This work reports on a sensitive electrochemiluminescence (ECL)-based immunoassay for measuring SMN protein in as little as 5 μ L of whole blood.

The SMN-ECL immunoassay has been qualified according to FDA guidelines. The assay has a dynamic range of 9.76-20,000 pg/mL requiring as little as 5 μ L whole blood volume. The SMN-ECL assay was used to measure SMN protein in whole blood from SMA patients and healthy controls, and protein levels were analyzed according to age, SMN2 copy number, and SMA type. Our results show that SMN protein levels were associated with SMN2 copy number and were greater in SMA patients with 4 copies, relative to those with 2 and 3 copies. Although there are limited data available for very young individuals, there appears to be a rapid decline in whole blood SMN levels from birth to approximately 2 years of age. Beyond the age of 2 years we did not see dramatic differences in SMN protein levels within an SMA type. Using the SMN-ECL assay, we found that SMN protein was stable for at least 360 days when stored at -80C but not at -20C, and that samples should not undergo more than two freeze-thaw cycles. SMN protein level variability over time was characterized in venous and capillary whole blood samples collected from healthy volunteers at Jasper Clinic, MI. SMN protein levels did not vary significantly over time (CV~10%) in either venous or capillary blood, and daily circadian rhythms had little effect on SMN protein levels. SMN levels in venous blood significantly correlated with levels in capillary blood.

As therapeutic treatments progress through clinical development, there is an increasing need to accurately measure SMN protein and understand SMN protein expression, stability, and variability over time. The SMN-ECL immunoassay enables accurate measurement of SMN in whole blood and other tissues. The assay has been validated according to FDA guidelines and is ready for use in clinical trials.

UNPLANNED DONATION AFTER CIRCULATORY DETERMINATION OF DEATH (UDCD) DEMONSTRATION PROJECT IN KALAMAZOO COUNTY

Steven Rudich, MD, PhD; William Fales, MD; Paul Lange, MD

Gift of Life Michigan, Medical Division; WMU Homer Stryker M.D. School of Medicine, Division of EMS and Disaster Medicine; Gift of Life Michigan, Medical Division

INTRODUCTION: There is no end to the organ donor shortage in the US; many would consider this a crisis. It has been estimated that there are several times the current number of brain dead donors IF those people whose hearts stop beating, outside of the immediate hospital setting, were considered as donors, called unplanned (or unexpected) donation after circulatory determination of death donors (uDCD). Unfortunately, such patients are considered far from ideal donors, and are not currently used in the US, although these types of donors are used successfully in Europe.

PURPOSE: To design, develop, critically assess, and implement a uDCD donation program in Kalamazoo County, Michigan.

MATERIALS & METHODS: Numerous stakeholders were identified during various stages in designing this project, including the: 1) medical director of the Kalamazoo County EMS service, 2) county Medical Examiner, 3) Emergency Department and trauma groups in two leading hospitals, 4) transportation services, as well as 5) general medical community, centered around Western Michigan School of Medicine. These various stakeholders were intensively engaged and educated concerning the proposed new uDCD protocol. Ideas were shared and potential problems and challenges to implement the final protocol were discussed.

DISCUSSION: This process will only be feasible through the direct and active participation of many different services. Emergency medicine personnel are needed in the field to diagnose patients, attempt to return of spontaneous circulation, and if the situation arises, to declare death and start mechanical CPR, after authorization for donation is verified. The Medical Examiner Investigator is called to perform her/his duties in a very expedient manner, and to release the body for donation. The ED and trauma services are called upon to quickly cannulate the uDCD donor for extracorporeal support and resultant transfer to the organ procurement organization. These tasks need to happen correctly, expeditiously and seamlessly in order to make the gift of organ donation for these families.

CONCLUSION: We believe that with community support and buy-in from appropriate stakeholders, Kalamazoo County has a near-perfect environment to demonstrate, for the first time in the US, a successful uDCD organ donation program. Preliminary data obtained from the EMS Service reveals that upwards of 10 to 15 “new” organ donors might be realized per year. We hope to use this protocol and process to engage additional communities in Michigan, to expand the hope of organ donation and transplantation to more Michiganders.

RADIAL ARTERY APPROACH FOR DIAGNOSTIC AND THERAPEUTIC PROCEDURES IN PERIPHERAL ARTERIAL DISEASE

Julia Miladore, MD; Syed Alam, MD; Daniel Johnston, MD; Mark Rummel, MD; John Munn, MD;
Krishna Jain, MD

WMU Homer Stryker M.D. School of Medicine, Department of General Surgery; Advanced Vascular Surgery; Advanced Vascular Surgery; Advanced Vascular Surgery; Advanced Vascular Surgery

INTRODUCTION: Radial artery access for percutaneous interventions was first introduced in 1989 for diagnostic coronary angiography. Radial access is being used in about 2% of peripheral percutaneous cases nationally while femoral approach remains the preferred method. We present our experience with radial artery access for diagnosis of peripheral arterial disease and intervention in our office endovascular lab.

MATERIALS & METHODS: We retrospectively analyzed our prospectively collected data at our outpatient endovascular center from January 2013 to April 2015. Demographic data and co-morbidities such as presence of hypertension, diabetes mellitus, hypercholesterolemia, and smoking status of each patient were assessed. A normal Allen test was a prerequisite for this approach. Indication for the procedure and procedure performed was documented. Sheath size was documented. Complications following the procedures were recorded. In follow up patients were queried about satisfaction.

RESULTS: A total of 520 arterial cases were performed of which 46 patients (8.8%) had trans-radial approach. The age range was 48-89 years (mean 69 years). Hypertension was present in 90%, diabetes mellitus in 37%, hypercholesterolemia in 84%, and 63% were active smokers. 24 procedures were diagnostic using a 4 French sheath. 12 patients had Iliac angioplasty using 5 and 6 French sheaths. Superficial femoral angioplasty was performed in 7 patients through a 5 French sheath. Subclavian angioplasty was performed in 3 patients through a 5 French sheath. Complications from these procedures consisted of 2 hematomas (4.6%) which did not require any further intervention, and one asymptomatic radial artery occlusion. All patients were discharged home within 2 hours of their procedure. During follow up 100% of patients were satisfied.

CONCLUSION: The radial access rate is higher in our outpatient endovascular center than the national average. Radial approach can be safely and effectively used for peripheral arterial disease diagnosis and intervention in an office setting. Patient satisfaction is high and complications are limited. There are limitations because of currently available catheter lengths and size of sheath that can be used depending on radial artery quality and size.

RECURRENT UTERINE PAPILLARY SEROUS CARCINOMA SEEN AS AN ISOLATED LUNG MASS SEVERAL YEARS AFTER COMPLETION OF STANDARD TREATMENT

Stephanie Chang; Monoj Kumar Konda, MD; Anna Hoekstra, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; West Michigan Cancer Center, Gynecologic Oncology

INTRODUCTION: 76 year old woman with a history of stage II uterine papillary serous carcinoma, that was treated with chemotherapy and whole pelvic radiation, presented 3 years later with a lung nodule on chest x-ray. The physical exam and vitals were normal. A CT chest showed a solitary 1.9 cm right lower lobe mass. CT-guided biopsy revealed metastatic serous adenocarcinoma of uterine primary with immunohistologic staining identical with primary cancer. The metastasis was resected under video-assisted thoracoscopic surgery. A 3 month follow-up CT scan showed a 9 mm nodule at operative site and new subcentimeter nodules in left lingula. Another chest, abdomen, and pelvic CT is planned in 3 months.

DISCUSSION: After successful treatment of gynecologic cancers, a disease free interval of six months to two years is reported in the literature. A study on uterine carcinoma recurrence showed the right lower lung lobe was the most common site of metastases (74%). Presentation is usually due to incidental nodule on follow-up imaging. Treatment options include surgical resection of chemotherapy. A study reported median survival of 98 months following surgical resection in patients with stage 1 or 2 endometrial cancer and isolated lung recurrences less than 2 cm size. Overall, the treatment success rates depend on stage and number of recurrent metastases. Thus, our case demonstrates that even after successful gynecological carcinoma treatment, it is critical for patients to be educated by primary care physicians to have stringent follow-ups with oncologists because of potential recurrence of the metastasis.

SOLITARY LUNG METASTASIS 2 YEARS AFTER SUCCESSFUL TREATMENT OF PRIMARY CERVICAL ADENOCARCINOMA

Stephanie Chang; Monoj Kumar Konda, MD; Anna Hoekstra, MD

WMU Homer Stryker M.D. School of Medicine, Medical Student Class of 2019; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; West Michigan Cancer Center, Gynecologic Oncology

INTRODUCTION: 55 year old woman with a history of stage I cervical cancer, which was treated with radiation and chemotherapy, presented with a 9 mm right lower lobe pulmonary nodule on chest CT. She was asymptomatic with normal physical exam and vitals. A follow-up CT 7 months later showed the mass had increased to 2.4 cm. A CT guided biopsy revealed adenocarcinoma consistent with metastasis from primary cervical adenocarcinoma with immunohistologic staining identical to initial cervical cancer. The patient underwent wedge resection of the metastatic lesion and remained disease free at 6 month follow-up.

