

# **Carilion Clinic Research Day**

## **April 9, 2019**



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# Research Day 2019

April 9, 2019

## Agenda

### Resident/ Fellow Rapid Communication Presentations

7:00 Epigenetic Silencing of MLH1 and Outcomes in Endometrial Cancer

Lindsay E. Borden, MD

7:10 Postoperative Pain: Dermatologists' Perceptions and How Perceptions Influence Opioid Prescribing

Savannah L. Taylor, MS

7:20 Robotic versus Laparoscopic Bariatric Surgery: Our Experience to Date

Christopher M. Reed, MD

7:30 Impact of a Novel Fidaxomicin Order set on Clostridioides difficile Infection

Rose Kohinke, Pharm.D.

7:40 Evaluation of Timing of First Antimicrobial Dose in Septic Patients

Roxie C. Martin, Pharm. D.

7:50 Prodrome of Major Depressive Disorder with Psychosis in ALS

Glen E. Oriafio, MD

**8:00-10:00 Poster Session I: Medical Resident/ Fellow Research**

**Presenters at posters 9:00-10:00**

**Faculty/ Professional Rapid Communication Presentations**

10:00 Correlation between National Emergency Department Overcrowding Scale and Patient Experience

Sarah Klemencic, MD

10:10 Early Cardiac Rehab to Reduce Heart Failure Readmissions

Renee M. Gerow, MSN, RN

10:20 Is Fecal Lactoferrin a Predictor of IBD Disease Severity

Marrieth G. Rubio, MD

10:30 Assessment of Nutrition Policies at Food Pantries in the United States

Meagan Helmick, PhD

**10:30-12:00 Poster Session II: Resident/ Faculty/ Professional Research**

**Presenters at posters 11:00-12:00**

**12:00-12:45 GOING BIG: Convergence of Clinical Data and Research Analytics**

Mattie Tenzer, Health Analytics and TriNetX

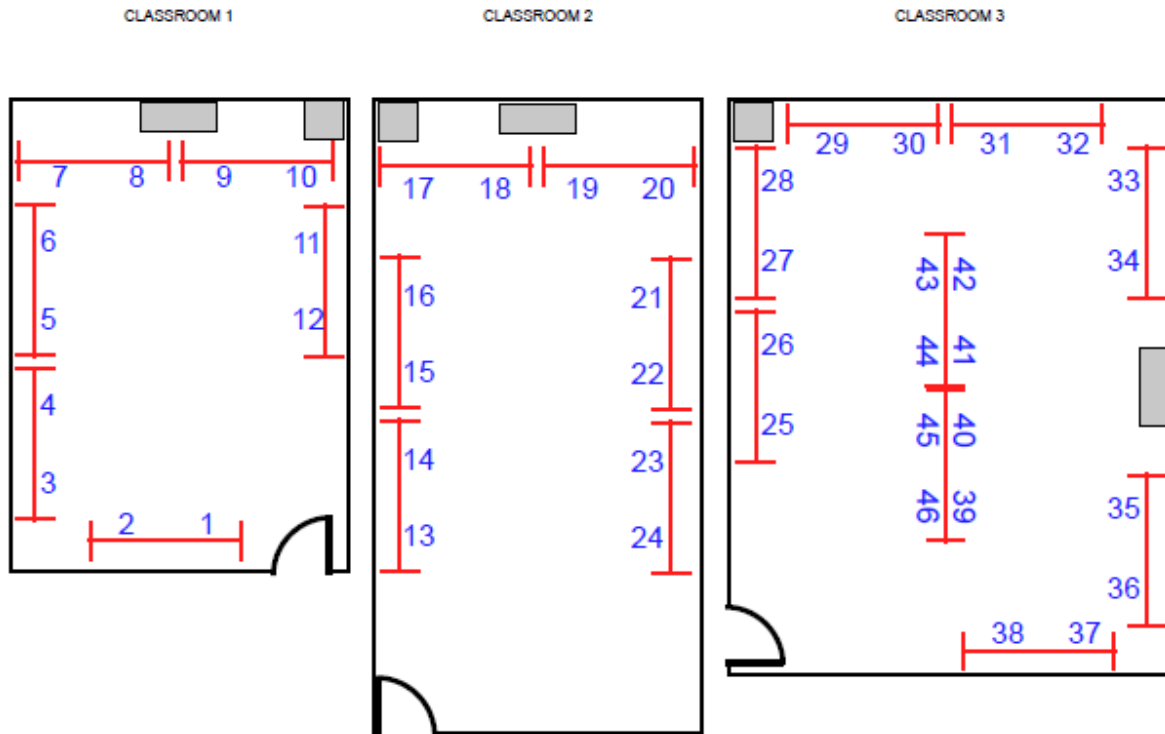
**1:00-2:00 Keynote Presentation:**

**Clinical Development of the Artificial Pancreas**  
**Daniel Chernavvsky, MD, CRC**  
University Of Virginia  
Assistant Professor of Research  
Center for Diabetes Technology  
International Artificial Pancreas (iAP) Study Group





## Poster Session I (Resident and Fellow)



**Poster Presenters please display your poster after 7:00 am and be present in person from 9:00-10:00 am. Remove your poster after the session close**

### Classroom 1

#### Gynecology/ Oncology

##### 1. Impact of adjunctive Azithromycin at cesarean delivery on infectious morbidity (R6)

**Authors:** Katy F. Sanderson, MD, Carilion Clinic, OBGYN, [krfleming@carilionclinic.org](mailto:krfleming@carilionclinic.org); Isaiah M. Johnson, MD, Carilion Clinic, OBGYN; Eduardo Lara Torre, MD, Carilion Clinic, OBGYN; Manjusha Sahni, MD, Carilion Clinic, OBGYN

##### 2. Pelvic Pain Clinic on Emergency Department Resource Utilization (R7)

**Authors:** Hoa T. Nguyen, MD, Carilion Clinic-Virginia Tech Carilion School of Medicine, Obstetrics and Gynecology, [htnguyen@carilionclinic.org](mailto:htnguyen@carilionclinic.org); Isaiah M. Johnson, MD, Carilion Clinic-Virginia Tech Carilion School of Medicine, Obstetrics and Gynecology; Hindiya A. Mustafa, MD, Carilion Clinic-Virginia Tech Carilion School of Medicine, Obstetrics and Gynecology

### **3. Outcomes for vulvar and vaginal intraepithelial neoplasia stratified by treatment (R24)**

**Authors:** Tulsi Patel, MD, Carilion Clinic, Obstetrics and Gynecology, tdpatel@carilionclinic.org; David Iglesias, MD, Carilion Clinic, Gynecology Oncology

### **4. Evaluation of a Rapid Bevacizumab Protocol (R30)**

**Authors:** Rose Kohinke, PharmD, Carilion Clinic, Pharmacy, rmkohinke@carilionclinic.org; Mimi Liu, PharmD, MBA/HSA, Carilion Clinic, Pharmacy; Ferealem Assefa, PharmD, BCPS, Carilion Clinic, Pharmacy; Tiffany Yoon, PharmD, BCPS, Carilion Clinic, Pharmacy

## Surgery/ Plastic and Reconstructive Surgery

### **5. Single-stage adipofascial turnover flap as an alternate for nasal defects (R16)**

**Authors:** Thomas M. Gallagher, MD, Virginia Tech Carilion, Plastic and Reconstructive Surgery, tmgallagher@carilionclinic.org; Anthony Capito, MD, VTC, Plastic and Reconstructive Surgery; Albert Truong, MS3, VTC, School of Medicine

### **6. Development of a Microvascular Surgery Simulation Platform for Resident Training (R25)**

**Authors:** Matthew T. Joy, MD, Virginia Tech Carilion, Surgery, mtjoy@carilionclinic.org; Jaime De La Ree, PhD, Virginia Tech, Electrical Engineering; Anthony Capito, MD, Virginia Tech Carilion, Surgery; Brian Fletcher, MD, University of Virginia, Surgery

### **7. Trauma Recidivism Post Discharge Mortality, Adult and Geriatric Populations (R36)**

**Authors:** Ashley Gerrish, MD, Virginia Tech Carilion, Surgery, gerrish.ashley@gmail.com; Mark Hamill, MD, Virginia Tech Carilion, Surgery; Tonya Locklear, PhD, Virginia Tech Carilion, Statistics; Katie Bower, MD, Virginia Tech Carilion, Surgery; Daniel Lollar, MD, Virginia Tech Carilion, Surgery; Emily Faulks, MD, Virginia Tech Carilion, Surgery; Michael Matos, DO, Virginia Tech Carilion, Surgery; Michael Nussbaum, MD, Virginia Tech Carilion, Surgery; Bryan Collier, DO, Virginia Tech Carilion, Surgery

### **8. Two faces of intentional self-inflicted injury: mortality and readmission rates (R46)**

**Authors:** Katherine L. Howe, MD, MPH, Carilion Clinic, Surgery, klhowe@carilionclinic.org; Emily R. Faulks, MD, Carilion Clinic, Surgery; Lollar I. Daniel, MD, Carilion Clinic, Surgery; Bower L. Katie, MD, Carilion Clinic, Surgery; Locklear M. Tonja, PhD, Carilion Clinic, Biostatistics; Matos A. Miguel, DO, Carilion Clinic, Surgery; Nussbaum S. Michael, MD, Carilion Clinic, Surgery; Hamill E. Mark, MD, Carilion Clinic, Surgery; Bryan R. Collier, DO, Carilion Clinic, Surgery; Jennifer Bath, MSN, Carilion Clinic, Surgery; Julian C. Lagoy, MD, Carilion Clinic, Psychiatry; Tracey M. Criss, MD, Carilion Clinic, Psychiatry

### **9. Laparoscopic Repair of Interparietal Abdominal Wall Hernias (R67)**

**Author:** Christopher L. Kalmar, MD MBA, Resident Physician, Department of Surgery, clkalmar@carilionclinic.org

### **10. Intraoperative Pectoral 1 and Pectoral 2 Nerve Blocks for Mastectomy (R69)**

**Authors:** Christopher L. Kalmar, MD MBA, Resident Physician, Department of Surgery, [ckalmar@carilionclinic.org](mailto:ckalmar@carilionclinic.org); Modupe White, MSN APRN FNP-C DNP-S, Nurse Practitioner, Department of Surgery; Hannah E. Worix, MD, Resident Physician, Department of Surgery; Roxanne R. Davenport, MD FACS, Associate Professor, Department of Surgery

#### **11. Intravenous Lidocaine As An Analgesic Adjunct In Trauma Patients (R73)**

**Authors:** Harry L. Warren, MD, General Surgery Resident, Department of surgery, [hlwarren@carilionclinic.org](mailto:hlwarren@carilionclinic.org); Daniel Lollar, MD, Trauma/Critical Care, Department of Surgery

### Classroom 2

Quality Improvement/ Quality Assurance / Process Improvement

#### **13. Neurotoxicity from Intrathecal Gadolinium Administration (IT-Gad) (R9)**

**Authors:** Nicholas Calvo, MD, Virginia Tech Carilion Clinic , Neurology, [necalvo@carilionclinic.org](mailto:necalvo@carilionclinic.org); Marium Jamil, MD, Virginia Tech Carilion Clinic , Neurology; Scott Feldman, MD, Virginia Tech Carilion Clinic , Internal Medicine; Aashit Shah, MD, Virginia Tech Carilion Clinic , Neurology; Feryal Nauman, MD, Virginia Tech Carilion Clinic , Neurology; Joseph Ferrara, MD, Virginia Tech Carilion Clinic , Neurology

#### **14. Is Shock Index a sensitive screening tool for sepsis?**

**Authors:** Jessica Nguyen, MD, VTC, EM, [jnguyen@carilionclinic.org](mailto:jnguyen@carilionclinic.org); Swami Rajaram, MS IV, VTCSOM, VTCSOM; Jack Perkins, MD, VTC, EM

#### **15. Robotic vs Laparoscopic Bariatric Surgery: Our Experience to Date (R77)**

**Authors:** Christopher M. Reed, MD, Virginia Tech Carilion School of Medicine, Surgery, [cmreed1@carilionclinic.org](mailto:cmreed1@carilionclinic.org); Nussbaum S. Michael, MD, FACS, Virginia Tech Carilion School of Medicine, Surgery; Tananchai A. Lucktong, MD, FACS, Virginia Tech Carilion School of Medicine, Surgery

### Nephrology

#### **16. Pulmonary Artery Pseudoaneurysm. What caused this one? (R72)**

**Authors:** Karina A. Mill, MD, Carilion Clinic, Internal Medicine, [kamill@carilionclinic.org](mailto:kamill@carilionclinic.org); Kurtsy Oswald , OMS IV, VCOM, Internal Medicine

### Psychiatry

#### **17. Attempted Suicide of Parkinsonian patient treated with DBS and Carbidopa-levodopa (R35)**

**Authors:** Ayotunde Ayobello, MD, Virginia Tech Carilion School of Medicine and Research Institute, Psychiatry, aoayobello@carilionclinic.org; Brian F. Saway, Medical Student MS3, Virginia Tech Carilion School of Medicine and Research Institute, Medical School; Michael Greenage, DO, Virginia Tech Carilion School of Medicine and Research Institute, Psychiatry

#### **18. Anti-NMDA Receptor Encephalitis Initially Presenting as Seizures and Psychosis (R37)**

**Authors:** Hanish D. Patel, MD, Virginia Tech Carilion Internal Medicine Residency, Internal Medicine, hdpatel1@carilionclinic.org.

#### **19. Clozapine Induced Hypothermia: A Chilling Side Effect (R52)**

**Author:** Kushagra Gupta, MD (Fellow), Virginia Tech Carilion School of Medicine, Pulmonary and Critical Care, kgupta1@carilionclinic.org;

#### **20. Microbiota in emotional behavior: antibiotic treatment in high anxiety-prone rat**

**Authors:** Kerman IA, Glover M, Cohen J, Clinton SM. Department of Psychiatry and Behavioral Medicine, Carilion Clinic School of Neuroscience, Virginia Tech

[Pain/ Education/ Wellness](#)

#### **21. Goat Therapy in Integrative Pain Management Model (R65)**

**Authors:** Abdul Siddiqui, MD, Carilion Clinic, Neurology , awsiddiqui@carilionclinic.org; Shaheen Lakhan , MD,

#### **22. Effect of 24 Hour Call on Dexterity, Cognition, and Mood (R79)**

**Authors:** Evin L. Guilliams, DO, VTC Neurosurgery, Neurosurgery, elguilliams@carilionclinc.org; Cara M. Rogers, DO, VTC Neurosurgery, Neurosurgery; Chris Busch, DO, VTC Neurosurgery, Neurosurgery; Gary Simonds, MD, VTC Neurosurgery, Neurosurgery

#### **23. Trends in Cancer Mortality in Virginia Appalachian Counties**

**Author:** Katie Kennedy, DO, Carilion , Internal Medicine, knkenedy@carilionclinic.org;

[Dermatology](#)

#### **24. A Case of Petechial Rash in an Healthy 29-year-old Male (R5)**

**Authors:** Nathan M. Johnson, MD, Carilion Clinic / Virginia Tech Carilion School of Medicine, Internal Medicine / Dermatology, nmjohnson@carilionclinic.org; Mariana A. Phillips, MD, Carilion Clinic / Virginia Tech Carilion School

of Medicine, Internal Medicine / Dermatology; Douglas J. Grider, MD, Virginia Tech Carilion School of Medicine, Basic Science Education

## Classroom 3

### Orthopaedics

#### **25. Effect of HbA1c on Clinical Outcomes in Carpal Tunnel Surgery (R26)**

**Authors:** Patrick Collins, MD, Resident Physician, Department of Surgery, Section of Plastic Surgery, pscollins1@carilionclinic.org; Melika Zarei, MS, VTC, VTCSOM; Anthony Capito, MD, Attending Physician, Department of Surgery, Section of Plastic Surgery; Lamvy Le, MS, VTC, VTCSOM; Christopher Kalmar, MD, Resident Physician, Department of Surgery; Albert Truong, MS, VTC, VTCSOM

#### **26. Achilles Tendon Rupture in the Setting of Alkaptonuric Ochronosis (R44)**

**Authors:** Wesley M. Leong, DPM, Carilion Roanoke Memorial Hospital, Orthopaedics, Wmleong@carilionclinic.com; John R. Clements, DPM, FACFAS, Carilion Roanoke Memorial Hospital, Orthopaedics; Wendy Introne, MD, National Institute of Health, National Human Genome Research Institute

#### **27. Cutaneous Temperature as a Metric for Predicting Septic Knees (R61)**

**Authors:** Lia Bos, MD, Vanderbilt University Medical Center, Obstetrics and Gynecology, dshahmanyant@carilionclinic.org; Conor O'Neill, MD, VCU, Orthopedics; Davit Shahmanyant, BS, Virginia Tech Carilion SOM, Medical Student; Zakk Walterscheid, MD, UW Orthopedics and Sports Medicine, Orthopedics; Trevor Owen, MD, Carilion Clinic, Orthopedics; Caleb Behrend, MD, Carilion Clinic, Orthopedics

### Hematology

#### **28. Ehrlichiosis-Induced Hemophagocytic Lymphohistiocytosis (R43)**

**Authors:** Christopher M. Hernandez, MD, Virginia Tech Carilion, Internal Medicine, cmhernandez@carilionclinic.org; Jon M. Sweet, MD, Virginia Tech Carilion, Internal Medicine

### Internal Medicine

#### **29. Alectinib-Induced ILD (R2)**

**Authors:** Maritza Carrillo, MD, Carilion Clinic - Virginia Tech, Pulmonary and Critical Care Medicine, Internal Medicine, [mecarrillo@carilionclinic.org](mailto:mecarrillo@carilionclinic.org); Venkat Kollipara, MD, Carilion Clinic - Virginia Tech, Pulmonary and Critical Care Medicine; Frank Biscardi, MD, FCCP, Carilion Clinic - Virginia Tech, Pulmonary and Critical Care Medicine; Umar Sofi, MD, FCCP, Carilion Clinic - Virginia Tech, Pulmonary and Critical Care Medicine

### **30. Rare Hereditary Hemochromatosis Subtype as Cause of Decompensated Liver Failure (R3)**

**Authors:** Patricia T. Dell, DO, Virginia Tech Carilion Family Medicine Residency, Family Medicine, [ptdell@carilionclinic.oth](mailto:ptdell@carilionclinic.oth); Karen Perkins, MD, Virginia Tech Carilion Family Medicine Residency, Family Medicine; Eric Chen, MD, Virginia Tech Carilion Family Medicine Residency, Family Medicine; Priscilla Tu, DO, Virginia Tech Carilion Family Medicine Residency, Family Medicine

### **31. Prevalence of Opiate-induced Suppression of Corticotropin Function (R8)**

**Authors:** Alexander Williams, MD, Virginia Tech Carilion Clinic, Internal Medicine, [ajwilliams1@carilionclinic.org](mailto:ajwilliams1@carilionclinic.org); Ali Iranmanesh, MD, Salem VA Medical Center, Research; Kathleen Glymph, DO, Salem VA Medical Center, Endocrinology

### **32. Smartphone Accelerometry In Diagnosis Of Primary Orthostatic Tremor (R11)**

**Authors:** Nicholas Calvo, MD, Virginia Tech Carilion Clinic, Neurology, [necalvo@carilionclinic.org](mailto:necalvo@carilionclinic.org); Joseph Ferrara, MD, Virginia Tech Carilion Clinic, Neurology

### **33. A Pericardial Cyst Causing Obstructive Shock: A Case Study (R13)**

**Authors:** Injoon Lee, MD, Carilion Memorial Hospital, Cardiology, [ilee@carilionclinic.org](mailto:ilee@carilionclinic.org); David C. Sane, MD, Carilion Clinic, Cardiology; Thomas Bishop, MD, Carilion Clinic, Interventional Radiology; Neel Parikh, MD, Carilion Clinic, Cardiology

### **34. Is Shock Index a sensitive screening tool for sepsis? (R15)**

**Authors:** Jessica Nguyen, MD, VTC, EM, [jnguyen@carilionclinic.org](mailto:jnguyen@carilionclinic.org); Swami Rajaram, MS IV, VTCSOM, VTCSOM; Jack Perkins, MD, VTC, EM

### **35. Successful TAVR after iatrogenic aortic cusp dissection (R28)**

**Authors:** Injoon Lee, MD, Carilion Memorial Hospital, Cardiology, ilee@carilionclinic.org; Gary P. Swank, M.D., Carilion Memorial Hospital, Interventional Cardiology ; Matt P. Cauchi, D.O., Carilion Memorial Hospital, Interventional Cardiology; Jason R. Foerst, M.D., Carilion Memorial Hospital, Structural/Interventional Cardiology

#### **36. A Rare Cardiomyopathy Presenting As Sudden Cardiac Death (R31)**

**Authors:** Scott Feldman, MD, Virginia Tech Carilion School of Medicine , Internal Medicine , slfeldman@carilionclinic.org; Ghaith Aboud, MD, VTCSOM, IM; David Kim, MD, VTCSOM, Cardiology

#### **37. Floating Metastases (R41)**

**Authors:** Scott Feldman, MD, Virginia Tech Carilion School of Medicine, Internal Medicine , slfeldman@carilionclinic.org; Chuckwudum Ufongu, MD, VTCSOM, Internal Medicine

#### **38. A Surprising Find (R33)**

**Authors:** Michael W. Sperling, MD/MPH, Carilion Clinic , Internal Medicine , mwsperling@carilionclinic.org; Lauren Selg, DO, Carilion Clinic, Internal Medicine ; Russel Dowel , Med Student , VCOM, Medical School

#### **39. A Bad Bag (R34)**

**Author:** Michael Sperling, MD/MPH, Carilion Clinic , Internal Medicine , mwsperling@carilionclinic.org;

#### **40. Evaluation of intravenous acyclovir use and herpes simplex virus testing (R38)**

**Authors:** Brandi L. Wian, PharmD, Carilion Clinic, Pharmacy, blwian@carilionclinic.org; Meghan Kamrada, PharmD, BCPS, Carilion Clinic, Pharmacy; Gus Stefanadis, PharmD, MS, BCPS, Carilion Clinic, Pharmacy; Nathan Everson, PharmD, AAHIVE, BCIDP, Carilion Clinic, Pharmacy

#### **41. Blood Pressure Control in the Setting of Vascular Ehlers Danlos (R40)**

**Authors:** Hanish D. Patel, MD, Virginia Tech Carilion Internal Medicine Residency, Internal Medicine, hdpatel1@carilionclinic.org; Timothy Spooner, DO, Virginia Tech Carilion Internal Medicine Residency, Internal Medicine; Jon Sweet, MD, Virginia Tech Carilion Internal Medicine Residency, Internal Medicine

#### **42. Anomalous Right Coronary System with a Malignant, Intramural Course (R45)**

**Authors:** Mit Patel, MD, Virginia Tech Carilion School of Medicine, Internal Medicine , mvpatel@carilionclinic.org; Bryant Self, D.O., Virginia Tech Carilion School of Medicine, Cardiology; Jacek Slowikowski, M.D., Virginia Tech Carilion School of Medicine, Cardiology

#### **43. Ischemic Duodenal Ulceration After Thoracic Endovascular Aortic Repair (R47)**

**Authors:** Lindsey A. Bierle, D.O., Virginia Tech Carilion, Graduate Medical Education Department of Internal Medicine , labierle@carilionclinic.org; Sol Moon, MSIII, Virginia Tech, School of Medicine

#### **44. Pulmonary Hypertension in Sickle Cell Disease (R49)**

**Author:** Lindsey A. Bierle, D.O., Virginia Tech Carilion, Graduate Medical Education Department of Internal Medicine, labierle@carilionclinic.org;

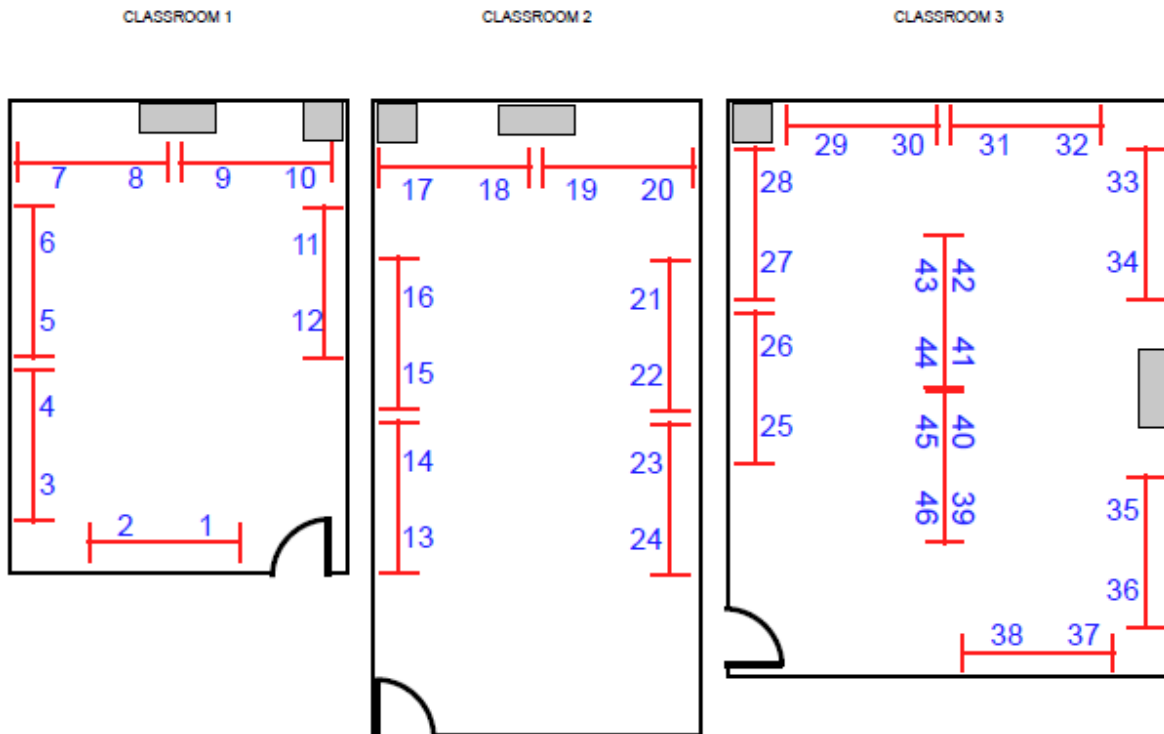
#### **45. A Rare Case of Native Valve Klebsiella Endocarditis (R55)**

**Authors:** Alyssa R. Strazanac, MD, Resident, Internal Medicine, arstrazanac@carilionclinic.org; Sol C. Moon, BA, VTC School of Medicine, Internal Medicine; Mustafa N. Rasheed, BS, VTC School of Medicine, Internal Medicine; Lauren Self, DO, Carilion Clinic Roanoke Memorial Hospital , Internal Medicine

#### **46. CDI Toxin Versus Molecular Assay Predicts Antibiotic Response In IBD (R70)**

**Authors:** Annu Gupta, MD, Virginia Tech Carilion, Roanoke, VA, Internal medicine, Gastroenterology, agupta2@carilionclinic.org; Christopher Walsh, MD, Virginia Tech Carilion, Roanoke, VA, Internal Medicine; Yingxing Wu, MD, Virginia Tech Carilion, Roanoke, VA, Internal medicine, Gastroenterology; Maithili V. Chitnavis, MD, Virginia Tech Carilion, Roanoke, VA, Internal medicine, Gastroenterology; Dario R. Sorrentino, MD, Virginia Tech Carilion, Roanoke, VA, Internal medicine, Gastroenterology; Vu Q. Nguyen, MD, Virginia Tech Carilion, Roanoke, VA, Internal medicine, Gastroenterology

## Poster Session II (Faculty/ Professional and Residents)



**Poster Presenters please display your poster after 10:30 am and be present in person from 11:00-12:00 noon. Remove your poster at 12:00 noon.**

### Classroom 1

Nursing/ Education

#### 1. Engaging Nurses and Bedside Staff in Injury Prevention Efforts (F3)

**Authors:** Sarah Beth Dinwiddie, MPH(c), BSN, RN, Carilion Roanoke Memorial Hospital, Trauma Services, [sehelms@carilionclinic.org](mailto:sehelms@carilionclinic.org); Stephanie Lareau, MD, FAWN, FACEP, DiMM, Carilion Clinic, Emergency Services; Randy Howell, DHSc, PA-C, Carilion Clinic, Emergency Services

#### 2. They're breathing aren't they? Why Counting Respirations is Important (F4)

**Authors:** Donna C. Bond, DNP, RN, CCNS, AE-C, CTTS, Carilion Clinic, Nursing, [DCBond@Carilionclinic.org](mailto:DCBond@Carilionclinic.org); Deborah J. Robinson, AS, RRT, ACCS, MA, MCC, DMin, Carilion Clinic, Respiratory Therapy

#### 3. Implementing a Simulation-Based Program for Nurse Leader Patient Rounding (F9)

**Authors:** Brandon Jones, MSN, RN, CEN, NEA-BC, Carilion Clinic, Patient Experience, bajones@carilionclinic.org; Amanda Anderson, BSN, RN, PCCN-K, CHSE, Carilion Clinic, Center for Simulation, Research, and Patient Safety; Kim Carter, Ph.D., R.N., NEA-BC, Carilion Clinic, Nursing; Ashli Semones, MPA, Carilion Clinic, Nursing; Amanda Kidd, MSN, RN, ANPC-AG, NEA-BC, Carilion Clinic, Nursing

#### **4. Ventilatory Associated Pneumonia Prevention in the Emergency Department (F10)**

**Authors:** Lisa Girani, BSN, RN, Carilion Roanoke Memorial Hospital, Emergency Department, lagirani@carilionclinic.org; Jonathan Behnisch, BSN, RN, Carilion Roanoke Memorial Hospital, Emergency Department; Ashley Allen, BSN, RN, Carilion Roanoke Memorial Hospital, Emergency Department

#### **5. Impact of Use of Stroke and Dysphagia Severity Algorithm (F11)**

**Authors:** Barbara Boggs, MSN, RN, Carilion Roanoke Memorial Hospital, Nursing Support Services, bmboggs@carilionclinic.org; Cindy Ward, DNP, RN-BC, CMSRN, ACNS-BC, Carilion Roanoke Memorial Hospital, Nursing Quality and Safety; Lindsay B. Collins, MSN, RN, CEN Inpatient Surgical Services

#### **6. Pain Management through Art and Relaxation (F12)**

**Authors:** Melissa Foster, BSN, RN, Carilion Clinic, Inpatient Rehabilitation, mmcooper@carilionclinic.org; Kimberly F. Carter, PhD, RN, NEA-BC, Carilion Clinic, Nursing Research, EBP, & Excellence

#### **7. A Descriptive Study from the International Quit & Recovery Registry (F7)**

**Authors:** Bob Reese, PhD, Jefferson College of Health Sciences, Arts & Sciences, rcreese@jchs.edu; Sandesh Bhandari, PhD, VTCRI, Addiction Recovery Research Center; Warren Bickel, PhD, VTCRI, Addiction Recovery Research Center; Amanda Quisenberry, PhD, Ohio State University, College of Public Health; Derek Pope, PhD, VTCRI, Addiction Recovery Research Center

#### **8. Basic Science Faculty Conception of Learning and Teaching (F8)**

**Authors:** Helena Carvalho, PhD, VTCSOM, DBSE, helena@vt.edu; Francis C. Dane, PhD, Jefferson College of Health Sciences, Department of Arts & Sciences; Shari A. Whicker, PhD, Carilion Clinic and Virginia Tech Carilion School of Medicine, Office of Continuing Professional Development

#### **9. Liberalization of Concealed Carry Legislation Not Associated with Increased Crime (F21)**

**Authors:** Mark E. Hamill, MD, VTC School of Medicine, Surgery, mehamill@carilionclinic.org; Matthew C. Hernandez, MD, Mayo Clinic, Surgery; Kent R. Bailey, PhD, Mayo Clinic, Biostatistics; Martin D. Zielinski, MD, Mayo Clinic, Surgery; Miguel A. Matos, DO, VTC School of Medicine, Surgery; Henry J. Schiller, MD, Mayo Clinic, Surgery

#### **10. With Hydroxychloroquine Use, The "Eyes" Have It! (F22)**

**Authors:** Kristen L. Wood, CRMA, Carilion Clinic , Rheumatology , klwood@carilionclinic.org; Tiffany L. Tuemler , CMA, Carilion Clinic , Rheumatology ; Melissa H. Crigger , BSN, RN, MHA, Carilion Clinic , Rheumatology ; Adegbenga A. Bankole , MD, Carilion Clinic , Rheumatology ; Stacy E. Hall, CNA, Carilion Clinic , Rheumatology

#### **11. Attitudes of VA mental health professionals towards LGBTQ veterans (R19)**

**Authors:** Julian C. Lagoy, M.D., Virginia Tech Carilion School of Medicine, Psychiatry, jclagoy@carilionclinic.org; Adam Childers, Ph.D., Roanoke College, Mathematics; Anita S. Kablinger, M.D., Carilion Clinic, Psychiatry; Anjali Varma, M.D., Salem Veterans Affairs Medical Center, Psychiatry

#### **12. Improving confidence of internal medicine residents in treatment of depression (R23)**

**Authors:** Sahar Alee Koloukani, MD, Virginia Tech Carilion School of Medicine, Psychiatry and Behavioral Medicine, saleekoloukani@carilionclinic.org; Erin E. Hayes, MD, Virginia Tech Carilion School of Medicine, Psychiatry and Behavioral Medicine; Elham Rahmani, MD, Virginia Tech Carilion School of Medicine, Psychiatry and Behavioral Medicine

### [Classroom 2](#)

[Case Studies/ Basic Science/ Education/ Surgery/ Medical Education](#)

#### **13. Rare Case of Moyamoya Syndrome Associated with Graves' Disease (R4)**

**Authors:** Eric Noh, DO, Virginia Tech Carilion, Family Medicine, ecnoh@carilionclinic.org; Priscilla Tu, DO, Virginia Tech Carilion, Family Medicine

#### **14. Arresting dental caries with silver diamine fluoride: a case report (R27)**

**Authors:** Karen Pettit, DDS, Carilion Dental Clinic, Dentistry, karencaisan@hotmail.com; David Brajdic, DMD, MS, FAGD, Program Director, Carilion Clinic General Practice Residency and Assistant Professor, VTC School of Medicine, Dentistry; Karina Miller, DDS, American Board Certified Pediatric Dentist, Carilion Pediatric Dental Clinic, Dentistry

#### **15. Intraoperative Visual Evoked Potentials and Post-Operative Visual Acuity (F2)**

**Authors:** Jacob J. Elias, DHSc, CNIM, Jefferson College of Health Sciences, Health sciences, jjelias@jchs.edu; Diana Willeman-Buckelew, PhD, Jefferson College, Health Sciences; Francis Farrell, PhD, Carilion Clinic, Research; Frank Dane, PhD, Jefferson College, Math & Science; Eric Marvin, DO, Carilion Clinic, Neurosurgery; Pamela Zollinger, MD, Anesthesia Consultants of Virginia, Anesthesia; Maxine Lee, MD, Anesthesia Consultants of Virginia, Anesthesia

#### **16. Comparison of PRP Systems Utilized In Orthopaedic Applications (F6)**

**Authors:** Mark E. Kasmer, MD, Carilion Clinic, Orthopaedics, mekasmer@carilionclinic.org; Cromer F. Stephen, MD, Carilion Clinic, Orthopaedics; Piple Amit, BS, Virginia Tech Carilion School Of Medicine, Orthopaedics; Lucas Claiborne, BS, University of South Carolina School Of Medicine, Orthopaedics

#### **17. Ethnomedicinal uses of stingless bee honey from Nepal (F13)**

**Author:** Chet P. Bhatta, PhD, Jefferson College of Health Sciences, Biomedical Sciences, cpbhatta@jchs.edu;

#### **18. Effects of Aqueous American Mistletoe Extracts on Cultured Cancer Cells (F16)**

**Authors:** Robin L. Davies, Ph.D., Jefferson College of Health Sciences, Arts and Sciences - Biomedical Sciences Program, rldavies@jchs.edu; Elena Swick, M.S., Auburn University, Biological Sciences

#### **19. Lithium toxicity following bariatric surgery (F15)**

**Authors:** Suzanna C. Jamison, MD, FACP, Carilion Clinic, Internal Medicine, scjamison@carilionclinic.org; Kelley D. Hale, PharmD, Carilion Clinic, Internal Medicine

#### **20. Teaching Excellence Academy for Collaborative Healthcare (TEACH) (F17)**

**Authors:** Shari Whicker, EdD, MEd, Carilion Clinic/Virginia Tech Carilion School of Medicine, Office of Continuing Professional Development, sawhicker@carilionclinic.org; Mariah Rudd, BS, Carilion Clinic/Virginia Tech Carilion School of Medicine, Office of Continuing Professional Development

#### **21. Using group peer review for national grant review process (F19)**

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#### **22. GME Core Curriculum (F27)**

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#### **23. Stressors and coping mechanisms of medical students (F20)**

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#### **24. Perception/Reality: Physicians Overestimate Resource Utilization When Working With Residents (F24)**

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### Classroom 3

#### Pharmacy/ Pharmacology/ Infectious Diseases

#### **25. Evaluation of missed antibiotic doses in hospitalized patients undergoing hemodialysis (R12)**

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#### **26. Emergency department prescribing changes in response to parenteral opioid shortages (R54)**

**Authors:** Matthew Hornsby, PharmD, Carilion Clinic, Pharmacy, mjhornsby@carilionclinic.org; Charlene Blubaugh, PharmD, BCPS, Carilion Clinic, Pharmacy; Brian Meier, MD, MSc-GH, Carilion Clinic, Emergency Medicine; Jessica Schad, PharmD, BCPS, Carilion Clinic, Pharmacy; Morgan Oxley, PharmD, Carilion Clinic, Pharmacy

#### **27. Medication use evaluation of sedative infusions utilized in subarachnoid hemorrhage (R71)**

**Authors:** Chelsea E. Bast, PharmD, Carilion Roanoke Memorial Hospital, Pharmacy, cebast@carilionclinic.org; Mimi Liu, PharmD, MBA/HSA, Carilion Roanoke Memorial Hospital, Pharmacy; Janis Faris, PharmD, BCPS, BCCP, Carilion Clinic, Pharmacy

#### **28. Evaluation of bivalirudin anticoagulation in patients receiving extracorporeal membrane oxygenation (R64)**

**Authors:** Chelsea E. Bast, PharmD, Carilion Roanoke Memorial Hospital, Pharmacy, cebast@carilionclinic.org; Robert Howitt, PharmD, BCPS, Carilion Roanoke Memorial Hospital, Pharmacy; Jonathan Dubyk, PharmD, BCPS, Carilion Roanoke Memorial Hospital, Pharmacy; David Sugrue, PharmD, BCCCP, Carilion Roanoke Memorial Hospital, Pharmacy

#### **29. Medication Use Evaluation of Methylene Blue (R66)**

**Authors:** Ashley E. Fontan, PharmD, Carilion Clinic, Pharmacy, aefontan@carilionclinic.org; Bradford McDaniel, PharmD, BCCCP, Carilion Clinic, Pharmacy; Corey Goodwin, PharmD, BCPS, Carilion Clinic, Pharmacy

#### **30. Evaluation of Fixed-Dose Four Factor Prothrombin Complex Concentrate (4F-PCC) (R68)**

**Authors:** Ashley E. Fontan, PharmD, Carilion Clinic, Pharmacy, aefontan@carilionclinic.org; David Sugrue, PharmD, BCCCP, Carilion Clinic, Pharmacy; Jessica Schad, PharmD, BCPS, Carilion Clinic, Pharmacy; Janie Faris, PharmD, BCPS, BCCCP, Carilion Clinic, Pharmacy; Kelly McAllister, PharmD, MBA, BCPS, Carilion Clinic, Pharmacy

### **31. Evaluation of Antibiotic Prescribing Practices at Hospital Discharge (R50)**

**Authors:** Brenda Simiyu, PharmD, BCPS, Carilion Clinic, Pharmacy, bsimiyu@carilionclinic.org; Lauren McDaniel, PharmD, BCIDP, Carilion Clinic, Pharmacy; Angela Perhac, PharmD, BCIDP, Carilion Clinic, Pharmacy; Nathan Everson, PharmD, BCIDP, AAHIVE, Carilion Clinic, Pharmacy

### **32. Evaluation of Implementation of Rapid Diagnostics Testing (R53)**

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### **33. Evaluating Diabetic Ketoacidosis Protocol Usage (R17)**

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### **34. Evaluation of epoetin use in chronic kidney disease (R57)**

**Authors:** Emily Johnson, PharmD, Carilion Clinic, Pharmacy, ebjohnson@carilionclinic.org; Janie Faris, PharmD, BCPS, BCCCP, Carilion Clinic, Pharmacy; Jonathan Dubyk, PharmD, BCPS, Carilion Clinic, Pharmacy; Shahram Ahmadzadeh, MD, Carilion Clinic, Nephrology; David Sugrue, PharmD, BCCCP, Carilion Clinic, Pharmacy

### **35. Intravenous agents in atrial fibrillation with rapid ventricular rate (R76)**

**Authors:** Emily Johnson, PharmD, Carilion Clinic, Pharmacy, ebjohnson@carilionclinic.org; Jessica Schad, PharmD, BCPS, Carilion Clinic, Pharmacy; David Sane, MD, Carilion Clinic, Cardiology; Hasan Kazmi, PharmD, BCPS, Carilion Clinic, Pharmacy

### **36. Comparing Two Hydrocortisone Regimens in the Treatment of Septic Shock (R74)**

**Authors:** Brandi L. Wian, PharmD, Carilion Clinic, Pharmacy, blwian@carilionclinic.org; Corey Goodwin, PharmD, BCPS, Carilion Clinic, Pharmacy

### **37. Impact of Infectious Diseases Consultation on Staphylococcus aureus Bacteremia Management (R62)**

**Authors:** ALEX SMART, Pharm.D., Carilion Clinic, Pharmacy, alsmart@carilionclinic.org; Lauren McDaniel, Pharm.D., BCIDP, Carilion Clinic, Pharmacy; Angela Perhac, Pharm.D., BCIDP, Carilion Clinic, Pharmacy; Nathan Everson, Pharm.D., AAHIVE, BCIDP, Carilion Clinic, Pharmacy

**38. Impact of pharmacist review on continuation of stress ulcer prophylaxis (R42)**

**Authors:** Chase Barnes, PharmD, Carilion Roanoke Memorial Hospital, Pharmacy, cebarnes@carilionclinic.org; Randi Earls, PharmD, CDE, Carilion Roanoke Memorial Hospital, Pharmacy; Jennifer Wright, PharmD, BCPS, Carilion Roanoke Memorial Hospital, Pharmacy; Bradford McDaniel, PharmD, BCPS, BCCCP, Carilion Roanoke Memorial Hospital, Pharmacy

**39. Beers medications and their association with non-geriatric falls (R60)**

**Authors:** Adam Maerz, MBBS, Carilion, General Surgery, ahmaerz@carilionclinic.org; Ben Walker, BS, Carilion, VTC SOM; Mark Hamill, MD, Carilion, Surgery ; Allison TEgge, PhD, Carilion, VTCRI