DISCUSSION: Although there are several successful treatments for cervical cancer, there has been extensive literature of this gynecological cancer appearing several years later in the right lower lobe of the patient's lungs as an isolated mass. In one study, within 2 years after initial cervical cancer treatment, lung metastases were seen in 89 (83.9%) out of a total 106 patients. Treatment options for this recurrent carcinoma include surgical lobe wedge resection and chemotherapy. Although the 5-year overall survival (OS) rates tended to be higher in the surgery group than in the chemotherapy group, they were not statistically significant (5-year OS 81.7% vs. 49.5%, $p=0.072$). In view of high recurrence rates, regular follow up and surveillance of patients after successful treatment for cervical cancer is critical. Primary care physicians need to educate this particular group of patients to follow up with oncologists and community with specialists to avoid missing these recurrences.

SEVERE RESPIRATORY DISEASE FROM ADENOVIRUS SEROTYPE 7

Sumaiya Ansari, MD; Christopher Begley, DO; Andrew Whipple, DO; Karthik Kailasam, MD; Jeffrey Wilt, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Borgess Critical Care Services

INTRODUCTION: Human adenoviruses (HAdVs) have been known to cause severe pneumonia at extremes of age and in the immunocompromised, but reports of life-threatening respiratory disease in adults are rare. Here we report three cases of acute respiratory failure caused by human adenovirus 7 in an adult population treated at a community hospital over a 2-month period in the winter of 2015-2016.

CASE DESCRIPTIONS:

CASE 1: Patient A was a 40 y/o F with COPD who presented with acute hypoxic respiratory failure. Chest radiographs showed bilateral infiltrates. She deteriorated rapidly requiring mechanical ventilation for ARDS. A bronchoscopy was done and respiratory cultures were positive for adenovirus that was later genotyped as serotype 7. The patient gradually improved and was extubated, eventually being discharged home in stable condition.

CASE 2: Patient B was a 51 y/o F with a PMHx of crescentic glomerulonephritis on chronic immunosuppression medication, and COPD who presented with cough, dyspnea, and high-grade fever. She was initially treated for community-acquired pneumonia but developed respiratory failure necessitating mechanical ventilation. CT scan showed bilateral lower lobe infiltrates. Respiratory cultures from bronchoscopy grew adenovirus identified as serotype 7. No other cultures were positive. She had a prolonged ICU course with multiple complications and ultimately underwent tracheostomy for failure to wean from the ventilator.

CASE 3: Patient C was a 72 y/o M with a PMHx of CAD who presented with acute onset dyspnea. He was emergently intubated for respiratory failure. Initial imaging was negative for pulmonary embolism but concerning for multifocal pneumonia involving the lower lobes. A bronchoscopy with respiratory cultures revealed adenovirus genotyped as serotype 7. He was extubated after 3 days and transferred to the medical floor in stable condition.

DISCUSSION: Human adenoviruses (HAdVs) are DNA viruses that cause mild respiratory tract infections worldwide. Serotypes 7, 3, 14 and 21 are implicated in severe pneumonias. In the USA, serious acute respiratory disease has historically been associated with outbreaks of serotypes 7 and 21 amongst military recruits. However sporadic severe cases in the community have also been reported with serotypes 4, 7, and more recently, type 14. Treatment is usually supportive although Cidofovir has been used to treat adenovirus pneumonias in post-transplant populations.

CONCLUSION: Adenovirus as a cause of outbreaks of severe pneumonia in the community is exceedingly rare. We report 3 adults, 2 of whom were immunocompetent, who developed severe respiratory disease from adenovirus serotype 7.

GLIOMATOSIS CEREBRI: A CASE OF A RARE AND LETHAL BRAIN MALIGNANCY

Sumaiya Ansari, MD; Monoj Kumar Konda, MD; Jason Lam, DO

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics

BACKGROUND: Gliomatosis cerebri is a rare and fatal cerebral malignancy characterized by diffuse neoplastic glial infiltration with relative preservation of the brain parenchyma. We describe a case of gliomatosis cerebri that manifested with seemingly innocuous neurological symptoms.

CASE REPORT: A 54 year old female presented with a 3 month history of intermittent jerking of the right lower extremity. She had no other symptoms. Her past medical history was significant for rheumatoid arthritis treated with etanercept for the last fifteen years. The only pertinent finding on physical examination was periodic myoclonic jerking of the RLE. A thorough neurological assessment was otherwise normal. A blood count and routine biochemistry were unremarkable. An awake/asleep EEG was normal. The patient then underwent imaging of the brain and spine. MRI spine was non-contributory. MRI brain showed diffuse hyperintense T2 signal abnormality involving the white and gray matter of multiple lobes. There was mild mass effect, and the lesions did not enhance with gadolinium. The radiographic differential was broad and included gliomatosis cerebri, CNS lymphoma, HSV, and vasculitis. None of these were congruent with her benign clinical status. However, with her history of long-term immunosuppression with etanercept, infections and CNS lymphoma remained of concern. She was admitted for further workup and underwent a lumbar puncture. CSF analysis revealed a normal cell count, normal protein, and was negative for oligoclonal immunoglobulin bands. Infectious disease workup was also negative. The patient's minimal symptoms were inconsistent with the extensive abnormalities seen on MRI. With autoimmune and infectious processes ruled out, there was strong suspicion for gliomatosis cerebri. A stereotactic biopsy of the L frontal lobe was done and histopathology demonstrated a glioma.

DISCUSSION: Gliomatosis cerebri is a diffusely infiltrating glial neoplastic process involving multiple lobes of the brain with relative preservation of neuronal architecture. It is an exceedingly rare disease with less than 300 cases reported in literature. Chemotherapy with temozolamide is the mainstay of treatment. However, regardless of therapy, prognosis remains extremely poor with one case series placing overall median survival at 18 months.

CONCLUSION: Our case illustrates the nonspecific presentation of gliomatosis cerebri and highlights the diagnostic challenges faced in identifying the disease. It is recommended that unexplained neurological abnormalities with concomitant widespread hyperintense T2 signals on cranial MRI be investigated with a biopsy to look for gliomatosis cerebri.

CAMERON ULCER AS A CAUSE OF ACUTE SYMPTOMATIC ANEMIA

Sumaiya Ansari, MD; Monoj Kumar Konda, MD

WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

BACKGROUND: Cameron lesions are gastric ulcers or erosions that occur in the sac of a hiatal hernia. When Cameron lesions manifest clinically it is usually in the form of chronic gastrointestinal bleeding with iron deficiency anemia. They are only rarely a cause of severe symptomatic anemia. We report such a case of a 62 year old woman who developed an acute GI bleed from Cameron lesions.

CASE REPORT: A 62 year old female with a history of GERD, hiatal hernia, and CAD presented to the ED with weakness, palpitations, and dark stools. She was found to be hypotensive and tachycardic. Labs were significant for Hb of 8 gm/dl from a baseline of 12 gm/d a few weeks prior. After hemodynamic stabilization, the patient underwent EGD which revealed a hiatal hernia with a Cameron ulcer in the pouch. The patient was started on acid suppression therapy and sucralfate with gradual improvement in her symptoms.

DISCUSSION: Cameron lesions are gastric ulcers or erosions that exist in 5% of hiatal hernia sacs. They are usually an incidental finding when these patients undergo EGD. The prevalence increases with larger hernia sacs, with one study reporting a prevalence of around 13.7% in sacs larger than 5 cm. The pathogenesis of Cameron lesions is not well understood but acid injury and mechanical trauma from contractions of the diaphragm are thought to be likely mechanisms. While Cameron lesions are classically associated with chronic blood loss, the incidence of acute gastrointestinal bleeding in one retrospective analysis was found to be as high as 58%. Medical management with acid suppressants is the mainstay of treatment while surgery is reserved for refractory disease.

CONCLUSION: This case highlights the importance of recognizing Cameron lesions as a rare but important source of severe symptomatic anemia in patients with hiatal hernias.

ACUTE CEREBRAL INFARCT AND ENCEPHALITIS AS A COMPLICATION OF PANSINUSITIS

Susan Musyimi, MD

WMU Homer Stryker M.D. School of Medicine, Department of Emergency Medicine

BACKGROUND: Sinusitis is the inflammation of paranasal and sinus mucous membranes. Symptoms include nasal drainage, congestion, anosmia, cough, facial tenderness or headache. Involvement of all four sinuses; maxillary, sphenoid, frontal and ethmoid is called pansinusitis⁴. Infectious complications occur in approximately 15% of complicated sinusitis as a result of local spread of infection from the sinuses to the bone, central nervous system and surrounding tissue^{3,4}. Complications include septal and pre-septal cellulitis, meningitis, intracranial abscess, sub-periosteal abscess, osteomyelitis, cavernous sinus thrombosis and rarely cerebral infarction^{3,5,6}. This case illustrates a severe case of cerebral infarction from pansinusitis not previously described.

CASE PRESENTATION: A 54 year old male with history of hypertension, hypercholesterolemia and undiagnosed diabetes mellitus presented to our intensive care unit for treatment of left frontal parietal cerebral infarct which was a complication of pansinusitis. Initial vitals revealed a fever of 103.8F and tachypnea of 30 breaths per minute. Pertinent laboratory findings included WBC of 17,900. The patient had gaze preference to the left, visual reaction to confrontation was intact, equal and reactive pupils, and aphasia. He had right sided hemiplegia, clonus of the right lower extremity and bilateral lower extremity hyperreflexia.

MRI of the brain showed large acute ischemic infarction on the inferior anterior left frontal lobe with positive restricted diffusion extending to the anterior left temporal lobe, basal ganglia and left internal capsule without enhancement. There was complete opacification of the sinuses consistent with pan-sinusitis without abscess empyemas. CT angiography negative for inflammation or infection of the major cerebral vessels, nor stenosis or occlusion. There was no osteomyelitis to suggest direct spread through bone Venous sinuses were patent without thrombosis.

Antibiotics administered were vancomycin, cefepime, flagyl, and amphotericin B. Cerebral Spinal Fluid analysis (CSF) suggested bacterial meningitis. Subsequently, CSF and blood cultures grew streptococcus pneumoniae. Endoscopic surgery showed nasal polyposis and purulent drainage from frontal, sphenoid, bilateral maxillary and ethmoid sinuses.

The patient's condition deteriorated and family ultimately chose comfort care measures, and the patient subsequently passed.

CONCLUSION: Our patient had encephalitis with infarcted cerebrum from pansinusitis that presumably was from localized inflammation of cerebral vessels. This mechanism was also proposed by Schut et al when no angiographic evidence can be found for infarction⁶. Our case illustrates need for further research into cause of cerebral infarction from chronic sinusitis given the high morbidity and mortality.

ROLE OF OXIDATIVE STRESS IN GLUCOSAMINE-INDUCED INSULIN RESISTANCE IN RAT LIVER CELLS

Sylvie Coulibaly; Susan Stapleton, PhD

Western Michigan University, Department of Biological Sciences; Western Michigan University, Departments of Biological Sciences and Chemistry

There is a growing body of evidence that increased flux through the hexosamine biosynthesis pathway (HBP) is a cause of insulin resistance. HBP normally employs 2-5% of the glucose processed in cells to produce UDP-GlcNAc, the substrate for O-glycosylation, a process that adds sugar to proteins. Current studies indicate that abnormal O-glycosylation increases due to hyperglycemia, hyperlipidemia, and/or hyperinsulinemia and can disturb the normal control of cell signaling, gene expression, and other cellular functions. Glucosamine (GlcN), a widely used dietary supplement and treatment for joint pain, is an intermediate of the HBP and it is believed that GlcN may cause insulin resistance through induction of oxidative stress. Oxidative stress is due to failure of cellular antioxidants (i.e. glutathione, heme oxygenase (Hmox1)) to counteract excessive formation of reactive oxygen species (i.e. H₂O₂). Thus we investigated whether or not GlcN could cause insulin resistance in liver cells in culture and if so was this a result of increased oxidative stress.

Rat primary hepatocytes and the hepatoma cell line (H4IIE) were used to assess the induction of both oxidative stress and insulin resistance in the presence of GlcN. Cells were incubated in media containing 5mM glucose and 0-40mM GlcN for 18 hrs to induce insulin resistance. Antioxidants were added 1-2 hr prior to glucosamine addition. Control treatments included media alone as a baseline control for different treatments.

We show that glucosamine did indeed result in insulin resistance by demonstrating a reduction in the insulin induction of a key insulin regulated signaling molecule (IRS1), a metabolic gene (G6PDH) and an antioxidant protein Hmox1. Additionally we show that glucosamine induced oxidative stress as measured by changes in cell morphology as indicated by nuclear condensation visualized by microscopy. There was also a concentration dependent activation of caspase 3 an apoptotic (cell death) protein. This increase in caspase 3 activity preceded the morphological changes indicating cellular apoptotic activity occurs first. Pretreatment of cells with the antioxidants completely prevented the morphological changes induced by glucosamine.

To mimic the GlcN induced oxidative stress, we tested H₂O₂ and showed it to inhibit the activation of IRS1 by insulin similarly to GlcN.

IMMUNE RESPONSE FOLLOWING INJURY IN THE ADULT ZEBRAFISH BRAIN

Susanna Var; Darcy Trimpe; Christine A. Byrd-Jacobs, PhD

Western Michigan University, Department of Biological Sciences

INTRODUCTION: The inherent plasticity and regenerative capacity of the zebrafish serve as a useful model for examining cellular interactions involved in the immune response following injury. Microglia are the resident immune cells of the central nervous system. Zebrafish microglia have dynamic processes and are able to respond to injury or infection by migrating to the site and phagocytizing pathogens and neuronal debris.

OBJECTIVE: Our previous work investigated immune response following direct injury to the olfactory bulb. We observed microglia collecting around the wound 4h following direct injury and found significant temporal changes in the intensity of microglia labeling until return to near-control levels at 48h post-injury. These findings suggest that direct injury to the olfactory bulb results in an acute immune response by resident microglia in the wounded bulb, and further proliferation may be due to migration of microglia from other regions of the brain or peripheral leukocytes entering through the olfactory nerves. In this study, we investigated the microglial response following removal of the olfactory and optic nerves in the isolated brain after complete deafferentation.

MATERIALS & METHODS: Adult zebrafish were obtained from local commercial sources. Complete and permanent removal of afferent input was performed by isolating the brain from the zebrafish. The isolated brain was placed in culture dish and submerged in oxygenated artificial fish cerebrospinal fluid and incubated for 4h. Immunohistochemistry was performed following standard protocols. Mouse monoclonal antibody 4C4 was used to label microglia. Sections were processed for diaminobenzidine labeling and visualized with brightfield microscopy.

RESULTS: We observed no significant changes in microglia levels in deafferentated isolated brains kept alive in culture for 4h compared to control brains. This finding may suggest that cells involved in the immune response may come from the periphery rather than originating from the local site of injury at 4h following deafferentation. Our next step is to compare these results of complete deafferentation with different forms of peripheral deafferentation, such as direct injury or cautery ablation and chemical lesioning of the olfactory organ, at different time points in the isolated brain.

CONCLUSION: Complete deafferentation of the brain by the removal of probable peripheral leukocyte migration pathways suggest that immune cells may be migrating from outside the brain to the site of injury at 4h. Further work is required to explore the temporal changes in the immune response within the brain following different forms of injury performed on the isolated brain.

5-YEAR EXPERIENCE WITH PRE-HOSPITAL ANTIARRHYTHMIC MEDICATION IN PEDIATRICS IN A STATEWIDE EMS SYSTEM

Emily Kraft, MD; William Fales, MD

WMU Homer Stryker M.D. School of Medicine, Department of Emergency Medicine; WMU Homer Stryker M.D. School of Medicine, Division of EMS and Disaster Medicine

PURPOSE: Antiarrhythmic medications are frequently included in EMS pediatric protocols despite little evidence supporting their safety/efficacy in this setting. The purpose of this study is to analyze the 5-year statewide experience with antiarrhythmic medications in pediatrics.

MATERIALS & METHODS: This was a retrospective analysis of a statewide EMS information system (EMSIS) conducted from 1/1/2010 to 12/31/2014. The study population was children <13 years old who received prehospital adenosine, amiodarone, or lidocaine, the three antiarrhythmic medications permitted in state EMS protocols, for presumed tachycardic arrhythmia. Cases were excluded for interfacility transfer, cardiac arrest upon EMS arrival, use of medication for other than arrhythmia, or age/medication documentation errors. Records were obtained from the EMSIS using filters for patient age <13 years old and administration of the three medications. Standard statistical analysis was performed.

RESULTS: During the study period there were 6,683,098 records within the EMSIS, 221,894 (3.3%) were <13 years old. Medications were administered to 13,434 patients within this age group (6.1%). The three study medications were administered to 78 patients. However, 71 of these cases were excluded leaving only 7 cases for analysis. Reasons for exclusion included interfacility air transport(43), interfacility ground transport(7), presentation in cardiac arrest(5), lidocaine for intraosseous anesthesia(7), age documentation error(4), medication documentation error(3), duplicate patient from a second ALS agency(1), and no narrative for review(1). Among the 7 remaining cases for analysis, a single dose of lidocaine was used unsuccessfully for a 10 year old with reported stable ventricular tachycardia (versus LBB). Adenosine was administered to 6 patients for reported stable paroxysmal supraventricular tachycardia, with 3 patients converting to sinus rhythm after receiving a single dose. The 3 patients who did not convert received 3 escalating doses of adenosine consistent with weight-based protocols. Amiodarone was not administered. The median age (range) of patients receiving antiarrhythmic medications was 9 years (26 days-12 years). There were no apparent adverse effects reported from the medications.

CONCLUSION: Antiarrhythmic medications are very rarely given in the pre-hospital setting to children under 13 years of age. In this statewide EMS system we identified only 7 patients to receive these medications over 5 years.

A RETROSPECTIVE COMPARISON OF THE KING LARYNGEAL TUBE AND I-GEL AIRWAYS IN OUT-OF-HOSPITAL CARDIAC ARREST - INITIAL EXPERIENCE IN A SINGLE EMS SYSTEM

Tyler Vaughn, MD; William Fales, MD; Kevin Patel, DO; Colleen MacCallum

WMU Homer Stryker M.D. School of Medicine, Department of Emergency Medicine; WMU Homer Stryker M.D. School of Medicine, Division of EMS and Disaster Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Emergency Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Epidemiology and Biostatistics

BACKGROUND: Supraglottic airways have been used for primary airway management in out-of-hospital cardiac arrest (OHCA), offering potential advantages of high success rates and the ability for insertion without chest compression interruption. Few studies have compared effectiveness of supraglottic airways in OHCA.

OBJECTIVE: Compare the King-LTS-D and I-gel airways in OHCA.