**40. Clostridium Difficile Infection in the Elderly: Beyond the Gut (F28)**

**Authors:** Stephanie E. Nagy-Agren, MD, Virginia Tech Carilion School of Medicine, Infectious Diseases, stephanie.nagy-agren@va.gov; Maria J. Fernandez Cotarelo, MD PhD, Hosp Univ Mostoles, Internal Medicine

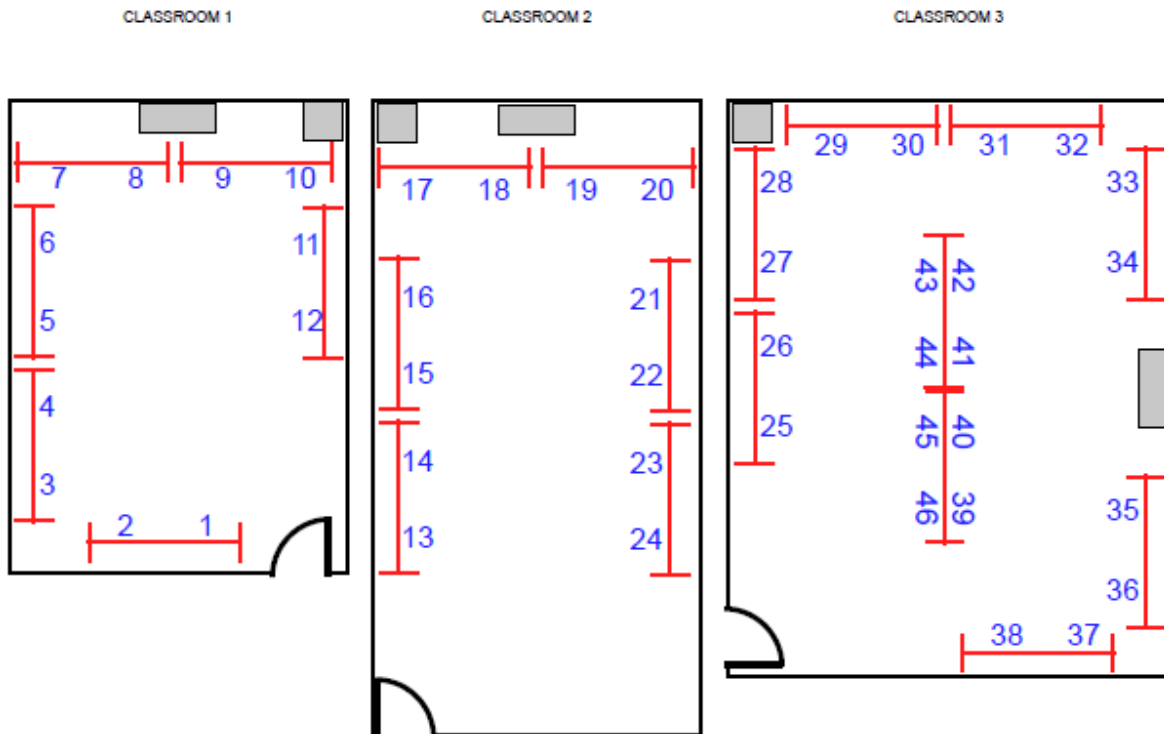
**41. Cost savings associated with potential monoclonal antibody dose rounding protocol (R58)**

**Authors:** Collin Strunk, PharmD, Carilion Clinic, Pharmacy, cstrunk@carilionclinic.org; Megan Goodwin, PharmD, BCPS, Carilion Clinic, Pharmacy; Jason Hoffman, PharmD, BCPS, Carilion Clinic, Pharmacy

**42. Utilization of Beta Blockers in Patients with Traumatic Brain Injuries (R56)**

**Authors:** Collin Strunk, PharmD, Carilion Clinic, Pharmacy , cstrunk@carilionclinic.org; Sandra Rummyantsev, PharmD, Carilion Clinic, Pharmacy ; Mimi Liu, PharmD, MBA/HSA, Carilion Clinic, Pharmacy; Robert Howitt, PharmD, BCPS, Carilion Clinic, Pharmacy; Janie Faris, PharmD, BCPS, BCCCP, Carilion Clinic, Pharmacy

## Poster Session III (Student)



**Poster Presenters please display your poster after 1:00 pm and be present in person from 2:00-3:00 pm. Remove your poster after session end**

### Classroom 1

Orthopaedics/ Trauma/ Surgery

#### 1. Nonspecific, Refractory Elbow Pain in an Adolescent Male (S9)

**Authors:** Taylor MacDonald, MS3, VTC-SOM, School of Medicine; Travis Nelson, MD, Carilion Clinic [jtnelson@carilionclinic.org](mailto:jtnelson@carilionclinic.org); Family Medicine; Briana Beach, DO, Carilion Clinic, Family Medicine; Eric Noh, DO, Carilion Clinic, Family Medicine; Priscilla Tu, DO, Carilion Clinic, Family Medicine \* Student's Mentor: Eric Noh, DO, Carilion Clinic, Family Medicine

#### 2. Efficacy of Intraoperative Marcaine Adductor Canal Block during TKA (S45)

**Authors:** Dan Park, MS3, Carilion Clinic, Orthopedic Surgery, [dan0401@vt.edu](mailto:dan0401@vt.edu); Grace Schumer, MD, VTCSOM, Orthopedic Surgery \* Student's Mentor: John W. Mann III, MD, Carilion Clinic, Orthopedic Surgery

### **3. Effects of Clinical Experience Variation on Physical Therapy Licensure Outcomes (S54)**

**Authors:** Molly Polizotto, Student of Physical Therapy, Radford University, Physical Therapy, mpolizotto@radford.edu; \* Student's Mentor: Renee Huth, Doctor of Physical Therapy, Radford University, Physical Therapy

### **4. Yield Strength Evaluation of TXA exposed bone cement (S55)**

**Authors:** davit shahmanyan, BS, Virginia Tech Carilion SOM, Medical Student, dshahmanyan@carilionclinic.org; Zakk Walterscheid, MD, UW Medicine, Orthopedics \* Student's Mentor: Thomas Shuler, MD, Carilion Clinic, Orthopedics

### **5. Use of Visual Evoked Potential (VEP) Monitoring during Spine Surgery (S58)**

**Authors:** Melika Zarei, BS, Virginia Tech Carilion, School of Medicine, mzarei@carilionclinic.org; Pamela L. Zollinger, MD, Anesthesia Consultants of Virginia, Anesthesia; Maxine M. Lee, MD, MBA, Anesthesia Consultants of Virginia, Anesthesia; Jacob J. Elias, PHD, MHA, Jefferson College of Health Science, Healthcare Administration \* Student's Mentor: Jonathan J. Carmouche, MD, Carilion Clinic, Institute of Orthopaedics & Neuroscience, Orthopaedics

### **6. Systems factors influence operative duration and turnover time (S64)**

**Authors:** Rosemary M. Mallonee, MS3, VTCSOM, Medical Student, rmallon4@vt.edu; Allison Tegge, Ph.D, Virginia Tech, Department of Statistics; Sarah Parker, Ph.D, Fralin Biomedical Research Institute at VTC, The Parker Laboratory \*Student's Mentor: Shawn Safford, MD, Carilion Clinic, Department of Surgery

### **7. Perioperative anxiety in a pediatric surgery cohort: A preliminary analysis (S67)**

**Authors:** Lisa Crisalli, BS, Virginia Tech Carilion, School of Medicine, lcrisalli@carilionclinic.org; Whitney Norbo, NP, Carilion Clinic, Pediatric Surgery \*Student's Mentor: Shawn D. Safford, MD, Carilion Clinic, Pediatric Surgery

### **8. Anatomical, Diagnostic Considerations in Tracheostomy Management for Emergency Medicine Providers (S12)**

**Authors:** Malek H. Bouzاهر, M.S., Virginia Tech Carilion School of Medicine, Student, malebou@vtc.vt.edu; Mustafa Rasheed, B.S., Virginia Tech Carilion School of Medicine, Student \* Student's Mentor: Keel E. Coleman, D.O., M.B.A., Carilion Clinic, Emergency Medicine

## Obstetrics/ Gynecology

### **9. Confirmatory Analysis of Prenatal Screening Tool for Self-Efficacy Hospital EBMF (S3)**

**Authors:** Elizabeth I. Kennedy, MPH, MCHES, CDE-E, A.t. Still University; Carilion Clinic; VTC School of Medicine /JCHS Department of Interprofessionalism, Interpreter Services & Diabetes Management, eikennedy@carilionclinic.org; Adrienne Uphoff, MD, IBCLC, VTC School of Medicine, Ob/GYN; Candace Ayars, PhD,

A. T. Still University, College of Graduate Health Studies; Meg Sheppard, PhD, A.T. Still University , College of Graduate Health Studies \*Student's Mentor: Amanda B. Murchison, MD, Virginia Tech Carilion School of Medicine, Obstetrics and Gynecology

## Gastroenterology

### 10. MUC2, BMP4, & CDX2 as Markers of Barrett's Esophagus (S20)

**Authors:** Airi Katoh, BA, VTCSOM, Student, akatoh@carilionclinic.org; Jonathan Bern, MD, Carilion Clinic, Department of Gastroenterology; Kristin Knight, MS, Carilion Clinic, Research and Development \*Student's Mentor: Douglas J. Grider, MD, Carilion Clinic, Department of Pathology

## Cardiology

### 11. Plasma cell-based cardiac tamponade: a case report and literature review (S5)

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## Classroom 2

### Pediatrics

### 13. Wearable Monitoring System in Infants with Neonatal Abstinence Syndrome (S25)

**Authors:** Charles Aardema, BS Animal Science, BS Biology, Virginia Tech, Mechanical Engineering, caardema@vt.edu; Hannah M. Nowinski, student, Virginia Tech, Mechanical Engineering; Elan Ahronovich, BS Biology, Virginia Tech, Mechanical Engineering; Colton Egan, student, Virginia Tech, Mechanical Engineering; Madeline Urso, student, Virginia Tech, Mechanical Engineering; Caroline Willi, student , Virginia Tech, Mechanical Engineering; Yousef Albanayan, student, Virginia Tech, Mechanical Engineering; Gabriel Miranda, student, Virginia Tech , Mechanical Engineering; Christian James, MS Mechanical Engineering, Virginia Tech, Mechanical Engineering; Andre Muelenaer, MD, MS, Virginia Tech, Biomedical Engineering and Mechanics \*Student's Mentor: Jacinda Hays, DO, Virginia Tech Carilion School of Medicine, Pediatrics

### 14. Modification of a Fetal Monitor for Use in Malawi (S30)

**Authors:** Kierstin A. Jenne, Student, Virginia Tech, Biological Systems Engineering, kjenne7@vt.edu; Maia J. Huntington, Student, Virginia Tech, Biological Systems Engineering; Seth D. Oliveira, Student, Virginia Tech, Biological Systems Engineering; Molly E. Simon, Student, Virginia Tech, Biological Systems Engineering; Hoang Hoa T. Nguyen, MD, Carilion Clinic, Department of Obstetrics and Gynecology; Penelope A. Muelenaer, MD, MPH, Virginia Tech Carilion School of Medicine, Department of Pediatrics; Christopher Riha, MS, Chris Riha Consulting, N/A \*Student's Mentor: Andre A. Muelenaer, MD, MS, Carilion Clinic, Department of Pediatrics

### 15. Relationship between Socio-demographic Factors and Pediatric Obstructive Sleep Apnea Symptoms (S27)

**Authors:** Malek H. Bouzaher, M.S., Virginia Tech Carilion School of Medicine, Student, mhbouzaher@gmail.com; Lena M. Turkheimer, M.P.H, Virginia Tech Carilion School of Medicine, Student \*Student's Mentor: Travis D. Reeves, M.D., Carilion Clinic, Otolaryngology

#### **16. Hospital course and nutrition in pediatric patients with G Tubes (S37)**

**Authors:** Mustafa N. Rasheed, BS, Virginia Tech Carilion School of Medicine, School of Medicine, mnrasheed@carilionclinic.org; Jane Gay, BA, Virginia Tech Carilion School of Medicine, School of Medicine; Christopher D. Liao, BS, Virginia Tech Carilion School of Medicine, School of Medicine; Brian Saway, BA, Virginia Tech Carilion School of Medicine, School of Medicine; Matthew Vinson, BA, Carilion Clinic, Emergency Department; Michael Hart, MD, Carilion Clinic, Department of Pediatrics \*Student's Mentor: Terri-Ann Wattsman, MD, Carilion Clinic, Pediatric Surgery

#### **17. Effect of gender and prematurity on pediatric opiate use (S52)**

**Authors:** Matthew G. Vinson, B.A., Jefferson College of Health Sciences & Carilion Clinic, Student / Emergency Department, mvinson@jchs.edu; Jane Gay, B.A., Virginia Tech Carilion School of Medicine, School of Medicine; Mustafa Rasheed, B.S., Virginia Tech School of Medicine, School of Medicine; Brian Saway, B.A., Virginia Tech School of Medicine, School of Medicine; Christopher Liao, B.S., Virginia Tech Carilion School of Medicine, School of Medicine; Michael Hart, MD, Carilion Clinic, Department of Pediatrics \*Student's Mentor: Terri-Ann Wattsman, M.D., Carilion Clinic, Pediatric Surgery

#### **18. Changing patterns of narcotic and antibiotics in pediatric G-tube patients (S53)**

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#### **19. Longitudinal Retrospective Study of G-tube Outcomes in the Pediatric Population (S57)**

**Authors:** Jane J. Gay, B.A., VTCSOM, School of Medicine, jagay01@vt.edu; Christopher Liao, B.S., VTCSOM, School of Medicine; Brian Saway, B.A., VTCSOM, School of Medicine; Mustafa Rasheed, B.S., VTCSOM, School of Medicine; Matthew Vinson, B.A., Carilion Clinic, Emergency Department; Michael Hart, MD, Carilion Clinic, Pediatrics; Terri-Ann Wattsman, MD, Carilion Clinic, Pediatric Surgery \*Student's Mentor: Terri-Ann Wattsman, MD, Carilion Clinic, Pediatric Surgery

#### **20. Affordable Valved Holding Chambers for Pediatric Asthma Therapy (S62)**

**Authors:** Kaila Martin, student, Virginia Tech, Biological Systems Engineering, kaila306@vt.edu; Rebecca A. Schmieley, student, Virginia Tech, Biological Systems Engineering; Myles Sullivan, student, Virginia Tech, Biological Systems Engineering; Josh James, student, Virginia Tech, Biological Systems Engineering; Andrew K. Miller, MD, Carilion Clinic, Pediatrics; Andre Muelenaer, MD,MS, Virginia Tech, Biomedical Engineering and Mechanics \*Student's Mentor: Joseph R. Tamez, MD, Carilion Clinic, Pediatrics

### Critical Care

#### **21. Outcomes with Third-Line Vasopressors on In-Hospital Mortality in Septic Shock (S1)**

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#### **22. Use of an Early Warning System to Improve Patient Outcomes (S22)**

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#### **23. Anti-inflammatory effects of extracorporeal membrane oxygenation (ECMO). More than support? (S44)**

**Authors:** Tom X. Liu, BA, Virginia Tech Carilion School of Medicine, Fralin Biomedical Research Institute, School of Medicine, txliu@vtc.vt.edu; Scott W. Arnold, MD, Carilion Clinic, Cardiothoracic Surgery \*Student's Mentor: Mark Joseph, MD, Carilion Clinic, Cardiothoracic Surgery

#### **24. Ultrasonographic Discrimination of Cellulitis versus Pseudocellulitis (S61)**

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### Classroom 3

#### Psychiatry

#### **25. Should We Prescribe Different Dosages of Psychotropic Medications by Sex? (S7)**

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#### **26. Medical Students' Knowledge and Perception of Deep Brain Stimulation (S31)**

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#### **27. Neuromodulation and Suicidality: A Review of The Literature (S33)**

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### **28. Current Advances for Treating Substance-use Disorders with Transcranial Magnetic Stimulation (S38)**

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### **29. Case Report of Late Onset Catatonia (S60)**

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## Infectious Diseases

### **30. Recurrent EBV in Patient with History of Post-Transplant Lymphoproliferative Disorder (S11)**

**Authors:** Anisha R. Chada, BA, Virginia Tech Carilion School of Medicine, N/A, achada@vt.edu; Asim Rana, MBA, MD, Carilion Clinic, Internal Medicine \*Student's Mentor: Ralph A. Blackwood, MD, Virginia Tech Carilion School of Medicine, Carilion Clinic, Internal Medicine

### **31. Escherichia coli Bacteremia and Sepsis: Biofilm Effect on Patient Outcomes (S23)**

**Authors:** Kermit S. Zhang, Medical Student, Virginia Tech Carilion School of Medicine, Infectious Diseases, szhang1@carilionclinic.org; Jayasimha Rao, PhD, Jefferson College of Health Sciences/Carilion Clinic, Infectious Diseases; Mariana Gomez de la Espriella, MD, Carilion Clinic, Infectious Diseases; Daniella Schneider, P.A, Jefferson College of Health Sciences, Health Science Program; Diana L. Willeman-Buckelew, PhD, Jefferson College of Health Sciences, Health Science Department; Rakesh Biswas, BS, VTCSOM, VTCSOM \*Student's Mentor: Anthony W. Baffoe-Bonnie, MD, Virginia Tech Carilion School of Medicine/ Carilion Roanoke Memorial Hospital, Infectious Diseases

### **32. Effects of Preoperative MRSA Colonization on Implant-Based Breast Reconstruction (S26)**

**Authors:** Steven Svoboda, B.S., VTCSOM, Medical Student, sasvoboda@carilionclinic.org; Christopher Liao, B.S., VTCSOM, Medical Student; Kurtis Moyer, M.D., Carilion Clinic, Plastic & Reconstructive Surgery \*Student's Mentor: Mathew Applebaum, M.D., Carilion Clinic, Plastic & Reconstructive Surgery

### **33. Identification of Bacterial Isolates from the Virginia Intercollegiate Anatomy Laboratory (S28)**

**Authors:** Dillon Skovira, College Senior, Jefferson College of Health Sciences, Biomedical Sciences, dcskovira@jchs.edu; Shawna Clarke, College Senior, Jefferson College of Health Sciences, Biomedical Sciences; John McNamara, MPA, MS, DC, Virginia Tech Carilion School of Medicine, Basic Science; Susan Tolliver, MBA, Jefferson College of Health Sciences, Biomedical Sciences; David Lugar, BS, Virginia Tech Carilion School of Medicine, Basic Science; Jayasimha Rao, Ph.D., Jefferson College of Health Sciences, Basic Science \*Student's Mentor: Sara Houser, MS, Jefferson College of Health Sciences, Biomedical Sciences

### **34. Urinalysis Reflex Culture and Antibiotic Prescriptions in the ED (S56)**

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[Surgery/ Neurosurgery](#)

### **35. Rapidly fatal encephalitis associated with atypical lymphoid proliferation: Case report (S2)**

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### **36. Effect of Noise on Fine Motor Skills, Cognition, and Mood (S4)**

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### **37. Near real-time prediction of eye gaze in endoscopic surgeries (S6)**

**Authors:** Subhash Holla Hosakoppa Sukumar, BS, Virginia Polytechnic Institute and State University, Grado Department of Industrial & Systems Engineering, subbu23@vt.edu; Sarah Parker, Ph.D., Virginia Tech Carilion Research Institute, Virginia Tech Carilion Research Institute; Shawn Safford, M.D, Virginia Tech Carilion Clinic Medical School, Virginia Tech Carilion Clinic Medical School \*Student's Mentor: Nathan Lau, Ph.D., Virginia Polytechnic Institute and State University, Grado Department of Industrial & Systems Engineering

### **38. Too Many Cooks? The Proliferation of Authors in Neurosurgical Papers (S14)**

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### **39. Too Many Beers? Analyzing Beers Criteria Medications and Traumatic Falls (S46)**

**Authors:** Benjamin S. Walker, BS, VTCSOM, VTCSOM M3 Medical Student, bswalker@carilionclinic.org; Bryan Collier, DO, Carilion Clinic, Trauma/Surgical Critical Care; Katie L. Bower, MD, Carilion Clinic, Trauma/Surgical Critical Care; Daniel Lollar, MD, Carilion Clinic, Trauma/Surgical Critical Care; Emily Faulks, MD, Carilion Clinic, Trauma/Surgical Critical Care; Miguel Matos, DO, Carilion Clinic, Trauma/Surgical Critical Care; Michael Nussbaum, MD, Carilion Clinic, General Surgery \*Student's Mentor: Mark Hamill, MD, Carilion Clinic, Trauma/Surgical Critical Care

### **40. Developing Educational Materials to Decrease Prescribing of Potentially Inappropriate Medications (S51)**

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#### **41. Multimodal Approach to Pain Management in Lumbar Spine Surgery (S43)**

**Authors:** Yazan Alshawkani, BS, Virginia Tech Carilion, School of Medicine, yyalshawkani@carilionclinic.org; Melika Zarei, BS, Virginia Tech Carilion, School of Medicine; Anirudh K. Gowd, BS, Virginia Tech Carilion, School of Medicine \*Student's Mentor: Jonathan J. Carmouche, MD, Carilion Clinic, Institute of Orthopaedics & Neuroscience, Orthopaedics

#### **42. Does repeat compression by robotic staplers increase colonic anastomotic leaks? (S66)**

**Authors:** Jay J. Patel, MS3, VTCSOM, Medical School, jaypatel@vt.edu; Michael Nussbaum, MD, Carilion Clinic, Surgery \*Student's Mentor: Farrell Adkins, MD, Carilion Clinic, Surgery

### Oncology

#### **43. Evaluating STAT3 and Aiolos in lymphocyte mimicry associated with metastasis (S8)**

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#### **44. PIK3CB and Connexin-43 Inhibition Sensitizes Glioblastoma Cells to Temozolomide (S10)**

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#### **45. Selective Activation of PIK3CB in Glioblastoma Multiforme (S35)**

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#### **46. Feasibility of an Integrated Exercise Program for Patients Receiving Chemotherapy (S40)**

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**Title:** Epigenetic silencing of MLH1 and outcomes in endometrial cancer

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**Abstract/Case Study:** Objective To describe clinicopathologic characteristics and recurrence rates of endometrial adenocarcinomas based on mismatch repair (MMR) status classification. Methods A retrospective study was conducted among all women with endometrial adenocarcinomas treated at Carilion Clinic from 2012 through 2017. Cases were categorized by MMR status 'intact mismatch repair (MMR+), probable MMR mutation (MMR-), or hypermethylation of MLH1 promoter (hMLH1+). Clinical and pathologic data were abstracted by chart review and compared using ANOVA, Fisher's exact test, Kaplan-Meier product limit and log rank test. Results: Three hundred seventy women were categorized into three groups based upon the results of MMR testing: MMR+ (77.3%), MMR- (5.4%), or hMLH1+ (17.3%). The hMLH1+ patients were significantly older ( $P = <0.001$ ). Demographic characteristics were otherwise well matched. Tumors from hMLH1+ patients were significantly more likely to exhibit grade 3 histology, compared to MMR+ and MMR- (17.2% vs 13.8% vs 10.5% respectively,  $P = 0.009$ ). The hMLH1+ and MMR- patients were more likely to exhibit presence of lymphovascular space invasion than MMR+ (22.2% vs 25.0% vs 10.3% respectively,  $P = 0.01$ ). No difference was noted in depth of invasion, stage, lymph node status, nor rate of adjuvant treatment. Early-stage endometrioid-type tumors were more likely to recur among hMLH1+ patients than MMR+ or MMR- patients (16.7% vs 2.2% vs 0%, respectively,  $P <0.001$ ). There was no difference in the rate of recurrence among advanced-stage endometrioid-type tumors for the three groups. Recurrence-free survival was significantly reduced in the hMLH1+ group for endometrioid-type tumors ( $P = 0.01$ ). Conclusions: Women with hMLH1+ endometrial cancer present at an older age and are more likely to exhibit a high-grade histology and lymphovascular space invasion. Significantly higher recurrence rates are noted with early-stage, hMLH1+ endometrioid-type tumors. Recurrence-free survival is decreased in hMLH1+ patients. This may have implications for adjuvant treatment decisions in these patients.