MATERIALS & METHODS: This is a retrospective analysis of data obtained from a countywide EMS system (population ~250,000) comparing the King-LTS-D and I-gel airways, used first-line in OHCA. This system changed from the King-LTS-D to the I-gel on 10/1/2015. Data for the I-gel were analyzed for a 4-month period beginning 10/1/2015 and compared to the King-LTS-D for a similar 4-month period beginning 10/1/2014. Data were obtained through the Michigan EMS Information System allowing for individual records to be manually reviewed. Cases were included when either device was used as the primary airway for OHCA. Non-OHCA cases were excluded. The primary outcome was first-pass success rate. Secondary outcomes were final success, return of spontaneous circulation (ROSC), and neurologically favorable discharge (cerebral performance categories 1 or 2) rates. Waveform capnography (ETCO₂) was typically used to confirm success. A non-inferiority chi-square analysis was performed with a significance of 0.05.

RESULTS: There were 60 King-LTS-D and 77 I-gel uses identified during the respective study periods. Three King-LTS-D and 2 I-gel cases were non-OHCA and were excluded. Final cases analyzed included 57 King-LTS-D and 75 I-gel uses. The King-LTS-D and I-gel patients were similar in age (64.6 vs. 61.2 years, $p=0.397$) and gender (59.6% vs. 62.2% male, $p=0.770$). The first pass success rate was 79.0% for the King-LTS-D vs. 92% for the I-gel ($p=0.018$). First pass success was confirmed by ETCO₂ was comparable between both groups (95.6% vs. 92.0%, $p=0.477$). The initial success rate with the I-gel is estimated to be 13.0% (95% CI: 0.8, 25.3) higher than the initial success rate with the King LTS-D. There was no difference between the King-LTS-D and the I-gel in terms of the final success rate (79% vs. 92.0%, $p=0.087$), ROSC (38.6% vs. 37.3%, $p=0.441$), and neurologically favorable hospital discharge rate (7.0% vs. 12.0%, $p=0.838$).

CONCLUSION: In OHCA, the I-gel airway was found to be non-inferior to the King-LTS-D airway for first pass success. However, the study was insufficiently powered to determine non-inferiority in final success, ROSC, or survival rates. Initial results support continued study of the I-gel airway.

EVALUATING THE COST AND UTILITY OF MANDATING SCHOOLS TO STOCK EPINEPHRINE AUTO-INJECTORS

Chelsea Steffens; William Fales, MD; Benjamin Clement; Robert Swor, DO

Chicago Medical School, Medical Student; WMU Homer Stryker M.D. School of Medicine, Division of EMS and Disaster Medicine; Oakland University William Beaumont School of Medicine, Medical Student; Oakland University William Beaumont School of Medicine, Department of Emergency Medicine

BACKGROUND: The Michigan Legislature mandated that all public schools stock epinephrine auto-injectors (EAI) and train staff in their use. There is little evidence regarding the incremental value of EAI in schools, especially in regions with developed EMS systems.

OBJECTIVE: Our primary objective was to describe the frequency of administration of epinephrine for EMS patients with acute allergic reactions in public schools. Our secondary objective was to estimate the cost of mandating public schools to stock EAI.

MATERIALS & METHODS: We performed a retrospective cohort study of EMS cases with an impression of allergic reaction and who received epinephrine recorded in the 2014 Michigan EMS Information System (MI-EMSIS) data set. We excluded responses with incomplete location information. We abstracted records for patient demographics, incident location, source of epinephrine given, and suspected allergen if known. We evaluated the temporal impact of school EAI in locations with a predominant advanced life support (ALS) response to emergencies (defined as 90% of calls receive an ALS response). We estimated the unsubsidized annual cost of this mandate for Michigan public schools (N = 4,039), with costs for the required EAI 2-pack as estimated by the legislature (\$140) and commercial sources (\$450). Training costs were not included. Descriptive statistics are reported.

RESULTS: During the study period there were 5,994 EMS cases with impression of allergic reaction with 487 receiving epinephrine, with 18 public school cases, 15 (83.3%) children, and 3 (16.7%) adults. Reported allergens were most often food 8 (44.4%), insect stings 4 (22.2%), or unknown 4 (22.2%). Among these patients, 7 (38.9%) administered their own EAI, 6 (33.3%) received epinephrine from EMS supply, 2 (11.1%) received epinephrine from school supply, with 3 (16.7%) whose epinephrine source was unknown. A majority (16, 88.9%) of the public school cases occurred in communities with ALS systems. ALS median (90%ile) response times in these communities was relatively rapid 6 (13) minutes. The estimated unsubsidized annual cost of Michigan public schools to stock EAI ranges from \$565,460 to \$1,817,550.

CONCLUSION: In this study, few public school patients received epinephrine and the vast majority occurred in communities with rapid ALS response. The direct annual supply cost of the school EAI mandate is substantial.

EVALUATING THE UTILITY OF THE STATUTORY REQUIREMENT OF BASIC LIFE SUPPORT EPINEPHRINE AUTO-INJECTORS

Benjamin Clement; William Fales, MD; Robert Swor, DO; Jason Wasserman, PhD; Jakob Taube, RN

Oakland University William Beaumont School of Medicine, Medical Student; WMU Homer Stryker M.D. School of Medicine, Division of EMS and Disaster Medicine; Oakland University William Beaumont School of Medicine, Department of Emergency Medicine; Oakland University William Beaumont School of Medicine, Department of Biomedical Sciences; Beaumont Health System, EMS Department

BACKGROUND: Legislation in Michigan requires all EMS-basic life support (BLS) vehicles to carry epinephrine auto-injectors (EAI) in adult and pediatric doses. While widely prescribed for patients with known anaphylaxis, the costs and utility of mandating BLS-EAI throughout a State is unknown.

OBJECTIVE: Our objective was to examine the temporal benefit of BLS-EAI use in Michigan and cost of equipping these vehicles.

MATERIALS & METHODS: Using the Michigan EMS Information System (MI-EMSIS), we performed a retrospective review of all cases with primary or secondary impression of allergic reaction and who received any epinephrine during 2014. Data and case narratives were analyzed collecting demographic data, BLS and ALS response time, epinephrine delivery (drawn or auto-injector), who administered EAI (patient/bystander, BLS or paramedic), and source (patient, BLS, ALS). To assess the temporal benefit of BLS-EAI in different demographic regions, we abstracted location, including urbanicity (Southeast Michigan, includes half the State's population, [SE Michigan]), all Michigan metropolitan/micropolitan statistical areas (2000 census; [Metro]), and non-metro-micropolitan (Rural). To estimate the EMS system cost of equipping BLS ambulances with EAI, we performed a sensitivity analysis varying percentage of licensed vehicles stocked (50%–100%) and cost of EAI two-pack (\$300–\$450). Descriptive statistics are presented.

RESULTS: During 2014, there were 1,550,009 EMS responses reported. Allergic reaction was the primary impression in 5,994; 494 received epinephrine. The mean age was 42.8 years (range 1-97) with 50.3% male. EAI were administered 180 times by: patients/bystanders (n = 102); BLS (n = 45), ALS (n = 33). BLS- EAI before use varied by region type: Rural (n = 11); SE Michigan (n = 14); Metro (n = 34). Time to BLS and ALS arrival on scene varied by system (Median, 90%ile, in min): Rural BLS (11,21), ALS (8, 17); SE Michigan BLS (4,9), ALS (6, 11); Metro BLS (6,11), ALS (6, 13). The cost to equip Rural systems with EAI ranged from \$22,950-\$68,850. This was less than the SE Michigan and Metro systems, which were \$79,500-\$238,500 and \$151,350-\$454,050, respectively.

CONCLUSION: Required stocking of BLS units with EAI may have utility in rural portions of Michigan. For metropolitan areas it is costly and has limited value in decreasing time to epinephrine administration.

PROGRESSIVE MACROCEPHALY LEADING TO EMESIS AND SEIZURES AS A PRESENTATION OF CAVERNOUS HEMANGIOMA IN A NINE MONTH OLD INFANT

Theotonius J. Gomes, DO; Ryan F. Halas, DO; Bryan Corpus, MD

WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Medicine-Pediatrics; Bronson Pediatric Hospitalist Service and Bronson Pediatric Referral Service

OBJECTIVE 1: Recognize cavernous hemangioma as a rare brain mass in infants which can cause hydrocephalus.

OBJECTIVE 2: Recognize macrocephaly with hydrocephalus can be overlooked in certain clinical settings

CASE: A nine month male presents in status epilepticus with recurrent rhythmic body and leg posturing preceded by three days of depressed activity and irritability. He had bouts of emesis a few weeks prior that was mistaken for viral gastritis on two separate occasions in the emergency department. There was a family history of seizures and intracranial hemorrhage during infancy in the patient's mother. On physical exam the patient appeared lethargic with intermittent high pitched cries, stiff neck and decerebrate posturing. Head circumference was 53cm (>99th%) with a tense bulging fontanelle. There was poor attention and tracking with presence of sunsetting. Initial labs (CBC, CMP, Procalcitonin, Urinalysis) were normal except for platelets of 719 and glucose of 167. A CT head and MRI revealed hydrocephalus with layered blood products and a calcified collection 35 x 49 x 61mm suspicious for possible TORCH infection. He was started on Keppra and underwent placement of an intraventricular drain followed by resection of the mass. A lumbar puncture prior to resection was negative for infection. Pathology revealed the final diagnosis of a multi-luminal vascular malformation with organizing blood clot, calcification and hemosiderin deposits most consistent with cavernous hemangioma.