**Title:** Postoperative pain: dermatologists' perceptions and how perceptions influence opioid prescribing

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**Abstract/Case Study:** Background: Opioid abuse in America has become an epidemic. There is evidence to suggest that thousands of patients are at risk for long term opioid use as a result of prescriptions that they receive from dermatologists. However, little is known about dermatologists' perceptions of postoperative pain and how they correlate with patient perceptions of pain. The objective of this study was to determine how physician perceptions of postoperative pain after Mohs micrographic surgery correlate with patient reported pain and affect physician opioid prescribing practices. We also sought to determine if patients receiving opioids were more satisfied with their pain control. Methods: Patients presenting for Mohs micrographic surgery completed pain surveys using the Numerical Rating Scale (0-10) on the evening of surgery (day 0). Patients also rated their satisfaction with their pain control on a 0-10 scale. After the repair, the physician recorded a prediction of the patient's pain level on the evening of surgery using the Numerical Rating Scale (0-10). Patients also recorded all analgesic medications taken in the postoperative period. Results: A total of 316 of 451 patients recruited completed the surveys. There is no significant difference between mean day 0 patient reported pain ( $2.7 \pm 2.5$ ) and physician predicted pain ( $2.9 \pm 1.1$ ;  $p=0.13$ ). Correlation between physician predicted pain and patient reported pain was significant ( $p < 0.001$ ;  $r = 0.27$ ). The majority (70%) of physician predictions were within 2 points of patient reported pain. Opioids were prescribed to 15.3% of patients. Patients prescribed opioids were no more satisfied with their pain control ( $p=0.001$ ). Conclusions: Physician predictions of perceived patient pain were within two points of patient reported pain in most cases. Physicians were more likely to prescribe opioids for patients with higher predicted pain. Patients who were prescribed opioids were no more satisfied with their level of pain control than patients who did not receive opioids.

**Title:** Robotic vs Laparoscopic Bariatric Surgery: Our Experience to Date

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**Abstract/Case Study:** Introduction: Bariatric surgery has been demonstrated to be both safe and effective in the treatment of morbid obesity with over 200,000 cases were performed in the United States in 2017. As robotic surgical technology advances, there is growing interest in its use in bariatric surgery. Methods: A retrospective review was performed of all Roux-en-Y Gastric Bypass (RYGB) and sleeve gastrectomy cases performed by a single surgeon at our institution between June 2016 and November 2018. Mean operative time, PACU time, and hospital length of stay (LOS) were assessed for each procedure and compared between laparoscopic and robotic techniques. Results: With RYGB, we saw an increase in operative time of 30 minutes (118.5 ' 148.4 minutes,  $p < 0.01$ ) with a decrease in PACU time (267.8 ' 219.3 minutes,  $p = 0.03$ ) and a trend toward decreased overall LOS (3.7 ' 1.6 days,  $p = 0.08$ ) after transitioning to the robotic technique. There was a slight trend towards increased operative time (102.6 ' 113.7 minutes,  $p = 0.09$ ) and decreased LOS though neither of these met criteria for statistical significance (3.68 ' 1.6 days,  $p = 0.07$ ). Sleeve gastrectomy did demonstrate a decrease in PACU time (231.4 ' 156.5 minutes,  $p = 0.02$ ). Conclusions: Operative time increased slightly for both procedures, but the improvements in PACU time and hospital LOS for our bariatric surgery patients improve hospital throughput, decrease total cost of care, and allow earlier return to daily routines for patients. We have seen a decreased supply cost for RYBG from \$4,383.00 to \$3,606.42 and \$2894.44 to \$2835.85 for sleeve gastrectomy. This data represents our first 53 RYGBs and 47 sleeve gastrectomies performed using the robotic approach. Evaluation of our data shows an overall decrease in operative time in the past year which we anticipate will continue to decrease..

**Title:** Impact of a novel fidaxomicin order set on *Clostridioides difficile* infection

**Authors:** Rose Kohinke, Pharm.D.; Lauren McDaniel, Pharm.D., BCIDP; Angela Perhac, Pharm.D., BCIDP; Nathan Everson, Pharm.D., BCIDP, AAHIVE

#### Abstract

**Background:** *Clostridioides difficile* infection (CDI) is the leading cause of nosocomial diarrhea. Fidaxomicin is recommended by the 2018 Infectious Diseases Society of America (IDSA) guidelines as a first-line treatment in adult patients. In January 2018, Carilion Roanoke Memorial Hospital (CRMH) implemented a clinical decision order set directing providers to initiate fidaxomicin for CDI in patients at high risk of recurrence. The purpose of this project was to assess the impact of this order set on the overall management of CDI.

**Methods:** This was a quasi-experimental study involving adults with a first or second diagnosis of CDI before and after orderset implementation. Patients receiving laxatives within 24 hours and those with fulminant CDI were excluded. Pre-implementation was defined as May 1, 2017 to November 31, 2017 and post-implementation as May 1, 2018 to November 31, 2018. The primary endpoint was recurrence (defined as diarrhea and a positive GDH with toxin or PCR within 4 weeks post-treatment). Secondary endpoints were clinical cure (resolution of symptoms within two days after completing therapy), global cure (cure with no recurrence within 3 months), 30-day mortality, and 30-day readmissions.

**Results:** A total of 282 patients were eligible for analysis. In the pre-group, 59.1% received metronidazole, 39.6% oral vancomycin, and 1.3% fidaxomicin. In the post-group, fidaxomicin use increased to 52.3%. Metronidazole use decreased to 3.1% and oral vancomycin increased to 44.5%. Order set compliance was 70.9%. The rate of recurrence was lower in the post-group (30.2% vs 20%,  $P=0.019$ ) and global cure was higher (68.2% vs. 81.3%,  $P=0.027$ ). Clinical cure (93.7% vs. 96.7%,  $P=0.39$ ) was similar. There was no difference in 30-day mortality (10.4% vs. 10.2%,  $P=1.00$ ) or 30-day readmissions (35.2% vs. 30%,  $P=0.356$ ).

**Conclusion:** Implementation of this order set succeeded in increasing the use of fidaxomicin, significantly decreasing recurrence and increasing global cure of uncomplicated CDI.

**Title:** Evaluation of timing of first antimicrobial dose in septic patients

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**Abstract/Case Study:** Purpose: The purpose of our study is to evaluate if antimicrobials are being administered within one hour without preventable delays in patients presenting to the emergency department with sepsis. Methods: This was a single center, retrospective, chart review medication use evaluation approved by the institutional review board. The electronic medical record was used to identify patients 18 years or older with an ICD-9 diagnosis code for sepsis and had presented through the emergency department at Carilion New River Valley Medical Center between January 2018 and September 2018. Based on the above criteria 100 patients were identified and evaluated. The primary outcome was the average length of time between arrival to the emergency department and administration of the first antimicrobial dose for patients diagnosed with sepsis. Secondary outcomes included the frequency of antimicrobials given before cultures were drawn, mechanisms leading to delays in treatment, and the length of time until antimicrobials were verified by a pharmacist. Results: The average length of time between arrival to the emergency department and administration of the first antimicrobial dose for patients diagnosed with sepsis was 2.35 hours. Antimicrobials were administered after blood cultures were drawn in 86% of the patients (n=100). Time between pharmacist verification and antibiotic administration lead to the longest delay in treatment (121 minutes, mean). Pharmacist verification of antimicrobials on average took 4 minutes after physician orders were released. Conclusions: The resulting average of 2.35 hours for the primary outcome did not meet current practice recommendations from the Surviving Sepsis Campaign Bundle: 2018 Update. Based on the results of the secondary outcomes, a delay in the administration of antimicrobials may occur in the time between pharmacist verification and the time of antibiotic administration. Further evaluation of possible causes of delay between pharmacist and antibiotic administration are needed.

**Title:** Prodrome of major depressive disorder with psychosis in ALS

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**Abstract/Case Study:** **BACKGROUND:** We present the novel case of a 66-year-old woman who was diagnosed with Amyotrophic Lateral Sclerosis (ALS) after the onset of an episode of MDD with psychotic features. MDD is an uncommon prodromal symptom of ALS. This case highlights the multidisciplinary approach to management of patients' with MDD with comorbid ALS. **CASE REPORT:** Ms. S is a 66-year-old woman who was seen on the psychiatry consultation-liaison service on an account of 3-month history of depressed mood and weight loss. She had previously been relatively well except for a recent diagnosis of ALS prior to which she had an onset of depressive episode. She complained of hearing demeaning voices, poor sleep, anhedonia and a 40 pounds weight loss. She exhibited poor oral intake and paranoid delusional thinking. She was noted to have bradykinesia, chelitis and impaired speech. Her chief complaint was she should be 'left alone to die'. **CONCLUSION:** This case adds to the literature that points to an association between MDD and ALS. The management of MDD with comorbid ALS requires a multifaceted approach. The patient was started on olanzapine dissolving tablet 7.5 mg nightly and sertraline 100 mg daily. Given the severity of her symptoms, ECT was initially considered. However, careful deliberation with neurology, pulmonology and anesthesiology teams deemed she was a poor candidate for ECT. Over the course of the hospitalization, olanzapine and sertraline were titrated to 20 mg QHS, and 175 mg daily, respectively. Depression and psychosis resolved and she was subsequently discharged in stable condition

**Title:** Correlation Between National Emergency Department Overcrowding Scale and Patient Experience

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**Abstract/Case Study:** Background: The National Emergency Department Overcrowding Scale (NEDOCS) has been utilized as an analytical tool of emergency department resource stress. Patient experience has become a primary focus within the healthcare industry. This study aims to determine if direct correlations exist between the NEDOCS and its variables to a patient's experience. We hypothesize that as the NEDOCS increases, overall experience will be negatively impacted. This is novel research with no known prior direct comparison between these scoring systems. Methods: A retrospective cohort study of discharged patients at an urban Level 1 Trauma Center who completed a third-party standardized patient experience survey over a 2-year period was completed. A Pearson correlation was used to analyze association between NEDOCS and patient experience, using the survey component Likelihood to Recommend the emergency department (ED) as a measure of overall experience. Results: A significant negative correlation was found between overall NEDOCS and survey responses of Definitely Yes for Likelihood to Recommend ( $r=-0.11$ ,  $p<0.01$ ). Correlations with four of the five variables of NEDOCS showed similar significant negative correlations with patient experience: total ED patients ( $r=-0.10$ ,  $p=0.01$ ), longest wait in the waiting room ( $r=-0.12$ ,  $p<0.01$ ), longest admit time ( $r=-0.09$ ,  $p=0.02$ ), and number of admitted patients ( $r=-0.13$ ,  $p<0.001$ ). As the number of each of these elements increased, the survey responses of Definitely Yes for Likelihood to Recommend decreased. Conclusion: Resource stress, evident by the overall NEDOCS, as well as individual elements, is associated with a poor ED experience as measured by Likelihood to Recommend. While efforts to decrease ED overcrowding can improve patient experience, a novel approach can utilize NEDOCS as an early warning system for overcrowding and patient experience. As NEDOCS increases, ED leaders, providers, and caregivers should have a heightened awareness of the impact overcrowding has on the patient experience and initiate appropriate responses to mitigate this impact.

**Title:** Early Cardiac Rehab to Reduce Heart Failure Readmissions

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**Abstract/Case Study:** The Center's for Medicare and Medicaid Services restrict heart failure patient attendance in Cardiac Rehab. Attendance is limited by diagnosis, ejection fraction, and patients must be considered stable before starting the program (at least six weeks post discharge from the hospital). Carilion Clinic has attempted to bridge this gap in service by providing an 8 session free CR program with no restrictions. The aim of the 8 session program is to reduce HF readmission rates. This IRB-approved study used a retrospective quasi-experimental comparison group design incorporating Epic Electronic Medical Record analysis for HF patients discharged between March 2013 and December 2017. Early CR attendance (within six weeks of discharge from the hospital) and readmission rates were evaluated in this study. The treatment group was identified as HF patients who had attended at least one CR visit within the first 6 weeks following discharge. The comparison group was identified as all HF patients who had not been admitted to the hospital during the previous one year period, were discharged to home/self-care, and did not attend CR within six weeks of being discharged from the hospital. Thirty-day and 6-week readmission rates were compared between the treatment and comparison groups. Out of 8,613 HF patients, 205 (2.4%) attended at least one session of CR within six weeks post discharge. Readmission rates for comparison group versus treatment group were: 2.7% versus 1.0% for 30-day readmission for HF ( $p=0.13$ ); 14% versus 5.9% for 30-day all-cause readmission ( $p<0.01$ ); 3.5% versus 1.0% for 6-week readmission for HF ( $p<0.05$ ); 17% versus 7.7% for 6-week all-cause readmission ( $p<0.01$ ). Statistically significant study results support early access to CR in reducing HF patient re-hospitalization rates.

**Title:** Is Fecal Lactoferrin a predictor of IBD Disease Severity?

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**Abstract/Case Study:** Endoscopy, gold standard for assessing disease activity in inflammatory bowel disease (IBD) cannot be used for frequent monitoring. Biomarkers like fecal lactoferrin [FL] and CRP are used to monitor response to therapy. There is a need to validate biomarkers to differentiate between inactive, mild, moderate and severe disease. Aims: To determine the accuracy of FL, CRP and WBC in predicting disease severity as assessed by the Simple Endoscopic Score for Crohn's Disease (SES-CD) and the Disease Activity Index for ulcerative colitis (DAI-UC). Methods: Retrospective analysis of IBD patients charts from 2008 to 2016. Median levels for FL ( $\mu\text{g/g}$ ), CRP ( $\text{mg/dL}$ ) and WBC ( $\text{K}/\mu\text{L}$ ) were compared to endoscopy scores for significant differences ( $p < 0.05$ ) between categories of disease severity. P-values were determined by post hoc pairwise of ANOVA. Results: 149 patients (92 CD and 57 UC). Average age was 37, 90 females. In CD patients, FL median levels showed a difference for inactive ( $20 \mu\text{g/g}$ ) vs mild ( $102 \mu\text{g/g}$ ), inactive vs moderate ( $104 \mu\text{g/g}$ ), mild vs severe ( $762 \mu\text{g/g}$ ) and moderate vs severe activity. CRP median levels were different for inactive ( $0.41 \text{ mg/dL}$ ) vs severe ( $2.43 \text{ mg/dL}$ ), and mild ( $0.87 \text{ mg/dL}$ ) vs severe activity. In UC patients, FL separated mild ( $56 \mu\text{g/g}$ ) vs moderate ( $427 \mu\text{g/g}$ ); and mild vs severe ( $766 \mu\text{g/g}$ ) cases. CRP was different between mild ( $0.35 \text{ mg/dL}$ ) vs severe ( $1.60 \text{ mg/dL}$ ); and for moderate ( $0.55 \text{ mg/dL}$ ) vs severe cases. WBC median levels were similar across all categories for both CD and UC. Estimates of coefficients contrasting the accuracy in discriminating different disease activities showed larger p-values for CRP than for FL in most cases (Table 1 and Table 2). Conclusions: FL differentiated between categories of disease severity defined by endoscopic score for both CD and UC patients. These results provide strong evidence that higher levels of FL indicate more active IBD.

**Title:** Assessment of Nutrition Policies at Food Pantries in the US

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**Abstract/Case Study:** Emergency food networks often include food banks, food pantries, and other meal programs. In most cases, food banks do not directly distribute food to households or individuals, whereas food pantries serve that function. Typically, food pantries receive food from food banks; however, most food pantries also accept food donations directly from the community and purchase food items to fill gaps in their offerings. While recent literature has shown that nutrition policies at food banks are on the rise, the role of nutrition policies at food pantries is relatively unknown. The primary aim of this study was to assess the strength and comprehensiveness of nutrition policies at food pantries. A cross-sectional survey was sent to pantries (N=5500) across the United States to assess nutrition policies currently in place. Submitted nutrition policies were then coded by two researchers to determine the strength and comprehensiveness of the written policy. Twenty-three items were individually coded and combined into six components. Scoring was assessed as a 0, 1, or 2 for each item. Where 0 was not addressed in the policy, 1 was addressed but not specific, and 2 was addressed and specific. Of the 1539 pantries that provided a completed survey (28%), approximately 18% (n=282) reported having a written nutrition policy. Forty pantries submitted policies to be coded, but the majority (n=27) were not specific to nutrition and therefore were defaulted to a score of zero for both strength and comprehensiveness. The average strength (M=0.16, SD=0.23) and comprehensiveness (M=0.34, SD=0.18) of the policies coded were relatively low, with the implementation component scoring lowest for both. A better understanding of what constitutes an effective nutrition policy, and how to draft, adopt, and implement the policy is needed for food pantries to improve the distribution of healthful foods within their organization.

**Title:** Anti-CASPR2 Acquired Neuromyotonia in a Patient with Undiagnosed Dejerine-Sottas Syndrome

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**Abstract/Case Study:** Charcot-Marie-Tooth (CMT) disease is a group of hereditary motor sensory neuropathies characterized by peripheral nerve dysfunction from demyelination or axonal damage. CMT is subclassified into 5 subtypes. CMT3 or Dejerine-Sottas syndrome is a rare form of demyelinating CMT usually manifesting before age 3. Affected individuals develop progressive weakness, loss of muscle mass, hand and foot deformities progressing to severe debility. It is predominantly inherited as autosomal dominant but recessive forms have been described as in periaxin (PRX) mutation associated CMT3. A 25-year-old Honduran male presented with acute generalized disabling, painful carpopedal and proximal extremity spasms over 2 weeks. Despite receiving all their childhood vaccinations, he and his 29-year-old sister were diagnosed with polio after developing progressive weakness as children. Examination was significant for neuromyotonia (NMT) with myokymia, hyperhidrosis, hyporeflexia, generalized muscle stiffness and bilateral pes cavus. Serum creatine kinase was elevated at 8,051 U/L. Nerve conduction studies showed generalized axonal sensorimotor polyneuropathy with non-specific myokymia in multiple muscles. Contactin-associated protein 2 (CASPR2) antibodies were positive. Whole exome sequencing revealed heterozygosity for two PRX gene mutations. CT head, chest, abdomen/pelvis were unremarkable. He was diagnosed with CMT3 with acquired CASPR2 neuromyotonia and started on carbamazepine with dramatic improvement. NMT is a form of peripheral nerve hyperexcitability causing spontaneous muscular activity resulting from repetitive motor unit action potentials manifesting in tonic muscle contraction, hyperhidrosis and myokymia. Acquired, paraneoplastic and hereditary forms exist. Autoimmune neuromyotonia is caused by antibodies related to leucine-rich glioma-inactivated 1 (LGI1) and CASPR2. Treatment involves membrane stabilizing drugs such as carbamazepine, corticosteroids, intravenous immunoglobulin and plasma exchange. We postulate an acquired autoimmune milieu was created in our patient due to the coexistence of CMT3 resulting in myelin destruction and exposure of neuronal tissue. We highlight an exceptionally rare case of undiagnosed CMT3 presenting with acquired autoimmune CASPR2-associated neuromyotonia.