DISCUSSION: Cavernous hemangiomas are vascular lesions made of groups of dilated blood vessels that can be found in the brain, spinal cord, skin and retina. The incidence is 1 in 500 people. Cavernous hemangiomas can be seen in children, however individuals do not present with symptoms until the third or fourth decade of life. Incidence can increase later in life due to formation of caverns. Thirty percent of patients become symptomatic. Cavernous hemangiomas fall under angiographically occult vascular malformations distinct from arteriovenous malformations with several subtypes: Familial, Sporadic, and Associated Venous. Twenty percent are familial and a child may have a 50% chance of inheriting a causative gene from their parent. Symptoms are highly variable ranging from asymptomatic to seizures and hemorrhage. The infant in the case developed hydrocephalus leading to macrocephaly that was missed in the emergency department. Cavernous hemangiomas are often diagnosed when symptomatic. MRI is the most sensitive imaging modality and has a raspberry like appearance. Genetic testing may be an option for diagnosis. Treatment includes medications, for seizures and headache, or resection.

RAPID GRAM NEGATIVE PATHOGEN IDENTIFICATION USING PCR DIAGNOSTICS AT BRONSON HOSPITAL

Thomas Beuschel

Ferris State University College of Pharmacy, Pharmacy Student

Bronson Methodist Hospital (BMH) has recently employed the use of the PCR FilmArray® system and begun using the Blood Culture Identification Panel for rapid diagnostic testing of bloodstream infections. This PCR method returns results in about an hour and tests for 27 different DNA targets, including 11 different Gram negative pathogens and 3 antibiotic resistance genes. The objective of this study is to discern whether the introduction of this PCR assay has an impact on the clinical resolution and length of stay for Gram negative bacteremia patients at BMH.

A list of patients having had a blood culture or FilmArray panel run will be generated and used to select patients sequentially as they meet inclusion criteria. Patients will be included if they demonstrate a positive blood culture showing a Gram negative organism and are over 18 years of age. Patients that have poly-microbial infection or presence of concurrent infection outside the blood will be excluded. Data collected will include patients' white blood cell count, temperature, and procalcitonin. Patient antibiotic regimens will also be collected to determine appropriateness. All data will be recorded and maintained confidentially. Descriptive statistics will be used to evaluate data. Comparisons will include average time to clinical resolution, time to appropriate antibiotics, and hospital length of stay between infections identified with the FilmArray panel and traditional plate culturing.

FEASIBILITY OF AN EARLY DISCHARGE PROTOCOL IN PATIENTS WITH NEW VENOUS THROMBOEMBOLISM IN AN EMERGENCY DEPARTMENT

Julie Schmidt, PharmD; Thomas Blostica, PharmD; James Curtis, PharmD

Bronson Methodist Hospital, Pharmacy Services

BACKGROUND: Each year, as many as 900,000 patients are diagnosed with venous thromboembolism (VTE). Many of these patients are admitted for an inpatient stay while they could have been safely discharged home depending on other concomitant factors. Early discharge of these patients from the emergency department (ED) would allow for prevention of an inpatient hospital stay, avoidance of potential nosocomial infections, and reduced costs.

PURPOSE: The purpose of this study is to retrospectively determine the potential reduction in the number of inpatient stay days associated with admissions due to new VTE using a validated assessment tool in the ED of Bronson Methodist Hospital (BMH).

MATERIALS & METHODS: This study is a retrospective chart review analyzing up to 400 patients who were admitted through the ED at BMH between October 2013 and October 2015 with a diagnosis of a new deep vein thrombosis (DVT) or pulmonary embolism (PE). Patients eligible for early discharge included adult patients 18 years of age or greater, presentation to the ED with a confirmed DVT and/or PE, and deemed to be at low risk of clinical deterioration based upon previously established criteria. The primary outcome is to assess the number of inpatient days associated with a new diagnosis of VTE which could have been avoided. Secondary outcomes include hospital length of stay, type of intravenous and oral anticoagulation initiated, adverse effects from anticoagulation, total patient costs which could have been avoided based on aggregate numbers, and VTE readmission rate.

RESULTS AND CONCLUSION: Data collection and analysis are currently in progress. Results and conclusions will be presented at the 34th Annual Kalamazoo Community Medical and Health Sciences Research Day.

A NOVEL TECHNIQUE: RETROGRADE FIXATION FEMORAL NECK FOR COMBINED FEMORAL HEAD AND NECK FRACTURES UTILIZING SURGICAL HIP DISLOCATION

Tyler Snoap MD; Jeffrey Freyder, MD; Jason Roberts, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery, WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Bronson Orthopedic Trauma, Foot & Ankle Specialists

Posterior hip dislocation with associated femoral head and neck fracture is a rare and potentially devastating injury. There is an inherent risk of avascular necrosis given the disruption of the soft tissues, most notably the circumflex vessels to the femoral head. The approach and fixation strategy can be challenging with little guidance in the literature given the rarity of this injury combination. The authors, utilizing the modified Gibson approach with trochanteric flip osteotomy, describe a novel technique to reduce and stabilize a femoral head and neck fracture with associated hip dislocation.

INCIDENCE AND EPIDEMIOLOGY OF POSTERIOR CRUCIATE LIGAMENT INJURIES IN NATIONAL COLLEGIATE ATHLETIC ASSOCIATION FOOTBALL PLAYERS

Jeffrey Freyder, MD; Andrew G. Geeslin, MD; Christopher W. Uggen, MD; Colleen MacCallum, PhD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Borgess Orthopedics, Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Biostatistics & Epidemiology

BACKGROUND: Anterior cruciate ligament injuries (ACL) are well characterized in the medical literature, however there is a paucity of published epidemiology data regarding posterior cruciate ligament (PCL) injury, particularly in high level American football athletes.

PURPOSE: To characterize the incidence of isolated PCL and combined PCL and concomitant knee injuries in NCAA football players using data from the NCAA injury surveillance system (2004-2009).

STUDY DESIGN: Descriptive epidemiology study

MATERIALS & METHODS: The National Collegiate Athletic Association Injury Surveillance System men's football PCL injury database from seasons 2004-2009 was analyzed. The PCL injury rate was determined using practice and competition exposures. Confidence rates were determined. Risk factors including playing surface type, time of season and player position were analyzed.

RESULTS: The overall PCL injury rate was 4.1 per 100,000 athlete exposures. Contact with another player had the greatest incidence of PCL injuries (2.4 per 100,000 athletes). The odds of a PCL injury during competition was 8.992 (5.370, 15.058) times greater than the odds of a PCL injury during practice (p,0.0001). The number of complete PCL injuries was 35, whereas the number of partial PCL injuries was 55. The greatest risk of PCL injury was observed during in season events (2.8 per 100,000 athletes). The percentage of PCL injuries that resulted in no surgery versus surgery were 16.3 and 83.7% respectively. PCL injuries were most commonly sustained while the athlete was participating on artificial fill playing surface (1.9 per 100,000 athlete exposures.). The recorded position with the most PCL injuries was running back followed by special teams and linebacker.

CONCLUSION: The incidence of PCL injury in collegiate football players was less than previously observed ACL injury. Contact injury with another player or the ground was responsible for approximately 82.5% of all PCL injuries. The majority of PCL injuries were partial injuries and did not result in operative treatment. The most frequently PCL injured positions were running back, special teams, linebacker and interior defensive lineman.

OPEN HIP DISLOCATION THROUGH THE SCROTUM: A CASE REPORT

Tyler Snoop, MD; Jason Habeck, MD; Jason Roberts, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Bronson Orthopedic Trauma, Foot & Ankle Specialists

INTRODUCTION: Anterior hip dislocations are exceedingly rare injuries, they account for only 10% of all hip dislocations. They can be further classified as obturator, iliac, pubic, or perineal. There are only been 12 reported cases of perineal hip dislocations, all of which have been associated with fractures. We present the only known case report of an anterior, perineal hip dislocation through the scrotum without evidence of bony injury.

CASE REPORT: A thirty-six-year-old bicyclist sustained an open, anterior hip dislocation through the scrotum after being struck by two motor vehicles. There was no bony injury present. The hip was irreducible by closed means and required open reduction via a Smith-Peterson approach. Post-operatively, he has not developed avascular necrosis of the femoral head and retained his hip function.

DISCUSSION: Perineal hip dislocations are rare events. All previous reported cases have involved bony injury to either the femur or acetabulum. A recent publication in the New England Journal of Medicine (NEJM) reported on a hip dislocation into the scrotum. There are some similarities to our case presented, however, the patient in the NEJM case report had associated trochanteric, acetabular, and pelvic ring injuries. The patient presented in our case report had a complex injury, having been hit by two cars sequentially. This likely resulted in novel force vectors that allowed for dislocation without associated bony injury.

CONCLUSION: Open anterior hip dislocation through the scrotum without a fracture is reported here for the first time in the literature. Closed reduction in this circumstance can be attempted but open surgical intervention is often required. A Smith-Peterson approach allows visualization for reduction and does not violate the vascularity to the femoral head.

BONE GRAFTING AROUND AN ANTIBIOTIC NAIL: A SMALL CASE SERIES

Jessica Marston, MD; Tyler Snoap, MD; Jason Roberts, MD

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Bronson Orthopedic Trauma, Foot & Ankle Specialists

The clinical course of two patients with infection and diaphyseal fractures is presented. The index procedure involved debridement and antibiotic nail insertion. The second stage involved bone grafting with retention of the antibiotic nail. At final follow-up, the patients were infection free with fracture union.

In the face of infection, treating an intramedullary, diaphyseal fracture poses a unique challenge to the orthopaedic surgeon. There is a delicate balance that must take place between providing fracture stability, while eradicating infection. In certain patient populations, one may choose to address one issue at a time. Retaining the hardware and suppressing the infection until union is one option. Removal of orthopaedic hardware after achieving union then takes place at a later stage procedure. Alternatively, orthopaedic hardware is often removed at the index procedure when the infection is fulminant or causing a sepsis type scenario. In either case, the hardware is eventually removed as pathogens can form glycocalyxes and biofilms making systemic antibiotic delivery less effective. For this reason, local antibiotic delivery via eluting antibiotic cement has gained popularity. This can take the form of antibiotic beads, cement spacers, or cement rods. The method of antibiotic cement rod insertion described by Paley and Herzenberg addresses stability and antibiotic administration. In their series, patients that did not heal at the time of antibiotic rod removal underwent exchange nailing with metal locking nails.

We describe a different methodology used in two patients to address an infected, fractured long bone. The index procedure involved debridement with metallic antibiotic nail placement. Following the resolution of infection, the fracture site was bone grafted adjacent to the retained metallic antibiotic nail and exchange nailing was not performed.

CONCLUSION: Following clearance of an intramedullary infection via debridement and antibiotic nail placement, bone grafting with retention of the antibiotic nail can be a viable option for treating bony defects and augmenting fracture biology.

BILATERAL FROSTBITE OF THE HANDS

Tyler Snoap, MD; Eric Gallagher, MD; Adam Snoap, Todd Ruiter, DO

WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; WMU Homer Stryker M.D. School of Medicine, Department of Orthopaedic Surgery; Indiana University School of Medicine, Medical Student; Borgess Medical Center, Hand Surgery

INTRODUCTION: Frostbite injuries historically were seen most commonly in military personnel during times of war. In more recent years, these injuries have been seen more frequently in the general population. Frostbite is seen more in men than women at a ratio of 10:1. The most commonly affected age group is 30-50 years of age. There have been several risk factors noted for frostbite including housing status, occupation, and recreational hobbies. Perhaps the most important predisposing factor is the use of alcohol, which a study by Valnicek found to be associated with nearly 50% of inpatient hospitalizations for the diagnosis of frostbite.

CASE REPORT: A 55-year-old gentleman from Southwest Michigan presented with frostbite injury to bilateral hands after losing consciousness outside during the winter season. There were signs of necrosis to all digits. After thorough debridement, all digits were salvaged with the exception of his right small finger, which was amputated at the MCP joint. He has retained excellent range of motion of all salvageable digits.

DISCUSSION: In general, a patient's prognosis for frostbite cannot be given before the tissues are allowed to thaw. In the early stages of injury it is difficult to assess tissue viability and often, surgical decision-making must be delayed until clear demarcation of the injury zone is established. Emergent surgical treatment of frostbite is rarely necessary unless there is concern for infection or compartment syndrome. The first step in treatment is rewarming the damaged hand and correcting any associated hypothermia or hypovolemia. This process generally takes 15 to 30 minutes and is performed in water at 100.4 to 104 degree Fahrenheit. The following steps are debated in the literature. Surgical debridement is certainly an option, however there is growing interest in the use of tissue plasminogen activator (TPA). Some studies have suggested that the use of TPA leads to lower amputation rates.

CONCLUSION: Frostbite in the area of Southwest Michigan is rare but there are still instances of this occurring. Prompt and diligent treatment of the injury can lead to salvage of the fingers and maintenance of function.

MADI: MEDICATION AND ALLERGY DISCREPANCY IMPROVES

Tracey Mersfelder, PharmD; Kevin J. Kavanaugh, MD; Carleigh Zahn; John S. Fleming, DO;
Richard D. Card II, DO; T. Kurtis Schubert, DO; Ryan F. Halas, DO; Abhishek Seth, MD

Ferris State University, College of Pharmacy; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Michigan State University, Medical Student Class of 2016; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine; Borgess Inpatient Services; WMU Homer Stryker M.D. School of Medicine, Department of Medicine/Pediatrics; WMU Homer Stryker M.D. School of Medicine, Department of Internal Medicine

INTRODUCTION: There has been a recent focus on medication reconciliations that was stimulated by a Joint Commission national patient safety goal. Accuracy rates have been noted to be low and are believed to be linked to increased medication errors.

RATIONALE/OBJECTIVE: To determine the rates of agreement between outpatient clinic medication records and outpatient pharmacy records with regards to medications and allergies/intolerances before and after an intervention.

MATERIALS & METHODS: Patient names were obtained by comparing the medication fill records at a local pharmacy with academic medicine and medicine/pediatric outpatient clinic physician names. Medication and allergy lists were collected from the respected sites and evaluated for agreement. The intervention consisted of a letter from the pharmacy to the physicians containing recent medication fill history and allergies. There was a return form for any pharmacy related updates. The medication and allergy lists were again obtained three months later. The study was approved by the investigational review board and considered exempt.

RESULTS: One hundred forty patients were initially screened. One hundred and twelve patients were included for analysis. There was a 49% rate of agreement between the pharmacy and clinic with regards to medications. This improved to 58% after the intervention. The rate of medication error at baseline was 1.18 ($p=0.0018$) times higher at baseline than at follow-up. Allergy/intolerant accuracy was lower at a 25% rate of agreement between the pharmacy and clinic. This improved to 38% after the intervention. The rate of allergy error at baseline was 1.17 ($p=0.0063$) times higher compared to follow-up.

DISCUSSION: Discrepancies between pharmacy records and medication histories upon hospital admission have been seen to be as high as 67-85%. Our study reported a 51% discrepancy rate which improved to 42% after the intervention. None of these published studies evaluated the discrepancy rate of medication allergies/intolerances.

CONCLUSION: The medication records at the outpatient clinic involved in this study had a low rate of accuracy compared to the pharmacy records; where the pharmacy records had a low rate of accuracy compared to the outpatient clinic records. The intervention did show some improvement in accuracy.

ANALYSIS OF PATHOGENS RESPONSIBLE FOR HEALTH CARE ASSOCIATED OR COMMUNITY ACQUIRED PNEUMONIA IN THE INTENSIVE CARE UNIT (ICU)

Tara Longman; Dean Van Loo, PharmD

Ferris State University College of Pharmacy, Pharmacy Student; Bronson Methodist Hospital, Pharmacy Services

BACKGROUND: Globally, the ability of the HCAP criteria to predict presence of multidrug-resistant organisms has been inconsistent, due to its composition of diverse risk factors. Locally, it is vital to observe microbiological patterns to guide empiric antibiotic selection.

PURPOSE: This study aims to provide healthcare professionals with pertinent microbiological information regarding pathogen frequency in association with each risk factor of health care associated pneumonia (HCAP) to aid in the future empiric treatment. By assessing pathogens associated with each HCAP risk factor, this study hopes to determine which factors are more indicative markers for predicting multi-drug resistant (MDR) pathogens.

MATERIALS & METHODS: This study will be a retrospective chart review of patients with culture-positive health care associated pneumonia in the ICU at Bronson Methodist Hospital. Patients will be identified from a list generated in the microbiology laboratory of positive bronchoalveolar lavage cultures from January 1st 2013 to January 1st 2015. Chart reviews will be performed to select patients meeting inclusion criteria. A maximum of 100 patients in each arm will be included in data collection, starting with the most recent admissions. For inclusion in the study, patients must be 18 years or older, treated in the ICU, have a diagnosis of pneumonia in their chart, have a positive respiratory culture obtained by bronchoalveolar lavage within 48 hours of admission, and quantitative culture indicating greater than or equal to 10,000 CFU/ml. Patients will be excluded if transferred from another hospital. Data collected will include: age, sex, inclusion criteria listed, specific HCAP risk factor or absence of HCAP risk factors, microorganism identified, sensitivities, and antibiotics used. Descriptive statistics will be used to analyze the primary outcome of pathogen frequency differences between health care associated pneumonia and community acquired pneumonia, as well as the secondary outcome of pathogen frequencies for each HCAP risk factor.

RESULTS: This research is still in the data collection phase but will be completed by April 2016.

CONCLUSION: Pending results.

EVALUATION OF A HEPARIN INFUSION DOSING PROTOCOL DURING THERAPEUTIC HYPOTHERMIA

Bradley Haan; Tara Holt, PharmD

Ferris State University College of Pharmacy, Pharmacy Student; Bronson Methodist Hospital, Pharmacy Services

BACKGROUND: Following cardiac arrest, patients who have achieved return of spontaneous circulation yet still remain comatose often undergo therapeutic hypothermia. During this hypothermic state, enzymatic reactions and coagulopathy processes are affected. Recent evidence has shown that as a result of these affected processes, unfractionated heparin infusions dosed per traditional protocols have resulted in supratherapeutic activated partial thromboplastin times.

PURPOSE: The purpose of this study is to evaluate the traditional protocols in place for dosing heparin and potentially create a dosing protocol specifically for patients undergoing therapeutic hypothermia in order to achieve goal activated partial thromboplastin times without producing supratherapeutic levels.