**Title:** Cooperative roles for Aiolos and STAT3 in TH17 differentiation

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**Abstract/Case Study:** TH17 cells are a subset of T helper cells involved in mucosal immunity that are defined, in part, by their production of the proinflammatory cytokine IL-17. Dysregulated Th17 cells have been implicated in several autoimmune diseases, such as multiple sclerosis and inflammatory bowel disease. Therefore, there is substantial interest in understanding the mechanisms underlying their differentiation and function. TH17 development requires signals from IL-6 to activate STAT3, which positively regulates the expression of proinflammatory genes including Il17a and Il17f. Our recent work established that the Ikaros Zinc Finger (IkZF) transcription factor Aiolos cooperates with STAT3 to positively regulate gene expression in T follicular helper cells. Given the role of STAT3 in TH17 populations, we hypothesized that Aiolos and STAT3 may also regulate the differentiation of TH17 cells. Here, we find that Aiolos expression is significantly increased in TH17 cells as compared to other T helper cell subsets. Corroborating previously published work, we find that overexpression of Aiolos results in reduced expression of Il2, which negatively regulates the TH17 gene program. Intriguingly, we find that concurrent Aiolos and STAT3 overexpression leads to further repression of Il2, as well as increased expression of the pro-TH17 gene Il6ra. However, expression of Rorc, Il17a, and Il17f were unaffected in this system, suggesting that Aiolos and STAT3 cooperate to regulate cytokine signaling pathways in TH17 cells, rather than ROR gamma t or TH17 effector functions. Collectively, these data suggest that Aiolos and STAT3 may cooperatively regulate TH17 differentiation through a feed-forward, cytokine signaling-mediated mechanism.

**Title:** The Effects of Breastfeeding on Neonatal Abstinence Syndrome

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**Abstract/Case Study:** Background: Prenatal opioid maintenance therapy (OMT) exposure is associated with withdrawal symptoms in newborns, a condition called neonatal abstinence syndrome (NAS) (Finnegan, Connaughton, Kron, & Emich, 1975). NAS has been shown to affect 60% to 90% of neonates exposed to drugs in-utero and has become more prevalent since 2000 (Patrick et al., 2012). The effects of breastfeeding on infants born to mothers on OMT is not well understood (Grummer-Strawn & Rollins, 2015). Objective: Our study examines the effects of breastfeeding on infant NAS scores (severity), pharmacologic use, and length of pharmacologic treatment. Methods: Data was extracted retrospectively from the medical charts of infants born to mothers on OMT at Carilion New River Valley or Carilion Roanoke Memorial Hospital. Data were analyzed using propensity score matching, which examines group differences in outcome while controlling for pre-existing differences in background variables (Rosenbaum & Rubin, 1985). Results: Of the sixty infants included in the study, at five days old thirty were being fed formula only, thirteen were breastfed only, and seventeen were fed both breastmilk and formula. Propensity score matching was used to match the thirteen breastmilk only infants to thirteen of the formula-only infants. Mean peak NAS scores in the formula and breastmilk groups were 10.85 and 6.54, respectively ( $p = .049$ ). Mean length of infant pharmacologic treatment was 1.23 months for formula fed infants and .33 months for breastfed infants ( $p = .11$ ). Among matched pairs with one infant receiving pharmacologic treatment and one not receiving treatment, the formula fed infant was more likely to have received pharmacologic treatment ( $p = .13$ ). Conclusion: Although most outcomes were non-significant, the trends matched our hypotheses that breastfeeding decreases NAS severity, pharmacologic use and length of pharmacologic treatment. A prospective study is warranted to further examine the relationship between breastfeeding and NAS.

**Title:** Early Feeding after PEG Tube Placement in TSICU patients

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**Abstract/Case Study:** BACKGROUND: Critically ill patients often experience interruptions in enteral nutrition(EN). For ventilated patients who undergo percutaneous endoscopic gastrostomy(PEG) tube placement, post-procedure fasting varies from 1-24hrs, depending on surgeon's preference. There is no evidence to support prolonged fasting after PEG placement. Hypothesis: There is no increase in complication rate associated with early resumption of EN after PEG placement. METHODS: Adult ventilated trauma and surgical (TSICU) patients who underwent PEG placement by one of 6 surgical intensivists over a 3-year period were selected for study. Practice for post-procedure feeding varied among the 6: 1 started EN at 1hr, 2 at 4hrs, 2 at 6hrs, and 1 at 24hrs. Times to initiation of EN and complication rates were assessed. The patients were divided into early feeding (<4hrs) and prolonged fasting (>4hrs) groups. Fisher's exact test was used to determine whether there was a difference in complication rate. RESULTS: A total of 150 TSICU patients underwent PEG placement. Average post-procedural fasting time was 5.50hrs. Complications included bleeding (2), infection (1), leakage (1), feeding intolerance (1) and aspiration (0). The overall complication rate was 3.3% with feeding intolerance rate 0.66% and aspiration rate 0%. There was no difference in complication rate for early feeding (3.13%) as compared to prolonged fasting (3.39%) (OR 0.92, 95%CI 0.10-8.52, p=0.4). CONCLUSIONS: The data collected from this group's practice correlates with the variability in feeding initiation times practiced nationally. Complication rates following PEG placement in ventilated patients are low and do not change with early feeding <4hr compared to delayed feeding >4hr. The results from this study demonstrate that early feeding after PEG may be safe. With this data, a randomized controlled trial is underway that will provide evidence to support a more consistent practice.

**Title:** Barriers to care for children with orofacial clefts

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**Abstract/Case Study:** Children born with orofacial clefts (OFCs) require complex care from multiple specialties, usually requiring a coordinated multidisciplinary team clinic. However, barriers to care in this population may vary regionally and between urban and rural populations. This study seeks to uncover unique obstacles experienced by parents and children with OFCs in Southwest Virginia. Parents and children with OFCs who are patients at Carilion's Cleft and Craniofacial Center were included. A validated questionnaire consisting of 25 questions was completed by all willing caregivers during their clinic visit from May 2018-February 2019. We analyzed 80 responses. Demographic data were White (74%), African-American (9%), Hispanic (6%), and Asian (6%), similar to regional population statistics with a slightly higher proportion of Asians. Most children for whom the survey was returned were <4 years old (56.9%), born full-term (85.3%), and had both cleft lip and palate (48.6%). Average annual income for most households was '\$50,000 (69.7%)'. A significant number of families travelled 50-100 miles to come to clinic (30%) while 6% travelled >100 miles. The most common health insurance type was public (64.4%); private insurance was held by 34.2% of respondents. Access to relevant medical care closer to home such as speech therapy, dentistry and orthodontics were reported issues for 15-32% of respondents. 'Forgoing clinic visits due to cost or distance' was the most commonly identified barrier in the survey (12.3%) and was associated with travel cost per month ( $p<0.001$ ) and access to community medical resources ( $p<0.01$ ). No association was identified between this barrier and annual income, travel time or distance, or yearly out-of-pocket costs. This questionnaire provides insight into perceived barriers of parents of children with OFCs in Southwest Virginia. Addressing monthly travel costs and availability of community medical resources may improve accessibility to care, health outcomes, and disparities in this population.

**Title:** Retrospective study of dual-proceduralist PEG placement in the pediatric population

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**Abstract/Case Study:** Percutaneous endoscopic gastrostomy (PEG) tubes are widely utilized in pediatric patients; however, no study to date has explicitly examined the outcomes of PEGs performed by two proceduralists. The purpose of our study was to examine the complication rate of PEG placement performed by two proceduralists instead of one. We performed a retrospective cohort study by screening all pediatric patients who underwent gastrostomy tube placement from June 1998 to February 2016. Only patients receiving PEGs by two proceduralists were selected for analysis--the procedure was performed in the presence of both a pediatric gastroenterologist and a pediatric surgeon in a single session. Early (<14 days) and late (between 30 days and 6 months) post-operative complication rates were compared to previously published data from single-proceduralist PEGs. In our cohort, 174 patients (61% male, 39% female) received dual-proceduralist PEGs with an average follow-up time of  $4.3 \pm 3.7$  years. Mean adjusted gestational age and weight at time of procedure was  $3.1 \pm 4.7$  years and  $13 \pm 16$  kg, respectively. Average procedure time was  $15 \pm 10$  minutes, and the average post-operative hospital stay was  $7.2 \pm 12.1$  days. The percentage of patients with '1 early and late PEG-related complication was 12% ( $n = 21/174$ ) and 21% ( $n = 32/164$ ), respectively. Complications consisted mostly of peristomal infections, mechanical injuries, and abnormal granulation tissue. Compared to previously published single-proceduralist PEG data, the dual-proceduralist approach had a lower relative risk of late complications (RR = 0.4661 [0.3130 to 0.6942],  $p < 0.001$ ); however, the risk of early complications was not significantly different ( $p = 0.7045$ ). Dual-proceduralist PEGs have a lower risk of late complications than single-proceduralist PEGs. Future economic cost-benefit studies will be essential for justifying the economic costs of PEGs placed by two proceduralists instead of one.

**Title:** Observation Usage in Elective Arthroplasty: A Single-Institution Perspective

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**Abstract/Case Study:** Background: The Affordable Care Act's Readmission Reduction Program (RRP) and ongoing transparency efforts to promote consumer-driven competition place significant institutional focus on improving 30-day readmission rates. It remains unclear whether the reduction in readmission rates subsequent the RRP occurred due to improved quality and/or partly due to increased observation usage. We hypothesize that a significant percentage of our institution's 30-day readmissions after elective total knee and hip arthroplasty (TKA/THA) inaccurately reflect the needs, duration and complexity of the hospital-based intervention. Methods: We performed a retrospective review of prospectively collected quality control data for 30-day readmissions after elective TKA/THA at our institution over a two-year period. We stratified the readmissions to under 48-hour and over 48-hour length of stay, and then calculated the out-of-pocket expenses for the under 48-hour Medicare subpopulation. Results: We found 16.5 percent of the 30-day readmissions after elective TKA/THA required a length of stay under 48-hours. If the short length of stay TKA/THA readmissions were reclassified as observations, our institution's 2018 RRP penalty would have been reduced by 39 percent or \$334,620. However, this reclassification would result in an increase of out-of-pocket expenses by \$540.25 (range: \$291.56 - \$1105.08) per patient. Conclusions: Reclassification of short length of stay readmissions enables the 30-day readmission rate to be reduced through increased observation usage while following current CMS guidelines. Until evidence-based observation criteria exist for specific diagnoses, when standardized observation protocols are used, the financial impact on patients should be recognized and minimized wherever possible.

**Title:** Microglia contribute to inhibitory synapse loss in chronic T.gondii infection

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**Abstract/Case Study:** Schizophrenia is a complex and heterogenous neurological disorder associated with debilitating cognitive impairment, acquisition of positive symptoms (such as hallucination and psychosis), and loss of behaviors that are normally present in healthy individuals (apathy and social withdrawal). Evidence from both human patients and rodent models suggest that schizophrenia-associated behaviors result from alterations in the assembly and function of inhibitory synapses, including inhibitory axo-somatic synapses. In addition to genetic causes (such as those examined with genetic mouse models) environmental factors can both increase the risk of schizophrenia and alter inhibitory circuit function in the brain. One such environmental factor is infection with *Toxoplasma gondii*, an intracellular protozoan parasite that infects over one-third of the human population worldwide. We previously discovered abnormalities in inhibitory synapse organization and function in chronically *Toxoplasma*-infected brains. Here, we sought to test whether chronic *Toxoplasma* infection specifically alters axo-somatic inhibitory synapses. We performed ultrastructural analysis of inhibitory axo-somatic synapses in the CA1 region of mouse hippocampus and in layer V of cerebral cortex using Serial Block Face Scanning Electron Microscopy (SBFSEM). The unique ultrastructural morphology of axo-somatic inhibitory synapses in these regions allowed us to unambiguously identify these synapses. In parasite-infected brains we discovered a significant reduction of inhibitory axo-somatic synapses in both CA1 and neocortex. Interestingly, we also observed a dramatic ensheathment of neuronal somas in these regions by microglia-like cells in *Toxoplasma*-infected brains. These findings were further corroborated with in situ hybridization for *Syt1* (a marker for neuronal somas) coupled with immunohistochemistry to visualize phagocytic microglia. Thus, we not only identified a significant reduction in axo-somatic synapses in parasite-infected brains, but our data also suggests a role for microglia in inhibitory synapse loss.

**Title:** Irreversible electroporation translational study as treatment for pancreatic cancer

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\* Student's Mentor: Irving C. Allen, PhD, MBA, Virginia Tech Carilion School of Medicine, Basic Science Education

**Abstract/Case Study:** A major type of cancer in the US, pancreatic cancer has a shockingly low 5-year survival rating of only 6%. This is due to a majority of the cases being considered inoperable by surgery and thermal ablation technologies based on the primary tumor's localization, risk of healthy tissue damage, and high metastatic potential. Pancreatic cancer has also been unresponsive to most immunotherapy options due to its immunosuppressive tumor microenvironment. However, novel non-thermal ablation treatment therapies such as irreversible electroporation (IRE) has shown great pre-clinical and clinical trial success. Little is known on the effect of IRE on the tumor microenvironment. Therefore, we hypothesize that IRE can reduce pancreatic tumor progression by initiating a more pro-inflammatory tumor microenvironment that stimulates the immune system. We utilized mouse pancreatic cancer cell lines, immunocompetent mouse models, patient-derived xenograft models, and porcine pancreatic tissues to determine the effect of IRE on tumor microenvironment and the initiation of cell death pathways between cancerous and normal pancreatic tissue. IRE elicits significant changes to the tumor microenvironment of pancreatic tumors that can stimulate a more robust anti-cancer immune response. This leads to increased immune cell invasion at the tumor site and retarded tumor progression. Cancerous tissue also responds with more inflammation-driven cell death than healthy tissue, indicating the selectivity of the treatment. Understanding the impact and mechanisms of IRE in pancreatic cancer can affect its clinical application and advancement as a viable treatment option for patients. IRE is proving to be a safe and effective treatment for pancreatic cancer by not only ablating the primary tumor but also stimulating the immune system to monitor for metastases throughout the body.

**Title:** Determining Parameters for Histotripsy Ablation Near Critical Structures

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**Abstract/Case Study:** Cancer is the second-leading cause of death world-wide, with the incidence of liver cancer growing significantly over the last decade. Addressing this, we are developing Histotripsy, an image-guided, non-thermal, non-invasive focused ultrasound therapy that ablates tissue with millimeter precision. By focusing high-pressure ultrasound pulses, cavitation bubbles form and collapse inside targeted-tissues, resulting in complete target disintegration. Due to this mechanical-mechanism, studies have shown that strong tissues are more resilient to Histotripsy and require a higher dose (i.e. number of pulses) to be fully ablated. Preliminary studies suggest that Histotripsy can safely and effectively ablate liver, and tumor, tissue near critical structures, such as vessels and bile ducts, while preserving these structures. For this study, we utilized an ex vivo model to test histotripsy parameters on porcine liver tissues and surrounding critical structures: gallbladder, vessels, intestines, stomach. Additionally, we conducted dosage tests on human liver tumors and tissues. Tissue mechanical properties were measured with ultrasound elastography, and damage was assessed using gross morphology and histopathology. Results showed that tissues with higher shear moduli require higher dosages to reach ablation, matching our hypothesis. For example, we found liver (shear-modulus 18kPa) to ablate with 250 pulses, while stomach (55kPa) gets mildly damaged at 2,000 pulses. Although tissues such as stomach and intestines have layers that appear to have weaker properties than areas of interest, more muscular and connective layers appeared to offer protection from clinically relevant damage. Even though a primary liver tumor is weak (14kPa) and should easily ablate, metastatic-colonic tumors in liver are stiffer (24kPa) and require a higher dose. Overall, these results indicate that Histotripsy parameters can be tailored for ablating tumors in liver without inducing relevant damage to critical structures. These results provide a rational basis for tailoring treatment of liver tumors in high-risk locations near critical structures.

**Title:** Role of OT in the Realm of Post-Concussion Syndrome Treatment

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**Abstract/Case Study:** While research supports the use of occupational therapy (OT) in the treatment of post-concussion syndrome (PCS), the role of OT in this treatment is not well-established. Because of this, the purpose of this study was to determine OT practitioners' awareness of their role in the treatment of PCS, as well as common tools and techniques used in intervention. This study was meant to add to the body of knowledge of OT treatment of PCS, providing further insight into the role of OT. Increasing the knowledge and awareness of the OT's role in the treatment of PCS will ultimately allow OT practitioners to provide a higher quality of care for PCS clients. In order to determine the role, this study used an exploratory, descriptive research design. An 18-item electronic survey created by the researchers, containing both qualitative and quantitative questions was distributed on the online forums AOTA CommunOT and various Facebook groups (Appendix E). Survey items included questions related to OT practitioner demographics, treatment modalities, interventions used, occupations addressed, specific underlying skills addressed, and OT practitioner awareness level related to PCS and the OT scope of practice. The data gathered from surveys was analyzed and presented using descriptive statistics. The population of this study consisted of OT practitioners, which included occupational therapists and occupational therapy assistants within the United States, including territories.

**Title:** LET'S TALK ABOUT SEX:COMFORT AND EDUCATIONAL PREPAREDNESS

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**Abstract/Case Study:** Purpose: The purpose of this research is to explore the comfort levels of OT practitioners in addressing their clients' sexual activity concerns, as well as the perceptions of OT practitioners' educational preparedness in addressing sexual activity as an occupation. Method: This research is an exploratory, non-experimental, prospective study that uses a quantitative approach to gather data. The population includes OT practitioners working in a clinical site at a minimum of PRN status within the U.S. and its territories. The study will use a secure online survey distributed through the OT Connection's website. The survey is a 19-item survey containing demographic items, Likert-scale items, and open-ended items; responses will be analyzed in SPSS using various descriptive statistics and a Spearman's rank correlation coefficient test.

**Title:** Preach What You Practice: Are School OT Practitioners Promoting

**Authors:** Sidney F. Kricheldorf, OTS, JCHS, Rehab & Wellness, sfkricheldorf@jchs.edu; Stephanie N. Alston, OTS, JCHS, Rehab & Wellness; Jordan B. Webster, OTS, JCHS, Rehab & Wellness

\* Student's Mentor: Glenn P. Kent, PHD; Viki Neurauter, Ph.D. JCHS, Arts & Sciences

**Abstract/Case Study:** Purpose: The purpose of this study was to explore if school-based OT practitioners were promoting their services in United States public elementary schools and if so, what method(s) were being utilized and what aspects of formal education were being addressed. Method: This research study was a non-experimental, exploratory, quantitative design investigating promotion in public elementary schools through online surveys. Findings: Conclusion:

**Title:** OT & PT Practitioners' Perceptions of Civility

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**Abstract/Case Study:** The purpose of this study is to identify perceived levels of civility between OT and PT practitioners as well as determine if one of the occupations and/or settings have greater levels of civility. This prospective, quantitative, non-experimental, pilot study will gather data through a 26 item survey. The target population will consist of licensed physical and occupational therapy practitioners. REDCap will create the survey and generate a link for the survey, while keeping the data secure. Researchers expect to gather and analyze the data to contribute to the gap currently in the literature, specifically perceived levels of civility between OT and PT practitioners. In addition, this study has potential to educate OT and PT students on how to navigate civility when entering the healthcare setting.

**Title:** Are You Ergonomically Sound?

**Authors:** Alina Dupree, OTS , Jefferson College of Health Sciences , Occupational Therapy, adupree@jchs.edu; Raymond Landrum, OTS, Jefferson College of Health Sciences, Occupational Therapy ; Sonia Lee, OTS, Jefferson College of Health Sciences, Occupational Therapy ; Chelsea Singletary , OTS, Jefferson College of Health Sciences , Occupational Therapy

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**Abstract/Case Study:** BACKGROUND: Literature revealed a positive correlation between sedentary computer use and work-related musculoskeletal disorders. Knowledge of ergonomics can increase workplace efficacy and health promotion, which can contribute to the reduction of work-related musculoskeletal disorders. To date, there is not one specific ergonomics program that is proven to be effective in learning about ergonomics. OBJECTIVE: The purpose of this study is to explore the effectiveness of an ergonomics program delivered online to college employees who describe themselves as performing sedentary work; as well as the knowledge of the role of occupational therapy practitioners in the workplace. METHODS: Emails via REDCap will be sent using college-wide list serve to recruit participants. Upon decision to participate in the study, participants will engage in the pre-intervention survey, the online intervention, and the post-intervention survey. RESULTS: Work in Progress. CONCLUSION: Work in Progress.

Poster Session I (Resident/ Fellow) Classroom 1

Gynecology/ Oncology

**Title:** Impact of adjunctive Azithromycin at cesarean delivery on infectious morbidity

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**Abstract/Case Study:** Objective: To evaluate the impact of adjunctive IV Azithromycin for unplanned cesarean deliveries on the rate of post-operative maternal infectious complications. Background: Cesarean sections are associated with an increased risk of maternal infectious complications at a rate 5-10 times more frequent than vaginal deliveries. Prophylactic administration of antibiotics has been shown to decrease the risk of post-operative infections. Women who undergo an unplanned cesarean section while laboring and/or have ruptured membranes are at a greater risk of postoperative infection. These outcomes can include endometritis, deep wound infection, and cellulitis. The use of Azithromycin in addition to standard antibiotics has been shown to decrease maternal infection rates from 12 to 6%. The department of Labor and Delivery instituted a policy to use Azithromycin in laboring and ruptured patients starting January 1, 2017. Methods: A retrospective cohort study with data collected in a pre-azithromycin group from January 1-December 31, 2016 (n=248) and a post-azithromycin group from January 1-December 31, 2017 (n=219). The primary outcome was the rate of composite maternal infections that occurred within 6 weeks after cesarean delivery. The secondary outcomes included the rates of endometritis, deep wound infections, cellulitis, and hospital readmission. Results: In the post-azithromycin group, a reduction in the rate of composite infections was identified from 12.8 to 4.17% (p=0.0017). There were a clinical, but not statistically significant decrease in rates of endometritis (4% to 1.3%, p=.0794), deep wound (2.8 to 1.4%, p=0.5229), cellulitis (6% to 2%, p=0.1002), and hospital readmissions (4.4% to 0.9%, p=0.1219). The patient and cesarean section characteristics were not different. Conclusions: There was a statistically significant decrease in the rate of composite surgical site infections in patients receiving adjunctive Azithromycin for unscheduled cesarean deliveries. A non-statistically significant decrease was observed in individual infectious measures and hospital readmissions.