MATERIALS & METHODS: This study will be a retrospective, chart review evaluating patients who have undergone therapeutic hypothermia and also receiving continuous infusion unfractionated heparin. In order to appropriately assess doses and have patients act as their own control, this study will record doses and associated activated partial thromboplastin times while the patient is undergoing induced hypothermia at temperatures less than or equal to 34 degrees Celsius and also when they have been re-warmed to greater than or equal to 35 degrees Celsius. These patients must be over the age of 18, have undergone therapeutic hypothermia and heparin infusions for at least six hours, and have had at least one activated partial thromboplastin time drawn. Using a linear model we will be able to predict what an appropriate dose would be for certain patients. Along with efficacy measures, this study will assess safety by identifying the incidence and severity of bleeding as documented by physician progress notes.

RESULTS AND CONCLUSION: Data collection still in progress therefore the conclusion has yet to be reached.

ADJUNCTIVE VALPROIC ACID FOR THE TREATMENT OF ICU DELIRIUM

Joseph Johnson, PharmD; Tara Holt, PharmD; James Curtis, PharmD; Tyler Monroe, PharmD

Bronson Methodist Hospital, Pharmacy Services

BACKGROUND: Acute, intensive care unit (ICU) delirium in critically ill patients continues to be a challenge for healthcare professionals. Suboptimal clinical response and unwanted side effects from current standards of therapy obviate the need for improved management of ICU delirium. The addition of valproic acid (VPA) may enhance symptom improvement and reduce patient requirement of concomitant antidelirium medications.

OBJECTIVE: The primary objective of this study is to further evaluate the efficacy and tolerability of VPA for the treatment of delirium in the ICU at Bronson Methodist Hospital, while also establishing a safe and effective dosing strategy for the titration and tapering of VPA in two differing patient populations: those in the medical intensive care unit (MICU) and the trauma care unit (TCU).

MATERIALS & METHODS: This is a retrospective chart review analyzing data collected from the electronic medical record of patients prescribed VPA in MICU or TCU between September 1st, 2015 and February 29th, 2016. Patients were included if they were at least 18 years of age and received VPA for the indication of ICU delirium for at least 48 hours. Patients were excluded if they received VPA for an indication other than delirium or if VPA was determined to be a home medication. Primary outcome measures include changes in patient requirement for concomitant sedative, opiate, and antipsychotic medications; the incidences of clinician-defined treatment success and failure in patients following the recommended VPA dosing schedule; CAM-ICU scores; and RASS scores after initiation of VPA. Secondary outcomes include mean time to extubation, number of ventilator days, and ICU length of stay prior to and after initiation of VPA.

RESULTS AND CONCLUSION: Data collection and analysis are currently in progress. Results and conclusions will be completed and presented at the Kalamazoo Community Medical and Health Sciences Research Day.

INDEX

- Aaron Labomascus, 9, 35
Aaron Lane-Davies, 63, 68, 69, 105, 200, 214
Abbie Brackman, 63, 112, 122
Abby Childs, 62, 90
Abhishek Seth, 61, 71, 73, 242
Achilles Malta, 67, 183
Alan J. Hifko, 8, 30, 62, 89
Alec Wilson, 61, 73
Alex Merlo, 7, 14
Alexander J Connaughton, 61
Alexander Witte, 68, 197
Alissa Welsh, 7, 20
Allan Wilke, 3, 11, 56, 61, 69, 75, 207
Alyssa Woodwyk, 8, 30, 62, 67, 90, 91, 181
Amanda Hult, 66, 159
Amanda Springer, 61, 76
Amy Attaway, 8, 31
Amy Curtis, 8, 9, 11, 29, 39, 40, 54, 61, 72
Amy Damashek, 9, 42
Amy O. Chonghasawat, 61
Ana Villalobos, 61, 83
Andrea Landesman, 67, 176
Andrea Scheurer, 61, 69, 77, 205
Andrew G. Geeslin, 7, 9, 11, 13, 21, 33, 36, 37, 58, 68, 71, 201, 238
Andrew Selles, 62, 93
Andrew Whipple, 63, 70, 115, 224
Aness Al-Khateeb, 61, 66, 79, 163
Angela Brightell-Conrad, 10, 47
Anju Patel, 61, 77
Anna Hoekstra, 64, 70, 121, 222, 223
Anna Jain, 61, 78, 104
Anusha Surender, 68, 196
Anusuiya Nagar, 69, 203, 204, 209
Arthur Feinberg, 3, 61, 67, 80, 178
Arthur James, 9, 39
Ashley Bergeon, 67, 183
Audrey F. Hand, 7, 15
Audrey Jensen, 62, 88
Autumn Edwards, 67, 170
Beena J. Premkumar, 67
Ben Dormitorio, 9, 39
Benjamin D. Clement, 70
Bernard Roehr, 69, 202
Blair Szymczyna, 61, 64, 68, 81, 117, 198
Bonny Dickinson, 3, 62, 66, 88, 89, 156
Brandon L. Seagle, 64
Bryan Corpus, 69, 71, 211, 234
Camryn Romph, 9, 42
Carleigh Zahn, 71, 242
Catherine L. Kothari, 8, 9, 11, 29, 30, 38, 39, 42, 55, 61, 62, 63, 67, 82, 83, 84, 85, 86, 87, 106, 181
Chelsea Steffens, 70, 232
Cheryl A. Dickson, 8, 9, 29, 38, 62, 66, 88, 90, 91, 92, 93, 94, 95, 96, 154
Chinton Shah, 66
Chris Jacob, 61, 62, 79, 97, 98
Christian Ertl, 3, 7, 15, 64, 129
Christine A. Byrd-Jacobs, 62, 63, 70, 99, 100, 101, 229
Christopher Begley, 63, 70, 115, 224
Christopher DeFelice, 62, 68
Christopher J. Schmehil, 10, 51, 69, 210
Christopher W. Uggen, 9, 37, 61, 71, 74, 238
Claire Cameron-Ruetz, 65, 135
Claire Liepmann, 64, 124
Claudio Owusu, 9, 40
Cody Overmyer, 62, 91
Colleen MacCallum, 8, 29, 70, 71, 231, 238
Courtney Barrett, 63, 115, 180
Craig Beam, 3, 8, 29
Craig Swanson, 68, 196
Cynthia Bishara, 64, 92, 126
Cynthia Schauer, 63, 102
Daniel Fain, 69, 217
Daniel Johnston, 70, 221
Daphne Sy, 62, 91
Darcy M. Trimpe, 70
David Christ, 69, 202
David Jeng, 11, 59
David L. Montgomery, 64
David Lee, 62, 88
David Riddle, 64, 130
Dean Van Loo, 63, 64, 71, 103, 120, 243
Deb Lenz, 9, 38, 39
Deepak Garg, 67, 167, 168
Dennis H. Kordish, 11, 59, 66, 157
Devika Malhotra, 10, 52
Dewei Qi, 7, 19
Diana Fidrocki, 65, 136, 137
Dilip Patel, 3, 61, 63, 69, 78, 104, 105, 217
Diti Ronvelia, 63, 106
Dominick Ohocinski, 63
Douglas Hollern, 9, 34
Elahe Honarvar, 63, 108
Eleanor Yu, 11, 55, 62, 95
Elena Lewis, 64, 123
Elizabeth Kluka, 66, 164
Elizabeth MacQuillan, 9, 11, 40, 54, 61, 72
Elliott Dasenbrook, 8, 31
Emily Cordes, 63, 66, 115, 165
Emma C. O'Hagan, 9, 33
Eric Edewaard, 10, 47, 62, 95
Eric Gallagher, 63, 71, 109, 110, 111, 241