**Title:** Pelvic Pain Clinic on Emergency Department Resource Utilization

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**Abstract/Case Study:** Objective: The aim of this study is to describe patterns of utilization of the Carilion Clinic Emergency Department (ED) and its resources by patients in the 6 month period before and after evaluation in the Pelvic Pain clinic. Study Design and Outcomes: This is a retrospective case series examining the utilization of an emergency department's resources before and after the establishment of care with a pelvic pain clinic. Outcomes looked at included amount of ED visits, opioids prescribed, imaging and surgeries performed. Methods: Patients aged 18-65 evaluated for chronic pelvic pain in the Carilion Pelvic Pain Clinic between 2011 and 2015 were identified through a query of the electronic medical records. Data were extracted for age, ethnicity, parity, payor status, gynecologic procedures performed for pain indications during the study period, number and type of imaging studies, opioid medication prescriptions, and number of ED visits for pelvic and abdominal pain. Data was analyzed using paired sample t-test. Results: A total of 98 patients were included in the study. Mean age was 39.2. The most frequent payor status was uninsured (36.2%). The average number of ER visits per patient during the 6 months preceding evaluation was 0.62 compared to 0.33 ( $p < 0.01$ ) in the 6 months following evaluation. Ultrasound utilization was also decreased following evaluation with 0.65 versus 0.35 studies/patient ( $p < 0.01$ ). More major (0.01 vs 0.14,  $p < 0.01$ ) and minor (0.16 vs 0.51,  $p < 0.01$ ) procedures were performed per patient in the 6 months following initial evaluation. Conclusions: Evaluation and management of patients in a Pelvic Pain clinic is associated with a reduced rate of emergency department utilization within the Carilion Clinic Health system.

**Title:** Outcomes for vulvar and vaginal intraepithelial neoplasia stratified by treatment

**Authors:** Tulsi Patel, MD, Carilion Clinic, Obstetrics and Gynecology, tdpatel@carilionclinic.org; David Iglesias, MD, Carilion Clinic, Gynecology Oncology

**Abstract/Case Study:** Pre-malignant vulvar and vaginal conditions are common in females. While the risk factors for the potential development of vulvar and vaginal cancer are similar to cervical cancer, there is no specific screening test for either cancer other than annual vulvovaginal examination. Additionally, there remains a lack of consensus regarding the treatment of vulvar intraepithelial neoplasia (VIN) and vaginal intraepithelial neoplasia (VaIN). There are multiple treatment options, including observation and surveillance, medical management with topical therapies and laser ablation, and surgical management with excision and/or vulvectomy or vaginectomy. In patients who want to avoid surgery, there is no known study that evaluates whether medical topical therapy only or cavitation ultrasonic surgical aspiration or a combination of therapies prevent recurrence of dysplasia and/or progression of dysplasia. This retrospective cohort study assesses whether one of the treatment options for vulvar and vaginal dysplasia serves as a better management option. The study population includes females between the age of 18-90 who were diagnosed VIN and/or VaIN Carilion Roanoke Memorial Hospital. We expect that patients who initially receive topical medical therapy will have a greater recurrence risk as well as progression of disease compared to patients who receive cavitation ultrasonic surgical aspiration or CO2 laser surgery. Understanding whether one of these treatment options serves as a better management option can ultimately help guide practitioners regarding what should be the initial therapy for patient with VIN and VaIN.

**Title:** Evaluation of a Rapid Bevacizumab Protocol

**Authors:** Rose Kohinke, PharmD, Carilion Clinic, Pharmacy, rmkohinke@carilionclinic.org; Mimi Liu, PharmD, MBA/HSA, Carilion Clinic, Pharmacy; Ferealem Assefa, PharmD, BCPS, Carilion Clinic, Pharmacy; Tiffany Yoon, PharmD, BCPS, Carilion Clinic, Pharmacy

**Abstract/Case Study:** Background: Bevacizumab (BCZ) is a vascular endothelial growth factor (VEGF)-A monoclonal antibody. The initial BCZ infusion was intentionally prolonged during clinical trials to avoid infusion-related reactions that are prevalent with other monoclonal antibodies, such as rituximab and cetuximab. Subsequent studies demonstrated that shorter infusions do not increase this risk. In June 2016, Carilion Medical Center (CMC) implemented a rapid infusion protocol without additional premedications. The purpose of this medication use evaluation was to examine the safety and feasibility of this protocol. Methods: This was an IRB-approved chart review of data collected for patients age 18 and older who received a de novo BCZ infusion between June 2016 and June 2018 at CMC. Information collected from the first two infusions were: patient characteristics, cancer diagnosis, infusion time, infusion-related reactions, blood pressure (pre- and post-infusion), infusion-related mortality, proteinuria, and bleeding. Data were summarized and reported using descriptive statistics. Results: Forty-five patients safely received 77 total doses of shorter BCZ infusions, without increased incidence of infusion-related mortality or hypersensitivity. Grade 1-3 hypertension (HTN) occurred within 30 minutes post infusion in 15/45 patients (33.3%) for the first infusion and 6/32 (18.7%) for second infusion. No rescue medications were utilized. HTN requiring intensification of the baseline hypertensive regimen was the most common long-term side effect, reported in 18 patients (40%), which is consistent with other studies and non-rate related. Grade 3 or 4 proteinuria and bleeding were not noted. The rapid infusion protocol reduced cumulative chair time by 51.1 minutes per patient during the first infusion and 21.2 minutes during the second infusion. Conclusions: Shorter BCZ infusions do not increase the risk for infusion-related mortality or hypersensitivity reactions. This protocol is well-tolerated and the most common adverse event is benign post-infusion HTN. Long-term non-rate related complications include new-onset or worsening of pre-existing HTN.

**Title:** Single-stage adipofascial turnover flap as an alternate for nasal defects

**Authors:** Thomas M. Gallagher, MD, Virginia Tech Carilion , Plastic and Reconstructive Surgery, [tmgallagher@carilionclinic.org](mailto:tmgallagher@carilionclinic.org); Anthony Capito, MD, VTC, Plastic and Reconstructive Surgery; Albert Truong, MS3, VTC, School of Medicine

**Abstract/Case Study:** Background: Large distal nasal defects with denuded cartilage have traditionally required a two-stage forehead flap. As many Mohs patients are presenting older with more medical co-morbidities, an alternative, single-stage adipofascial turnover (AFT) flap with a full-thickness skin graft (FTSG) was developed by the senior author. The authors hypothesize that the AFT flap would have similar success rates, fewer complications and less operative expense. Methods: A retrospective case control review of all patients in the senior author's practice, who underwent either a forehead flap or AFT flap between January 2016 and February 2019 was conducted. Results: There were 7 traditional forehead flap patients and 11 patients with AFT flaps. Total complication rate was 43% (3/7) for the forehead flap group, and 18% (2/11) for the AFT flap group. The complications for the forehead group were a mortality (n=1), revisional surgery for an area of prominent tip cartilage causing flap atrophy and noticeable tip asymmetry (n=1), and airflow obstruction (n=1). The AFT group had one partial skin graft loss and one incisional dehiscence. There were no flap failures in either group. The total operating room (OR) costs were substantially less in the AFT group. The average cost savings was over \$25,000 in the AFT group. Conclusion: This review demonstrates that the single-stage adipofascial turnover flap with FTSG is a safe, reliable and less expensive reconstructive alternative to the forehead flap. In our experience, both reconstructive methods offer good aesthetic results, and patients have been satisfied with their outcomes. We can conclude from our study that multiple surgeries increase the total cost of nasal reconstruction and could contribute to higher complication rates. The AFT flap is a straightforward single-stage reconstruction that may reduce the risk of complications while cutting operating costs.

**Title:** Development of a Microvascular Surgery Simulation Platform for Resident Training

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**Abstract/Case Study:** Background: Microsurgery requires a high level of skill achieved only through guided practice and repetition to achieve proficiency. Learning curves are steep and studies have suggested that trainees must perform at least 50 procedures to achieve results comparable to the well-trained provider. These skills are a core part of plastic surgery training, thus it is essential that residents have sufficient opportunities to learn safe and effective microsurgical technique. With current duty-hour restrictions and supervision requirements, plastic surgery residents are becoming more reliant on opportunities for hands on training outside of the operating room. Simulation training can significantly improve knowledge and technical skills. Numerous models for microvascular simulation have been described; however, virtually all of these models lack the combination of human tissue and pulsatile flow. Methods: The authors, based on previous experience with a model for vascular surgery simulation, designed and built a microvascular simulation platform using cryopreserved human vein grafts and a pulsatile flow generator. The platform utilizes inexpensive and readily available materials to create a simulated vascular circuit with adjustable pulsatile flow. The pulse generator was designed to recreate biphasic pulsatile flow with controls to adjust pulse rate and ratio of systole to diastole. Results: The human cryopreserved vein graft and pulsatile flow circuit allow for practice of techniques to control hemorrhage in the surgical field, to assess and address a leaking anastomosis, and to evaluate anastomotic patency during microsurgical simulation resulting in a highly realistic training experience. Conclusion: The combination of human tissue and pulsatile flow results in a simulation that approaches the level of realism achieved with live-animal models. As a result, this simulation platform has the potential to allow plastic surgery residents to gain more proficiency and confidence in microsurgical techniques without the need for expensive animal labs or any additional risk to patients.

**Title:** Trauma Recidivism Post Discharge Mortality, Adult and Geriatric Populations.

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**Abstract/Case Study:** Background: Trauma recidivists are a high risk patient population. Trends for recidivism have been seen but no clear link to post discharge mortality has been delineated. Geriatric patients in particular represent an increasingly common and at risk population. Our hypothesis is that trauma recidivism is associated with high post-discharge mortality after the index admission in both geriatric and adult trauma populations. Methods: The trauma registry of our level 1 trauma center was queried for patients evaluated between July 2008 and December 2012. Patients were stratified by age into adult (18-64) and geriatric ( $\geq 65$ ) groups and matched with mortality data from the National Death Index. Unique patients were identified and recidivists with multiple evaluations flagged. Statistical analysis was performed based on index admission using non-parametric tests including Wilcoxon two sample tests, Chi Square and Fisher's exact tests. Results: 8716 records met inclusion criteria. 800 recidivist records were identified representing 369 unique patients. Recidivists were more likely to be male (71.0% vs 64.9%,  $p=0.0165$ ), were less likely to discharge home (61.0% vs 69.5%,  $p=0.0005$ ) and had a higher post discharge mortality (17.1% vs 10.7%,  $p=0.0007$ ). Stratifying into adult and geriatric groups demonstrated significant differences in injury severity, gender, mechanism and post-discharge mortality. Recidivists demonstrated a higher post-discharge mortality in both groups with the geriatric group approaching 46% in 1 to 5 years after their initial index evaluation. Further subgroup analysis between adult and geriatric recidivists was performed to help identify risk factors. Conclusion: Trauma recidivists represent an at risk group with significantly higher post-discharge mortality. Two unique groups exist, but both groups have a significantly increased post-discharge mortality. Further research is needed to identify modifiable risk factors in these populations to minimize risks of morbidity and mortality.

**Title:** Two faces of intentional self-inflicted injury: mortality and readmission rates

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**Abstract/Case Study:** Background. Intentional self-inflicted injuries (ISI) present unique challenges in treatment and prevention. We hypothesized ISI would have higher in-hospital and post-discharge mortality than non-ISI trauma. Methods. Adult patients evaluated 2008-2012 were identified in our trauma registry and matched with mortality data from the National Death Index. ISI were identified using E-Codes. Readmissions were identified and analyzed. ISI patients who died in-hospital were compared with those surviving to discharge. Univariate analysis was performed using non-parametric tests. Kaplan-Meier curves were plotted to compare mortality up to 5 years post-discharge between ISI and non-ISI patients. Results. 8716 patient records were evaluated with 245 (2.8%) classified as ISI. 18 (7.8%) ISI patients had multiple admissions, compared to 352 (4.4%) non-ISI patients with readmissions ( $p=0.0210$ ). In-hospital mortality was higher for ISI compared to non-ISI patients (18.7% vs 4.9%,  $p<.0001$ ). Survival analysis demonstrated that ISI patients had significantly lower post-discharge mortality at multiple time points. Conclusion. ISI trauma patients have high in-hospital mortality, but low post-discharge mortality. We attribute this to high lethality mechanisms but appropriate psychiatric treatment and rehabilitation. However, the high ISI readmission rate indicates further study of ISI follow-up is warranted. Better prevention strategies are needed to identify and intervene in patients at-risk for ISI.

**Title:** Laparoscopic Repair of Interparietal Abdominal Wall Hernias

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**Abstract/Case Study:** BACKGROUND: Interparietal hernias are a rare form of abdominal defect where intraabdominal contents protrude between layers of the abdominal wall. Incidence is about 0.1 to 1.6 % and more often seen in adult males. There is limited experience using laparoscopic technique for repairing substantially large interparietal hernias. METHODS: An 84-year-old female presented for evaluation of left upper abdominal quadrant bulge, which had been present after left flank incision for lumbar spine surgery. CT scan demonstrated an intact external oblique muscle, but the internal oblique and transversus abdominis on the left side were detached from the linea semilunaris with a 10 cm defect. A 53-year-old female presented for evaluation of right flank bulge after right nephrectomy resulting in an interparietal hernia with a 13 cm defect. We used a #1 barbed synthetic absorbable monofilament suture to approximate the linea semilunaris back to the internal oblique. We placed a 15x10 cm monofilament macroporous composite mesh in underlay fashion securing it to the abdominal wall using a laparoscopic absorbable tack fixation device. RESULTS: The patients did well postoperatively and were both discharged on the first postoperative day. At postoperative follow-up, our patients continued to do well with resolution of abdominal wall discomfort and resolution of abdominal wall hernias. CONCLUSION: Our experience demonstrates the largest interparietal hernias treated entirely with laparoscopic repair. Barbed suture helped maintain suture tension between bites keeping distantly opposing aspects of the muscular abdominal wall securely approximated. Mesh reinforcement helped offload tension. Moreover, reducing insufflation pressure during approximation was beneficial in ensuring adequate tissue approximation of substantially large abdominal wall defects. This technique successfully resolved these large interparietal hernias entirely with laparoscopic approach helping patients achieve resolution of symptoms and abdominal wall irregularity, as well as achieve discharge on the first postoperative day without complication. VIDEO: <https://vimeo.com/287782511>

**Title:** Intraoperative Pectoral 1 and Pectoral 2 Nerve Blocks for Mastectomy

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**Abstract/Case Study:** BACKGROUND: Pectoral plane blocks were developed as a newer ultrasound-guided modality used for uncontrolled pain after breast and lateral thoracic wall surgery. Although initially designed as an ultrasound-guided technique, we have found great utility applying these principles in the operating room given exposed anatomy facilitating its use as an intraoperatively administered prophylactic component of our multimodal analgesic therapy. METHODS: We performed these intraoperative blocks in over one hundred patients undergoing mastectomy. The procedure uses a 7 French 10-cm femoral access sheath as an introducer system. For the Pectoral 1 block, we identify the sternal notch and aim approximately two-thirds the distance between the humeral head. We place the introducer system within the plane between the pectoralis major and pectoralis minor and carefully advance the sheath until near the clavicle. Here we inject 15 cc of 0.25% bupivacaine. For the Pectoral 2 block, we will identify the lateral border of the pectoralis minor and guide our introducer system along its lateral surface. This will ensure that our introducer remains between the pectoralis minor and its interface with the serratus anterior. The introducer will be directed toward the axilla along the anterior axillary line. Here we again inject 15 cc of 0.25% bupivacaine. Thereafter, we proceed with closing the surgical incisions in standard fashion. RESULTS: Our experience has shown earlier return to work, earlier return to activities of daily living, increased patient satisfaction, as well as decreased postoperative inpatient recovery times. Additionally, our use of femoral access catheters, rather than sharp needles, ensures that our injectate is always delivered within fascial planes with relative ease and reliability of avoiding vascular penetration. CONCLUSION: Intraoperative pectoral nerve blocks should become a standard component of mastectomies to provide additional pain control to increase patient comfort and minimize postoperative narcotic requirements. VIDEO: <https://vimeo.com/320711534>

**Title:** INTRAVENOUS LIDOCAINE AS AN ANALGESIC ADJUNCT IN TRAUMA PATIENTS

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**Abstract/Case Study:** H. L. Warren, P. Faris, D. H. Bivins, E. R. Lockhart, R. Muthukattil, D. Lollar  
Introduction: Pain control in patients suffering traumatic injury can be challenging. Exposure to opioid pain medications can lead to prolonged dependence, therefore regimens which reduce opioid analgesia are needed. We have identified no data regarding the use of intravenous lidocaine (IVL) in trauma populations. We sought to explore the safety of IVL in these patients. Methods: We performed a single-institution retrospective review of trauma patients receiving IVL from 6/30/16-6/30/17. We extracted data on demographics, pre-admission substance use, injury severity, in-hospital analgesic use, PT/OT participation rates and side-effect events. The lidocaine group was compared with a non-lidocaine control (C) group which was matched based on age, sex, race and ISS score. Patients with length of stay <24 hours were excluded from the control group. Results: 81 patients received IVL and were compared to 89 controls. Age, sex, race and ISS were no different. Significantly more patients receiving IVL had a history of narcotic and polysubstance use ( $p<0.01$ ). Mortality was the same ( $p=1.0$ ) Hospital length of stay was longer in the IVL group (7.5 vs 11.8,  $p=0.01$ ). 38/81 patients received a bolus and all patients received a drip. The mean rate was 1.47mg/hr. 28 side effect events occurred in 23 of 81 IVL patients (28.4%). The most common side effect was delirium (14/28). There was no relationship between side effects and blood lidocaine levels. Side effects resolved with cessation of medication. Side effects occurred in 5 of 89 control patients (5.6%). Conclusion: Side effects of IVL were common but resolved with cessation of IVL. No mortality was attributed to IVL. IVL may be a useful adjunct for patients requiring high narcotic use with careful monitoring. Use of IVL in elderly patients requires caution. These results should be clarified with prospective evaluation.

**Title:** Neurotoxicity from Intrathecal Gadolinium Administration (IT-Gad)

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**Abstract/Case Study:** Introduction: While low-dose (~0.5 mL) IT-Gad has been used off-label for cisternography and myelography, case reports of inadvertent high-dose IT-Gad have highlighted risk of severe neurotoxicity. Herein we describe the clinical course of a patient administered high-dose IT-Gad (~4.3  $\mu$ mol/g brain). Case: This 55-year-old man was mistakenly administered 12 mL of Gadobutrol for purposes of cervical myelography. Convulsive seizures arose within minutes. His initial examination (following lorazepam and fosphenytoin) showed hemodynamic instability and coma with normal pupillary/corneal reflexes but absent cold caloric, gag/cough and deep tendon reflexes. Generalized seizures remitted only with anesthetic doses of pentobarbital, and attempts to wean from a burst suppression pattern on EEG were unsuccessful because of reemergent status epilepticus, despite a 3 antiepileptic drug regimen and methylprednisolone. Discontinuation of pentobarbital without recurrent seizures was possible on day 9. While brainstem reflexes normalized within 12 hours of exposure, he did not regain consciousness until day 11 and examination at that time showed diffuse weakness and areflexia which improved gradually over the course of 3 weeks. His initial head CT showed diffuse contrast enhancement of the subarachnoid, cisternal and intraventricular compartments. MR imaging on day 8 also showed restricted diffusion of the hippocampi, likely from prolonged status epilepticus. Repeat MR imaging (day 23) showed resolution of hippocampal cytotoxic edema, but diffuse cortical enhancement from parenchymal deposition of gadolinium. When last examined, 7-weeks after exposure, seizures had not recurred, but his examination showed severe anterograde memory deficits. Discussion: Gadolinium encephalopathy is a potentially catastrophic complication of high-dose IT-Gad. Few patients have been reported with a range of neurotoxic effects including coma, seizures, ataxia and other deficits related to focal cerebral dysfunction. While best management practices are unknown, cerebrospinal fluid lavage has been advocated as therapeutic option and may be reasonable given the potential for severe morbidity.

**Title:** Is Shock Index a sensitive screening tool for sepsis?

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**Abstract/Case Study:** Is Shock Index a Sensitive Screening Tool for Sepsis? Objective The diagnosis of sepsis has relied upon the SIRS criteria. However, SIRS is only 86% sensitive in patients with severe sepsis. Shock index (SI) is a calculation made by dividing the systolic blood pressure by the heart rate. SI values > 0.7 have been used to predict mortality for trauma and ICU patients. Furthermore, elevated SI values have been associated with hyperlactatemia. We hypothesized that SI will be a more sensitive screening tool for sepsis patients in the ED than SIRS. Methods: Retrospective chart review from March 2015 to March 2016. Experimental group - older than 18 years of age who entered the sepsis alert (SA) protocol in the ED. Control group: 1) 18 or older 2) admitted to the hospital yet did not enter the SA protocol 3) evaluated in ED triage with a full set of vital signs 4) Lactate obtained in the ED. Objective variables were obtained through automated abstraction. Calculated and recorded SI and SIRS criteria for each patient. McNemar's testing was used to compare the sensitivities and specificities of the two tests in both the experimental and control group. Results: McNemar testing shows no statistical difference in sensitivity or specificity between SI and SIRS criteria for both the control and experimental groups ( $\alpha < .05$ ). Conclusion: This is a pilot study and is limited by its retrospective nature. However, the results show that SIRS criteria does not have adequate sensitivity for a screening tool and there is room for improvement. SI did show increased sensitivity but was less sensitive than SIRS. Further prospective studies are warranted and would help clarify SI's role in medical decision making.

**Title:** Robotic vs Laparoscopic Bariatric Surgery: Our Experience to Date

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**Abstract/Case Study:** Introduction: Bariatric surgery has been demonstrated to be both safe and effective in the treatment of morbid obesity with over 200,000 cases were performed in the United States in 2017. As robotic surgical technology advances, there is growing interest in its use in bariatric surgery. Methods: A retrospective review was performed of all Roux-en-Y Gastric Bypass (RYGB) and sleeve gastrectomy cases performed by a single surgeon at our institution between June 2016 and November 2018. Mean operative time, PACU time, and hospital length of stay (LOS) were assessed for each procedure and compared between laparoscopic and robotic techniques. Results: With RYGB, we saw an increase in operative time of 30 minutes (118.5 ' 148.4 minutes,  $p < 0.01$ ) with a decrease in PACU time (267.8 ' 219.3 minutes,  $p = 0.03$ ) and a trend toward decreased overall LOS (3.7 ' 1.6 days,  $p = 0.08$ ) after transitioning to the robotic technique. There was a slight trend towards increased operative time (102.6 ' 113.7 minutes,  $p = 0.09$ ) and decreased LOS though neither of these met criteria for statistical significance (3.68 ' 1.6 days,  $p = 0.07$ ). Sleeve gastrectomy did demonstrate a decrease in PACU time (231.4 ' 156.5 minutes,  $p = 0.02$ ). Conclusions: Operative time increased slightly for both procedures, but the improvements in PACU time and hospital LOS for our bariatric surgery patients improve hospital throughput, decrease total cost of care, and allow earlier return to daily routines for patients. We have seen a decreased supply cost for RYBG from \$4,383.00 to \$3,606.42 and \$2894.44 to \$2835.85 for sleeve gastrectomy. This data represents our first 53 RYGBs and 47 sleeve gastrectomies performed using the robotic approach. Evaluation of our data shows an overall decrease in operative time in the past year which we anticipate will continue to decrease..

**Title:** Pulmonary Artery Pseudoaneurysm. What caused this one?

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**Abstract/Case Study:** Pseudoaneurysms differ from true aneurysms in that they involve bleeding from a vessel contained only by the adventitial layer rather than a ballooning of all three layers, yielding a profound risk for rupture. Pulmonary artery pseudoaneurysms (PAPs) are uncommon and are most commonly caused by trauma, after Swan-Ganz catheterization, infection, or neoplasms. They are not usually reported without one of these precipitating causes. It presents as either acute, severe hemoptysis or as an asymptomatic lesion found incidentally on imaging that may enlarge insidiously over time. Early diagnosis and treatment is key to reducing the high mortality associated with PAP rupture. A 69-year-old male with significant history of chronic steroid use and ESRD with brachiocephalic fistula presented to the Emergency Department with acute, severe hemoptysis and respiratory distress. The patient was admitted 2 weeks prior for cellulitis of his fistula site, at which time a tunneled right internal jugular catheter was placed for an alternate dialysis route. X-ray after line placement was clear. Six days later, at presentation, repeat chest X-ray and subsequent CT angiogram revealed a completely new anterior segmental PAP measuring 5.1 x 5.1 x 5.8cm. Interventional radiology successfully performed an emergency endovascular embolization. PAPs can result in life-threatening hemoptysis, but are classically associated with some sort of event such as trauma or complication from Swan-Ganz catheterization. Our patient did not have any known risk factors, and so perhaps a history of any vascular procedure should render consideration for PAP. Infection was ruled out given his chronic steroid use, and there have been no associations described of PAPs in immunocompromised patients without infection, or in patients with ESRD. More research may be needed to identify additional risk factors for PAPs, but it is clear that prompt acquisition of radiologic imaging allows for rapid diagnosis and lifesaving treatment.

**Title:** Attempted Suicide of Parkinsonian patient treated with DBS and Carbidopa-levodopa

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**Abstract/Case Study:** Introduction: Parkinson's Disease (PD) is a complex disease that is often treated with dopaminergic medications such as carbidopa-levodopa and now with innovative interventions such as deep brain stimulation (DBS). While PD frequently presents with depression and apathy, research must elucidate whether its treatment modalities have an additive or synergistic effect that can lead to an increased suicide risk. DBS has been associated with depression, behavioral changes and suicidality while dopaminergic treatment has also been shown to cause behavioral changes such as hypersexuality and impulsivity. Considering the now frequent practice of utilizing both DBS and carbidopa-levodopa to treat PD, it is crucial to understand how to properly manage PD patients who are displaying this overlap in symptomology. Case Report: A 56-year old Caucasian male with a 6-year diagnosis of PD who was being treated with high dose carbidopa-levodopa and left DBS of the Ventral Intermediate Nucleus (VIM) presents after a suicide attempt. The patient was found to be severely depressed and had exhibited behavioral changes in the weeks leading up to the attempt. Imaging was performed to assess positional changes of DBS and carbidopa-levodopa dosage adjusted while under close observation in the inpatient unit. The patient was started on Fluoxetine to treat the depressive symptoms and was eventually discharged with close monitoring. Discussion: With PD and DBS being associated with behavioral changes and depressive symptoms and carbidopa-levodopa therapy being linked to behavioral changes such as impulsivity, it is important that these patients be closely monitored and research analyzes how these factors may interact and lead to an increased risk of suicide. Furthermore, when symptoms appear, a clear protocol must be established on managing these patients. We therefore recommend an approach that utilizes imaging to assess any changes in DBS placement, dose management of carbidopa-levodopa and behavior monitoring in an inpatient setting.

**Title:** Anti-NMDA Receptor Encephalitis Initially Presenting as Seizures and Psychosis

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**Abstract/Case Study:** Anti-N-methyl-D-aspartate (Anti-NMDA) Receptor Encephalitis is an autoimmune neurological syndrome that was first described in 2007. To date, there are no estimates to the prevalence rates but more than 500 cases have been reported. The patients are typically treated on the psychiatric service for a prolonged period, leading to a delay in care. Symptoms include psychiatric symptoms, seizures, confusion, and memory loss. The diagnosis is confirmed by detection of immunoglobulin (IgG) antibodies to the GluN1 (also known as NR1) sub-unit of the NMDA receptor in serum or CSF. The autoimmune disease is commonly associated with ovarian teratomas, testicular germ cell tumor, teratoma of the mediastinum, and small cell lung cancer. It is also recognized as a syndrome that affects children and adults with or without a tumor. The mortality rate is 25% due to delay in care and misdiagnosis. A 39-year-old woman without significant PMH originally presented to two outside facilities. First facility was due to seizure like activity. EEG showed epileptic focus of the right posterior temporal area and MRI brain which was normal. She was started on Keppra therapy and discharged. Approximately one week later, she presented to another facility with similar complaints. This facility started her on Valproic Acid and Phenobarbital due to recurring facial twitching. Lastly, she presented to Carilion and a lumbar puncture was performed. CSF tested positive for NMDA receptor antibody. Since Anti-NMDA Receptor Encephalitis is commonly associated with teratomas, further imaging was performed with no findings. She underwent multiple EEGs which were noted to have extreme delta brushes, a novel finding in Anti-NMDA Receptor Encephalitis. She was started on methylprednisolone 1g x 5 days, six treatments of plasmapheresis, and two doses of rituximab. After a 26-day hospital stay, she showed clinical improvement in her mental status, aphasia, dysphagia, and ambulation and was discharged home.

**Title:** CLOZAPINE INDUCED HYPOTHERMIA: A CHILLING SIDE EFFECT

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**Abstract/Case Study:** INTRODUCTION: Hypothermia is defined as a drop-in core body temperature below 35°C or <95°F. 1 Etiology of hypothermia is divided into primary and secondary. Primary hypothermia is due to environmental exposure. Secondary hypothermia is due to impaired thermoregulation, burns, trauma, shock, medications, and metabolic imbalances. We present an unusual case of patient with schizophrenia who received clozapine and developed hypothermia on two separate occasions. CASE PRESENTATION: 58-year-old male with history of dementia, seizures, traumatic brain injury secondary to motor vehicle accident, refractory schizophrenia was noted to be hypothermic (92.5°F) in psychiatry ward. He was started on clozapine two weeks ago and its dose was increased a day prior to hypothermic event. His labs (CBC, BMP, TSH, lactate), cultures (urine, blood) and imaging (CXR) were unremarkable. Hypothermia was attributed to clozapine use, which was discontinued. He was transferred back to psychiatry ward where clozapine was restarted at a lower dose. He developed hypothermia again and clozapine was discontinued permanently. DISCUSSION: Dopaminergic receptors are believed to play an important role in thermoregulation. Antipsychotics have significant effects on dopamine mediated pathways, thereby, causing disruption of endogenous thermoregulatory processes. While research is limited, there is growing evidence that the antagonistic properties of clozapine on D2 and D3 receptors may be involved in development of hypothermia. It is also proposed that antagonistic properties of clozapine on alpha-2 adrenergic receptors may prevent peripheral responses, such as vasoconstriction and shivering, to a decrease in body temperature. Antipsychotic drug (APD) induced hypothermia is more prevalent among schizophrenic patients when compared with other psychiatric illnesses, perhaps due to neurotensin. Neurotensin is a neuropeptide involved in several key thermoregulatory processes and is lowered in the CSF of schizophrenic patients. Drug change or dose increase prompts a stronger incidence of antipsychotic induced hypothermia usually in the first days following start or dose increase.

**Title:** Microbiota in emotional behavior: antibiotic treatment in high anxiety-prone rat

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Gastrointestinal disorders are highly comorbid with affective disorders. An emerging view of gut microbiota highlights their roles in its broader effects on the immune system, central nervous system function and organismal health overall. Recent rodent studies indicate that manipulating microbiota influences brain function and emotional behavior. The present study builds on this work using a model of individual differences in temperament in rats. Low Novelty Responder (LR) rats exhibit high levels of anxiety- and depression-like behaviors compared to High Novelty Responders (HR). We hypothesized that some aspects of the HR/LR neurobehavioral phenotypes may be driven, at least in part, by differences in their microbiomes. We first treated adult male HR/LR rats with an antibiotic cocktail aimed at depleting the microbiome to test if changes in microbiota altered HR/LR emotional behavior. Then, 16s RNA was extracted from fecal samples and we applied next generation sequencing to profile the microbiome in adult male HR/LR animals at baseline and following antibiotic treatment. We also analyzed levels of several cytokines/chemokines in HR/LR rats at baseline and following antibiotic treatment to determine any potential correlations between immune markers, microbiome components, and/or behavioral measures. Antibiotic treatment exacerbated HR/LR behavioral differences, increasing LRs' already high levels of anxiety-like behavior while reducing the already low levels of passive coping in HRs. We found significant correlations between distinct behavioral domains and levels of several gut microbial species as well as levels of circulating cytokines. These results point to novel correlations between microbiota species, peripheral immune factors, and rodent emotional behavior, which may ultimately shed light on biological mechanisms relevant to human psychiatric condition.

**Title:** Goat Therapy in Integrative Pain Management Model

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**Abstract/Case Study:** To demonstrate the effectiveness of goat therapy in an integrative pain management approach for chronic pain. Integrative pain management is a partnership between patients and caregivers to achieve shared functional goals rather than emphasizing movements on pain scales. A 61 year old woman was diagnosed with fibromyalgia, right sacroiliitis, and right greater trochanteric bursitis based on history and physical examination in our integrative pain clinic located in southwest Virginia. The patient and her treating team established shared functional goals to include tending to her house (i.e. mopping floors, vacuuming, and laundry). In a holistic approach, the patient underwent pharmacological (milnacipran and tizanidine), interventional (trigger point and right sacroiliac joint and greater trochanteric bursa steroid injections), physical rehabilitation (structured home exercises), mental health (pain psychologist), and integrative measures (pain nutrition, therapeutic neuroscience education, and pet therapy). Specifically, she was prescribed a regimen to care for Nigerian dwarf goats in her rural property. Three months into the integrative program, the patient achieved her shared functional goals. She raised two goats (Zero and Fin) and was able to address her household duties. Her low back and neck range of motion was improved, along with reduced global myofascial tenderness. Further, she was pain-free in her right low back, buttocks, and hip. Taking an integrative approach to pain management and by incorporating pet therapy may achieve shared functional goals.

**Title:** Effect of 24 Hour Call on Dexterity, Cognition, and Mood

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**Abstract/Case Study:** Introduction: The goal of our study was to evaluate whether 24 hour call has an impact on fine motor abilities, cognitive thinking skills, and mood. Methods : We tested 27 subjects before and after call. We separated subjects into two groups for analysis; seasoned subjects were those who regularly take 24 hour call while non seasoned subjects included those without experience. We utilized the Motor Performance Series to assess fine motor, paper-pencil neuropsychological tests to assess cognition, and Profile of Mood States to evaluate mood. Outcomes : There was no impact on seasoned subjects fine motor or cognitive abilities after call. Non-seasoned subjects showed decrements in several motor tests including decrease in precision ( $p = 0.032$ ), information processing ( $p = 0.014$ ), and speed ( $p = 0.002$ ), and also had a decline in cognitive tests for immediate recall ( $p = 0.025$ ), and mental flexibility ( $p = 0.03$ ). In regards mood, seasoned subjects showed a decrease in friendliness and vigor and an increase in a sense of confusion, but there was no change in total mood disturbance. Call negatively impacted non-seasoned subjects in their sense of confusion, vigor, fatigue, and friendliness and also showed an increase in total mood disturbance ( $p = 0.012$ ). Conclusion : We think this study raises interesting questions about neurosurgical training with respect to the alleged detrimental effects of prolonged work hours. Our results suggest that fatigue-induced decrements in professional function can be ameliorated by experience with prolonged duty hours. Therefore an argument can be made that we are turning the neurosurgical training paradigm upside down with the current ACGME duty hour restrictions and conditioning the mind and body to fatigue should be viewed as an essential aspect of training.

**Title:** Trends in Cancer Mortality in Virginia Appalachian Counties

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**Abstract/Case Study:** Cancer is the second leading cause of death nationwide. In Virginia (VA), cancer mortality is markedly higher in the rural, Appalachian region. In these rural regions health disparities have long been acknowledged and even with efforts to identify causality of higher cancer mortality in southwestern VA, improvement has been slow and the topic debated. This study takes a closer look at social determinants of counties not meeting HP2020 goals for reducing cancer mortality. **Objective** The goal of this study was to determine the progress of VA Appalachian counties striving to meet the nationwide HP2020 objectives Hypothesis Measures of multiple known modifiable risk factors for all cancers are better in VA counties with lower cancer death rates that are currently meeting HP2020 objectives for reducing all cancers than in counties with higher cancer death rates. **Results** Mortality from cancer related deaths was significantly higher in the AP population compared with the HP2020 group 201.6 vs. 142.4 (p-value < 0.0001). When examining risk factors, AP population had higher rates of obesity AP 30.8 % ± 1.7 vs. HP 26.5% ± 3.5 (p-value <0.0001), smoking AP 26.1% ± 4.4 vs. HP 15.4% ± 6.25 (p-value <0.0001), inactivity with lack of exercise AP 28.1 % ± 4.4 vs. HP 21.5% ± 3.5 (p-value <0.0001), but there were no differences in access to exercise between the two groups. AP population had higher rates of uninsured AP 16.8% ± 1.9 vs. HP 14.4% ± 3.5 (p-value <0.0063) and higher rates of preventable hospital days AP 99.6 ± 33.3 vs. HP 49.7± 12 (p-value < 0.0001). **Conclusion** Improvements in environmental factors such as health behaviors and access to physicians and health care services were associated with improvements in cancer mortality in VA counties meeting the Healthy People 2020 objectives.

**Title:** A Case of Petechial Rash in an Healthy 29-year-old Male

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**Abstract/Case Study:** Introduction: Scurvy, or ascorbic acid deficiency, is considered by many to be a disease irrelevant to the developed world. However, with increased awareness for subclinical vitamin C deficiency as well as the rise of restrictive eating patterns, clinicians should be aware of the characteristic clinical and histologic findings associated with scurvy, as highlighted by the following case. Case presentation: A 29-year-old male presented to the emergency department with 7-day history of an asymptomatic petechial, follicular rash of the bilateral lower legs and a large area of ecchymosis on his left posterior thigh. On admission, patient endorsed mild headache and arthralgia of the knees; ROS was otherwise negative. He had no PMH and denied alcohol or illicit drug use. Histology: Histological examination revealed superficial perivascular and perifollicular extravasation of erythrocytes without obvious vasculitis or vasculopathy. Specimen also demonstrated follicular hyperkeratosis with a corkscrew-shaped hair shaft in a bed of follicular debris. Discussion: Symptomatic scurvy can arise with as little as 3-6 months of insufficient vitamin C intake. While more commonly seen in patients at high risk for nutritional deficiencies (alcoholics, elderly or nursing home residents), it can also be seen in low-risk patients, including children, with restrictive or inadequately diverse diets.

### Classroom 3

#### Orthopaedics

**Title:** Effect of HbA1c on Clinical Outcomes in Carpal Tunnel Surgery

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**Abstract/Case Study:** HYPOTHESIS: Diabetes is a well-established risk factor for increased surgical risk profiles: but the quantitative impact of poor glycemic control on clinical outcomes in elective carpal tunnel surgery remains unclear. 1-5 We hypothesize that poorly controlled diabetics will have an increased complication risk profile after carpal tunnel release compared to well controlled and non-diabetic patients. METHODS: A retrospective review identified 831 patients who underwent elective carpal tunnel surgery within the past 10 years at our single institution. All patients included were required to have had a hemoglobin A1C recorded within 90 days of surgery. Primary outcomes of interest included surgical site infection, wound dehiscence, readmission, reoperation, hematoma, and overall complication rate. Patients were stratified into three groups of interest: HbA1c <7, HbA1c 7-8, and HbA1c >8. These groups were analyzed for variance of outcomes during the immediate thirty day postoperative period using Chi-Squared and Fischer's exact test. RESULTS: The study included 586 patients with HbA1c <7, 104 patients 7-8, and 100 patients >8. Poorly controlled diabetics HbA1c >8 demonstrated higher rates of overall complication, surgical site infection, and wound dehiscence. A significant difference in complications were also demonstrated in the rate of surgical site infections (p = 0.02) and wound dehiscence (p = 0.01; table 1) . Rates of readmission, reoperation, and hematoma did not demonstrate a significant difference. SUMMARY POINTS: ' Elective carpal tunnel surgery is a safe procedure with low complication rates ' Poorly controlled diabetics exhibit a higher rate of surgical site infection, wound dehiscence, and overall complications in elective carpal tunnel surgery compared to well controlled and non-diabetic patients. ' Judicious consideration of the benefit of nerve decompression given the severity of clinical symptoms versus postponement of surgery for improved glycemic control should be performed and proceed at the surgeon's discretion.

**Title:** Achilles Tendon Rupture in the Setting of Alkaptonuric Ochronosis

**Authors:** Wesley M. Leong, DPM, Carilion Roanoke Memorial Hospital, Orthopaedics, Wmleong@carilionclinic.com; John R. Clements, DPM, FACFAS, Carilion Roanoke Memorial Hospital, Orthopaedics; Wendy Introne, MD, National Institute of Health, National Human Genome Research Institute

**Abstract/Case Study:** Purpose: Alkaptonuria, with its sequelae of ochronosis, is a rare hereditary metabolic disease characterized by the accumulation of homogentisic acid in connective tissues such as the tendons, cartilage, heart valves and skin. It has an incidence of 1:125,000 to 1:1,000,000 worldwide. In the present study, we report the presentation and surgical treatment of a patient with spontaneous Achilles tendon rupture, a complication of ochronosis. To our knowledge, this is the first surgical case report from the United States to address Achilles tendon rupture in the setting of alkaptonuria. Case Study: A 38 year old male with a history of alkaptonuria presented to his primary care provider complaining of pain and swelling in his right rearfoot sustained while he was stomping on ice. The post-injury MRI report revealed that the Achilles tendon was completely torn with approximately 5 cm of retraction. He underwent transfer of the flexor hallucis longus tendon to the posterior aspect of the calcaneus, which was reinforced by myodesis of the gastrocnemius muscle belly. Results: At his 36 month post-operative visit, the patient reported no pain with ambulation and a successful return to normal weight-bearing activities of daily living. Analysis & Discussions: This case study details our approach to the flexor hallucis longus transfer with myotenodesis of the gastrocnemius muscle belly. The goal of the procedure was to restore the active function of the ankle joint and minimize the chance of re-rupture in this patient whose medical history of alkaptonuria presented unique challenges. In addition to presenting our surgical techniques and principles, we will discuss the patient's physical therapy regimen and the current recommendations found in the literature for minimizing the chance further complications and morbidity.