- Eric Yoder, 8, 23
Fernando Ospina, 9, 39
Frank Jacono, 8, 31
Gabriel Cole, 63, 64, 112, 122
Garrett Koon, 63, 80, 113
Geneva A. Sagun, 63
Gitonga Munene, 3, 7, 14
Grace Lubwama, 9, 38
Grant M. Finlayson, 61
Gregory Vanden Heuvel, 10, 47
Guraminder Thind, 61, 79
H. Arad Abadi, 10, 46, 62, 93
Hardik Chhatrala, 63, 64, 68, 115, 116, 186, 188
Harry Chanzu, 61, 64, 81, 117
Heather I. Chen, 10, 50, 62, 64, 89, 118
Heather I-Hsuan Chen, 8, 30
Helene M. Woyczeszyk, 11, 59
Hira Hasnain, 63, 107
Hoa T. Le, 9, 41
Hou-en Joseph Hui, 64, 119
Jaclyn Skradski, 64, 120
Jacqueline Dauch, 64, 65, 128, 139
Jagadeesh K. Kalavakunta, 68
Jairo A. Espinosa, 7, 14
Jakob Taube, 70, 233
James Hentig, 62, 99
James M. Curtis, 64, 71
James R. Jastifer, 3, 7, 9, 13, 16, 17, 35
James R. Springstead, 63, 64
James Wiley, 9, 39
Jamie Harden, 66, 161
Jason Habeck, 71, 153, 239
Jason Lam, 8, 26, 64, 68, 69, 70, 123, 124, 191, 210, 212, 225
Jason Roberts, 71, 237, 239, 240
Jason T Ryan, 64
Jason Wasserman, 70, 233
Jean Shelton, 65, 131
Jeannette Lia Gaggino, 66, 161
Jeffrey C. King, 9
Jeffrey Freyder, 71, 237, 238
Jeffrey Johnson, 64, 128, 129, 130
Jeffrey King, 33
Jeffrey Wilt, 3, 70, 224
Jen Brenton, 9, 38
Jennifer Kim, 62, 65, 88, 131
Jerry Colca, 10, 47
Jerry Pratt, 3, 63, 107
Jessica Marston, 7, 17, 240
Jessica McCoy, 3, 65, 134
Jessica Ramsay, 65, 137
Joanna M. Dickens, 62
Joanne Baker, 3, 10, 63, 115
John Cochrane, 67, 173
John Divine, 9, 34
John Hoyle, 65, 132, 133
John Munn, 70, 221
John S. Fleming, 71, 242
John T. Collins, 64
Jorge Weber, 64, 125
Joseph D. Barnett, 9, 41
Joseph Fakhoury, 69, 205, 206
Joseph Prahlow, 65, 66, 127, 135, 136, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 155
Joshua Szykowski, 62, 95
Joyce deJong, 10, 50, 64, 118
Julie Helmer, 11, 55
Kanika Jaggi, 11, 56, 67, 179
Karen Bovid, 3, 7, 8, 15, 28, 66, 153
Karim Essani, 11, 59, 66, 157
Karthik Kailasam, 8, 26, 61, 70, 79, 224
Karthik Kannegolla, 62, 68, 97, 196
Katelin Anderson, 63, 103
Katherine Soe, 67, 177
Kathleen A. Gross, 67, 69, 181, 209, 218
Kathleen M. Baker, 9, 39, 40, 61, 72
Kathy Lentz, 61, 86
Keith Kenter, 3, 9, 34
Kelly Doyle, 66, 154
Kelly Quesnelle, 3, 64, 66, 130, 158
Kendyll Erickson, 66, 159
Kevin Cates, 66, 67, 154, 155, 156, 167, 168
Kevin J. Kavanaugh, 71, 242
Kevin Kunzer, 69, 209
Kevin McKelvey, 66, 160
Kevin Patel, 10, 48, 70, 231
Kim Wells, 62, 88
Krishna Jain, 70, 221
Kristen Hastin, 61
Kristen Hastings, 61, 77
Kristi Vanderkolk, 61, 76
Kristine M. Gibson, 66
Lance von Bracht, 62, 95
Larry Lutwick, 3, 8, 10, 23, 43, 66, 67, 162, 163, 164, 165, 166, 167, 168, 169
Larry W. Mann, 67
Lauren Piper, 11, 56
Leah Omilion-Hodges, 67, 170
Leandra Burke, 64, 129
Lindsey Henderson, 61, 76
Luis H. Toledo-Pereyra, 7, 10, 11, 20, 21, 44, 46, 57, 67, 171
M. Myrtha Gregoire-Bottex, 8, 32, 67, 69, 177, 216
Manasa Josyula, 67, 77, 105, 178
Manpreet S. Narwal, 67
Marc T. Downing, 7, 14
Maria Sheakley, 64, 130
Mark Kanzawa, 67, 172, 173, 174, 175, 176
Mark Loehrke, 3, 65, 131
Mark Omwansa, 11, 58
Mark Rummel, 70, 221

- Mark Schauer, 7, 67, 68, 180, 191
Mark Sytsma, 11, 58
Mathew Zaccheo, 8, 27
Matthew J. Radler, 67
Matthew Jaykel, 7, 8, 16, 28, 67, 182
Matthew M. LaCasse, 67
Matthew T. Siuba, 7, 8, 18, 31, 68, 196
McKenzie J. Akers, 61, 69, 82, 216
Megan Sikkema, 8, 25, 66, 161
Michael A. Behun, 9, 33, 61, 82
Michael Fonger, 8, 28
Michael R. Liepman, 67, 69
Michael S. Wagner, 7, 18
Michael Schmalz, 67, 178
Mindie Smith, 67, 183
Mohamed Arafeh, 7, 14
Mona M. Sonbol, 66
Monica Kwasnik, 61, 72
Monoj Kumar Konda, 8, 10, 26, 27, 49, 64, 68, 70, 116, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 222, 223, 225, 226
Nafiseh Jandaghi Jafari, 68, 198
Nancy Luethy, 66, 166
Nauman Khan, 67, 176, 184
Nicholas Beam, 65, 95, 143
Nicholas Miladore, 7, 15, 63, 111
Nichole Sackett, 8, 32
Nickolas D. Habben, 9, 41
Nicole C. Foley, 8, 30, 62, 65, 89, 149
Nicole Carpp, 64, 129
Nicole J. Baker, 68
Niecia Anjorin, 8, 32
Nina Sadigh, 65, 137, 152
Olivia Fournier, 62, 91
Oro Enaohwo, 68, 69, 200, 214
Patricia J. Choi, 8, 30, 62, 65, 89, 141
Patrick Staso, 63, 113
Paul A. Lange, 70
Peter A. Gustafson, 7, 9, 11, 13, 35, 41, 58, 66, 68, 153, 201
Peter Howard, 69, 202
Peter J. White, 61
Peter Longstreet, 69, 203, 204
Peter White, 11, 57, 82
Philip Bystrom, 64, 65, 128, 148
Philip Pazderka, 66, 160
Piao Jian Tan, 63, 64, 112, 122
Pimpawan Boapimp, 10, 43
Polly Hollenbeck, 8, 32, 67, 177
Prashant Patel, 61, 79
Prince Sidhu, 68, 186
Quinter Burnett, 7, 21
Rajib Paul, 9, 39, 40, 61, 72
Rasha Kazi, 69, 205, 206
Richard D. Card II, 71, 242
Robert Baker, 3, 69, 207
Robert F. LaPrade, 9, 36
Robert Gorman, 63, 111
Robert Swor, 70, 232, 233
Robin Fountain, 10, 52
Rohan Kedar, 62, 95
Rolf Kletzien, 10, 47
Ruqiya Tareen, 69, 208
Ryan F. Halas, 8, 10, 25, 52, 69, 71, 210, 211, 212, 213, 234, 242
Saad A. Shebrain, 69
Sala Sadaps, 67, 172, 173
Sally Bonnema, 8, 32
Samarth Bhandari, 62, 64, 92, 126
Samuel K. Yost, 68
Sandeep Patri, 64, 68, 116, 186, 189
Sandra Koehn, 8, 24, 66, 165
Sara Lang, 8, 24
Sarah Myer, 67, 172, 173
Satya Dalavayi, 8, 28, 61, 84, 142
Sean Phippen, 63, 115
Serena Chen, 62, 91
Shanna Cole, 66, 158
Sheila Sullivan, 8, 30, 62, 65, 89, 144
Sherry Brockway, 11, 55
Sherry Pejka, 69, 210, 212
Silpa Nadella, 69, 214, 215, 217
Sonia Joychan, 69, 215, 216, 217
Sonia Motin, 69, 218
Sourabh Aggarwal, 68, 196
Stephanie Chang, 8, 27, 62, 70, 88, 222, 223
Stephen Anim-Preko, 61, 72
Stephen Covington, 10, 44
Stephen John, 9, 41
Stephen Lee McGinnis, 69, 206
Steven J. Weber, 70
Steven M. Rudich, 70
Steven Strausbaugh, 8, 31
Sulin Wu, 65, 131, 145
Sumaiya Ansari, 61, 64, 68, 70, 79, 116, 187, 195, 224, 225, 226
Susan Bannon, 8, 31
Susan Jevett, 11, 56
Susan Musyimi, 70, 227
Susan R Stapleton, 70
Susanna R. Var, 70
Susmitha Daggubati, 62, 87
Suzanne Suchyta, 67, 181
Syed Alam, 3, 70, 221
Sylvie F Coulibaly, 70
T. Kurtis Schubert, 71, 242
Tai-hsien WU, 7, 19
Tara Holt, 71, 244, 245
Tara L. Maser, 63
Tara Longman, 71, 243
Tara R. Holt, 71
Tarannom Shoghi, 10, 46, 62, 64, 90, 126

Terra Bautista, 9, 42, 62, 87
Theotoni J. Gomes, 8, 25, 69, 71, 211, 213, 234
Thomas A. Melgar, 3, 7, 18, 61, 68, 73, 196
Thomas Beuschel, 71, 235
Thomas M. Blostica, 71
Thomas Pott, 61, 78
Thu N. Nguyen, 61, 64, 82, 126, 127
Tiantian Zhang, 11, 59, 157
Tim Bauler, 3, 10, 45
Timothy H. Truong, 68
Timothy Wysozan, 61, 65, 83, 146
Todd Ruiter, 63, 67, 71, 109, 110, 182, 241
Tracey Mersfelder, 3, 71, 242
Tyler J. Monroe, 71
Tyler Snoap, 9, 35, 37, 67, 71, 182, 237, 239, 240, 241
Tyler Vaughn, 70, 231
Uzair Munshey, 61, 75
Valerie Duhn, 63, 115
Vishal Gupta, 3, 10, 49, 68, 190, 193, 194
Wendy Lackey-Cornelison, 7, 22
William Fales, 10, 48, 70, 220, 230, 231, 232, 233
William McDonald, 10, 47
William Nichols, 62, 97
William Rasmussen, 62, 91
Xavier Jean, 62, 88
Yamini Kuchipudi, 9, 38, 42
Yasaman Back, 9, 40
Yashwant Agrawal, 63, 68, 114, 187, 192
Yen-Yu Tina Chen, 61, 82
Yirong Zhu, 7, 14
Yogesh R. Suryawansh, 11, 59, 66, 157