**Title:** Cutaneous Temperature as a Metric for Predicting Septic Knees

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**Abstract/Case Study:** Background: Due to the severity of possible sequelae of septic knees, many EDs obtain immediate arthrocentesis for suspected septic arthritis though it may not always be indicated. While 'warmth' is a common finding of septic joints, there are no studies assessing the utility of the cutaneous temperatures in the diagnostic process. Objective: Research Question: Can the quantification of temperatures be used in the diagnosis of septic joints? Hypothesis: The difference of knee temperatures in a patient with a septic and unaffected knee will be greater than the difference of knee temperatures in a patient's two unaffected knees. Methods: Subjects presenting in the ED with possible septic knees make up the study group. The control group consists of subjects from spine clinic, with no current knee complaints. Cutaneous temperatures of affected and unaffected knees are taken in four places. The difference between each patient's average knee temperatures is used to compare the temperature differences in subjects with and without possible septic knees. Secondary outcomes include the temperature differences between subjects with gout, pseudogout, and infected joints. RESULTS: Control group patients had a mean difference of 0.96°F between left and right knees, while the mean difference in knee temperatures in all patients with knee symptoms was 4.32°F. The mean difference in patients with confirmed septic arthritis was 6.53°F, which represented a greater difference between affected and unaffected knees than all other groups of patients. CONCLUSION/DISCUSSION: This study provides evidence that joint temperatures can be used to help determine a management plan for a patient with possible septic arthritis. There is a significantly greater difference in the temperatures between a patient's knees when one is septic compared to when they are both asymptomatic. After enrollment, larger studies will be needed to confirm the utility of cutaneous temperatures to differentiate between gout, pseudogout and septic joints.

**Title:** Ehrlichiosis-Induced Hemophagocytic Lymphohistiocytosis

**Authors:** Christopher M. Hernandez, MD, Virginia Tech Carilion, Internal Medicine, cmhernandez@carilionclinic.org; Jon M. Sweet, MD, Virginia Tech Carilion, Internal Medicine

**Abstract/Case Study:** Case: A 53-year-old woman with no significant past medical history presented in July with one week of fever, headache, malaise, myalgia, and vomiting. She reported recently removing a tick in the shower. She was lethargic with a temperature of 40.1 C, heart rate 132, respiratory rate 35, and blood pressure 80/50 mm Hg. The neck was supple. Petechiae were present on the abdomen and extremities. The WBC was 800/uL (35% bands, 52% segs), platelets 26,000/uL, AST 373 IU/L and ALT 84 IU/L. Lumbar puncture values were unremarkable. Doxycycline monotherapy was administered. Classic intraleukocytic morulae were seen in the blood smear and CSF, and *E. chaffeensis* DNA was detected. Blood cultures and tests for HIV, EBV, CMV, Lyme, and rickettsia panel were negative. Despite appropriate antibiotics and supportive care, she gradually declined and required endotracheal intubation on day 4. Brain MRI was unremarkable. The ferritin level was markedly elevated at 47,547 ng/mL, triglycerides 693 mg/dL, nadir fibrinogen 63 mg/dL, and soluble CD25 10,668 pg/mL (532-1891). Bone marrow biopsy demonstrated hemophagocytosis. Six of the eight criteria for hemophagocytic lymphohistiocytosis (HLH) were present, confirming the diagnosis. Along with doxycycline, she was treated per the HLH-94 protocol with dexamethasone and etoposide. She recovered nicely and was discharged home on the sixteenth day. Discussion: Secondary HLH is a rare life-threatening disorder characterized by uncontrolled T-cell activation and increased secretion of cytokines, which activate macrophages. HLH is typically triggered by infections (most commonly EBV), lymphoma, or autoimmune conditions. Hyperferritinemia is a critical finding and should be sought early for any patient with suspected sepsis who fails to improve as expected. Ferritin >10,000 ng/mL is associated with a limited list of diagnoses and would prompt one, in the appropriate setting, to urgently seek other HLH criteria so that appropriate therapy could be commenced in a timely fashion.

**Title:** Alectinib-Induced ILD

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**Abstract/Case Study:** A 64 year old man with PMH of copd, stage IV adenocarcinoma lung cancer diagnosed 4 years prior on chemotherapy and Alectinib presented with cough and shortness of breath. He was admitted for acute hypoxic respiratory failure. In the evaluation of his dyspnea, CT chest showed showed bilateral ground glass opacities. He was started on broad spectrum antibiotics. Bronchoscopy with BAL was consistent with DAH. Trimethoprim sulfamethoxazole was started to cover PJP given protracted steroid use and azithromycin was added for atypical coverage. Unfortunately patients clinical course worsened and he passed away. Postmortem autopsy showed diffuse alveolar damage with acute exudative phase consistent with ARDS pathology. Discussion: The development of molecular genetics has led to targeted therapies directed to different fusion genes for patients with lung cancer. Echinoderm microtubule associated protein-like 4- anaplastic lymphoma kinase is an aberrant fusion gene encoding a chimeric protein with constitutive activity. EML4-ALK fusion genes occur in 6.7% of NSCLC, mostly occurring in non-smokers or light smokers. The current first-line therapy for patients with advanced-stage non-small-cell lung cancer that harbors rearrangement of the ALK gene is a second generation ALK inhibitor, alectinib. Unlike crizotinib which is a first generation ALK inhibitor, alectinib is a CNS penetrant; it is not a substrate of P-glycoprotein, a key efflux transporter located at the blood-brain barrier. In both preclinical and clinical investigations, alectinib was active in the CNS with incidence of CNS disease progression of 12% compared to 45% in crizotinib. The exact mechanism by which ALK inhibitors cause lung toxicity it not well understood. Créquit P et al suggested that ILD could be a drug related hypersensitivity pneumonitis and resolves with discontinuation of medication and administration of glucocorticoids. In a systematic review by Pellegrino, 2.1% of patients on Alectinib developed pulmonary adverse events.

**Title:** Rare Hereditary Hemochromatosis Subtype as Cause of Decompensated Liver Failure

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**Abstract/Case Study:** Introduction: Hereditary Hemochromatosis (HH) is a common genetic disorders in those with Northern European descent. HH is autosomal recessive and causes increased absorption of iron deposition in in the liver, pancreas, and heart. The HH gene can be heterozygous or homozygous, with the homozygous H63D mutation being a rare form. Patients at time of diagnosis are usually asymptomatic and may have elevated ferritin levels, noted incidentally on routine anemia studies or when family history indicates screening. This case illustrates a rare diagnosis of the H63D mutation, diagnosed when the patient presented with decompensated liver failure. Case Presentation: A 56 year-old male with a history of hypothyroidism, diabetes, and cirrhosis who presented with intractable vomiting and worsening jaundice. His liver failure was presumed secondary to alcoholic use, and had a TIPS procedure seventeen months prior and has steadily declined since then. Initial imaging, ERCP, and autoimmune tests were negative. His bilirubin levels continued to increase. The patient divulged that he did not use alcohol heavily and stopped 7 years ago. A test to determine if his liver failure was caused by chronic alcohol abuse was negative. A liver biopsy was performed and revealed the patient is homozygous for the rare H63D hemochromatosis gene mutation. Discussion: Homozygous H63D mutation is the rarest of HH diagnoses, and even rarer to progress to End-Stage Liver Disease. The patient was previously diagnosed with alcoholic cirrhosis, so previously his treatment options were limited. His true diagnosis qualified him for a liver transplant. It is important to gather a thorough history, as it can affect patient care and lead to a delayed diagnosis. The patient's lack of response to traditional therapies prompted us to include other causes of liver failure and advocate for a liver biopsy, which divulged his true diagnosis.

**Title:** Prevalence of Opiate-induced Suppression of Corticotropic Function

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**Abstract/Case Study:** Endogenous and exogenous opioids have been demonstrated to suppress the hypothalamic-pituitary-gonadal (HPG) and hypothalamic-pituitary-adrenal (HPA) axes. It is well established that opiate medications can cause secondary hypogonadism through inhibition of luteinizing hormone (LH) and follicle-stimulating hormone release. However, despite multiple studies showing inhibitory effects of endogenous and exogenous opioids on the (HPA) axis; these effects are less well known. We performed a retrospective study at a single, Veteran's Affairs Medical Center over a 10 year period (2006-2016) to investigate the correlation between opioid medication and adrenal insufficiency. 138 patients were found to using serum cortisol less than 3.0 as the parameter. Out of these, 52 patients were undergoing overnight dexamethasone suppression tests to evaluate for hypercortisolism, and were excluded. Of the remaining 86 patients, 25 (29.07%) had received glucocorticoids, 14 (16.28%) had a normal afternoon or evening cortisol level, 9 (10.46%) had panhypopituitarism, 3 (3.49%) had primary adrenal insufficiency, 4 (4.65%) were taking megestrol acetate, 1 (1.16%) was suspected to be due to anti-retroviral medication, 4 (4.65%) were in the intensive care unit (ICU), and 24 (27.91%) were suspected to be related to opioid use. The remaining 2 (2.32%) patients had non-prescription opioid use but no repeat laboratory data was available. Of the 4 patients in the ICU, 3 were taking glucocorticoids and 1 was taking megestrol acetate. 10 of the 24 patients with low cortisol suspected to be secondary to opioid use also had gonadal hormones measured; of which 9 had either low FSH, LH or testosterone.

**Title:** SMARTPHONE ACCELOMETRY IN DIAGNOSIS OF PRIMARY ORTHOSTATIC TREMOR

**Authors:** Nicholas Calvo, MD, Virginia Tech Carilion Clinic, Neurology, necalvo@carilionclinic.org; Joseph Ferrara, MD, Virginia Tech Carilion Clinic, Neurology

**Abstract/Case Study:** Introduction: Primary orthostatic tremor (OT) is a rare movement disorder characterized by a 13-18 Hz leg tremor, which arises when standing and is relieved by walking or sitting. Those affected generally do not fall, but experience fear of falling, lessened by ambulation. Because of its low amplitude, the tremor is not readily visible, and the diagnosis requires confirmation with surface electromyography (SEMG). Recently applications using the accelerometer feature of smartphones (SPA) have been used to detect and quantify tremors, including OT (1), though the accuracy of SPA in diagnosing OT is unknown. Methods: We conducted a prospective pilot study of SPA in consecutive adults (18+ years), who presented to our neurology clinic with either subjective leg shakiness upon standing or unsteadiness when standing that lessened with ambulation. We assessed tremor using the StudyMyTremor application (2) on an iPhone 6s adhered with medical tape to the patient's right tibialis anterior. SEMG was completed at the same site. The primary outcome of this study was to determine the SPA's sensitivity and specificity in detecting OT (defined as a 13-18 Hz tremor) when compared with SEMG. Results: 46 patients with the following diagnoses were included: OT (5), Parkinson's disease, Hereditary Spastic Paraplegia, orthostatic hypotension, essential tremor, spinal cerebellar ataxia, sensory ataxia and functional movement disorder. SPA detected a 13-18 Hz tremor in all OT patients, diagnosed by SEMG. No false positive SPA recordings were seen in other conditions. Discussion: Though a larger ample size is desirable, preliminary data suggest that SPA is an alternative to SEMG in the diagnosis of OT. Cited: (1) Balachandar A, Fasano A. Characterizing Orthostatic Tremor Using a Smartphone Application. Tremor Other Hyperkinet Mov (N Y). 2017;7:488. (2) Lauk M, et al. A software for recording and analysis of human tremor. Comput Methods Programs Biomed. 1999;60:65-77.

**Title:** A Pericardial Cyst Causing Obstructive Shock: A Case Study

**Authors:** Injoon Lee, MD, Carilion Memorial Hospital, Cardiology, ilee@carilionclinic.org; David C. Sane, MD, Carilion Clinic, Cardiology; Thomas Bishop, MD, Carilion Clinic, Interventional Radiology; Neel Parikh, MD, Carilion Clinic, Cardiology

**Abstract/Case Study:** Case: Male, 71 year old admitted for small bowel obstruction. CT of the abdomen showed a pericardial cyst of 10cm x 11cm. Upon further history with the patient, he was diagnosed with pericardial cyst (<5cm) many years ago during a staging scan for his colon cancer, had followed with his PCP and oncologist however, he was lost to follow up. Patient underwent lysis of adhesion, however after the surgery, patient developed hypotension and lactic acidosis requiring pressors suggestive of shock. His post-op CT scan did not suggest of any bowel perforation or post-op complications. He underwent stat echocardiogram which showed signs of RV filling defect. Interventional Radiology was consulted for an emergent aspiration. 575cc of yellowish cloudy fluid was aspirated. Patient's lactic acidosis and shock resolved after the procedure. Fluid analysis was consistent with proteinaceous debris and rare benign cellular elements suggestive of histiocytes. Final diagnosis was cystic aspiration fluid.

**Title:** Is Shock Index a sensitive screening tool for sepsis?

**Authors:** Jessica Nguyen, MD, VTC, EM, Jlnghuyen@carilionclinic.org; Swami Rajaram, MS IV, VTCSOM, VTCSOM; Jack Perkins, MD, VTC, EM

**Abstract/Case Study:** Is Shock Index a Sensitive Screening Tool for Sepsis? Objective The diagnosis of sepsis has relied upon the SIRS criteria. However, SIRS is only 86% sensitive in patients with severe sepsis. Shock index (SI) is a calculation made by dividing the systolic blood pressure by the heart rate. SI values > 0.7 have been used to predict mortality for trauma and ICU patients. Furthermore, elevated SI values have been associated with hyperlactatemia. We hypothesized that SI will be a more sensitive screening tool for sepsis patients in the ED than SIRS. Methods Retrospective chart review from March 2015 to March 2016. Experimental group - older than 18 years of age who entered the sepsis alert (SA) protocol in the ED. Control group: 1) 18 or older 2) admitted to the hospital yet did not enter the SA protocol 3) evaluated in ED triage with a full set of vital signs 4) Lactate obtained in the ED. Objective variables were obtained through automated abstraction. Calculated and recorded SI and SIRS criteria for each patient. McNemar's testing was used to compare the sensitivities and specificities of the two tests in both the experimental and control group. Results McNemar testing shows no statistical difference in sensitivity or specificity between SI and SIRS criteria for both the control and experimental groups ( $\alpha < .05$ ). Conclusion This is a pilot study and is limited by its retrospective nature. However, the results show that SIRS criteria does not have adequate sensitivity for a screening tool and there is room for improvement. SI did show increased sensitivity but was less sensitive than SIRS. Further prospective studies are warranted and would help clarify SI's role in medical decision making.

**Title:** Successful TAVR after iatrogenic aortic cusp dissection

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**Abstract/Case Study:** Aortic dissection is a rare, albeit potentially fatal complication related to percutaneous coronary intervention, especially when dealing heavily calcified concomitant left main disease and severe valvular heart disease. Rapid stratification of patients in need of early invasive repair versus conservative observation is crucial to patient morbidity and mortality. We present a case of an elderly female with severe aortic stenosis and severe complex multi-vessel coronary artery disease involving the left main bifurcation who underwent high-risk Impella protected rotational atherectomy and bifurcation stenting complicated by left coronary cusp dissection managed conservatively without long-term sequelae. This case highlights both this potentially lethal complication and management strategies

**Title:** A Rare Cardiomyopathy Presenting As Sudden Cardiac Death

**Authors:** Scott Feldman, MD, Virginia Tech Carilion School of Medicine , Internal Medicine , [sfeldman@carilionclinic.org](mailto:sfeldman@carilionclinic.org); Ghaith Aboud, MD, VTCSOM, IM; David Kim, MD, VTCSOM, Cardiology

**Abstract/Case Study:** Introduction: Left ventricular non-compaction cardiomyopathy (LVNC) is a heterogeneous myocardial disorder characterized by a heavily trabeculated left ventricle thought to be caused by arrest of the final stages of normal embryogenesis. The incidence in observational studies has been found in 0.01-0.26% of all adults referred to an echocardiography lab. The diagnosis is becoming more frequent as imaging technology, such as cardiac magnetic resonance imaging (cMRI), becomes more available. Case: A 59 year old healthy female presented after collapsing at work and was found in ventricular fibrillation. Cardiopulmonary resuscitation was started resulting in return of spontaneous circulation. Her initial electrocardiogram did not have an ischemic or infarction pattern and she was transferred to the cardiac care unit for treatment of cardiogenic shock. Cardiac catheterization showed normal coronary anatomy but an echocardiogram revealed an ejection fraction of 20-30%. cMRI demonstrated left ventricular non-compaction. The patient underwent placement of an automatic implantable cardioverter-defibrillator (AICD) for secondary prevention. She was discharged on hospital day 14 to inpatient rehabilitation. Discussion: Clinical manifestations of LVNC are variable but involve congestive heart failure, arrhythmias, and/or systemic thromboemboli. Ventricular arrhythmias have been reported in 47% of patients. One cohort followed for four years after the diagnosis of LVNC showed that 50% died from sudden cardiac death. As the incidence of this cardiomyopathy increases it will be important to stay vigilant for the higher incidence of life threatening arrhythmias in this population. When used appropriately a cMRI obtained for evaluation of unexplained cardiomyopathy may aid in the diagnosis and early placement of an AICD for primary prevention. To our knowledge however, this is the first case report of LVNC presenting as sudden cardiac death where the patient survived to discharge allowing for AICD placement for secondary prevention.

**Title:** Floating Metastases

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**Abstract/Case Study:** There are around thirty common symptoms and signs of non-small cell lung cancer. Unfortunately the symptoms are often non-specific and recognition of new symptoms is difficult in the presence of other lung conditions. We present a case of pulmonary adenocarcinoma presenting with bronchorrhea, more than one-hundred milliliters of sputum production per day. A 74 year old male presented to clinic with a cough productive of copious sputum, fatigue, and weight loss. By the end of the day he could fill up a coffee cup with sputum. He had a 15-pack-year smoking history but quit 25 years ago. Vitals revealed hypoxia. Physical exam showed unlabored breathing with rales over the posterior lungs fields bilaterally. Chest imaging demonstrated bilateral hazy opacification in a lepidic pattern along with consolidation in the dependent areas of the left lower lobe. Bronchoscopy with bronchoalveolar lavage and transbronchial biopsy would give the diagnosis of adenocarcinoma. Bronchorrhea is seen in chronic bronchitis, bronchiectasis, and, rarely, scorpion stings and organophosphate poisoning. Dyspnea and cough are common from the volume of secretions. The differential should also always include adenocarcinoma as bronchorrhea is described in the literature most often in the mucinous subtype of adenocarcinoma in situ. Radiographically the tumor appears as branching opacities with ill defined margins and ground-glass attenuation in a multi-lobar or pneumonia-like pattern. This is due to intrapulmonary discontinuous spread of detached floating neoplastic cells through airspace and airways, or aerogenous spread. For this reason contralateral lung involvement is common as coughing launches the tumor laden sputum throughout the airways. Treatment for bronchorrhea, independent of the cancer itself, includes EGFR inhibitors, Octreotide, Indomethacin, erythromycin, or corticosteroids. Bronchorrhea while rare and non-specific should always raise concern for cancer and timely diagnosis should be sought after.

**Title:** A Surprising Find

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**Abstract/Case Study:** A 53-year-old female presented with complaints of nausea, poor appetite, and epigastric abdominal pain made worse with food intake. Labs demonstrated a mild leukocytosis with elevated inflammatory markers and a lipase of 1470 U/L. Triglyceride level was 190 MG/DL while liver enzymes and GGT were normal. Bedside ultrasound was used and upon viewing the pancreas and subsequently obtaining a subcostal view of the chest a suspicious entity was appreciated. CT of the chest was remarkable for a heterogenous well-circumscribed attenuating mass. TSH was elevated at 7.353 uIU/mL. Free thyroxine was normal. Biopsy revealed the mass to be a WHO type B2 thymoma at clinical stage III. Further laboratory workup revealed a low positive ANA and a low IgG level of 552 mg/dL. Although she exhibited no signs of myasthenia gravis in her history or exam, she did admit to ongoing eye issues since the beginning of the month. Acetylcholine receptor antibodies were negative. This case warrants recognition because it not only demonstrates a rare presentation of a thymoma, but also because it highlights the effectiveness regarding the utilization of ultrasound. Several studies have demonstrated the superiority of diagnostic ultrasonography to physical exam alone including avoidance of unnecessary radiation and increased diagnostic accuracy. The etiology of the patient's pancreatitis was believed to have been secondary to a paraneoplastic autoimmune-like reaction associated with her thymoma. Her hypogammaglobulinemia, elevated TSH, and low positive ANA also support the notion of a paraneoplastic process. Literature review produced only one report of pancreatitis being the paraneoplastic demonstration of a thymoma. Currently there is no recognized test that would definitively link pancreatitis to a thymoma however given our patient's entire clinic presentation and paraneoplastic lab findings, it is reasonable to conclude the pancreatitis as being an autoimmune-like manifestation stemming from the thymoma.

**Title:** A Bad Bag

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**Abstract/Case Study:** A 74-year old African American male with diabetes mellitus, obesity, and tobacco abuse presented with a complaint of constant, non-radiating, and sharp right upper quadrant abdominal pain for 2 days. Initial physical exam was remarkable only for right upper quadrant tenderness. Right upper quadrant ultrasound demonstrated cholelithiasis without common bile duct dilatation. HIDA scan revealed patency of the cystic and common bile ducts and an ejection fraction of 60%. The patient continued to deteriorate with worsening abdominal pain, new onset abdominal distension and an associated ileus. CT scan demonstrated a moderate amount of ascites with a mass at the gallbladder fundus. Paracentesis revealed dark green colored fluid with culture negative neutrocytic ascites and a total bilirubin level of 17.5. Subsequent MRI showed a heterogeneous polypoid sessile intraluminal mass involving the gallbladder fundus and transmural extension with microinvasion into segment V of the liver. This constellation of findings correlated with a diagnosis of stage IIIa gallbladder adenocarcinoma with metastasis to the liver. A percutaneous transhepatic drain was placed and continuously drained a large amount of bilious ascitic fluid. A second HIDA scan showed a biliary leak from the fundus of the gall bladder adjacent to the fungating. This case illustrates a rare complication of an uncommon and highly fatal malignancy. An extensive literature review of gall bladder carcinoma dating back 30 years revealed only two incidents of spontaneous gallbladder rupture in patients with gallbladder carcinoma. Perforation of the gallbladder is a serious clinical condition and is associated with high morbidity and mortality. Early endoscopic intervention with placement of a transpapillary stent is a feasible intervention which would allow preferential transpapillary bile flow rather than extravasation at the potential sight of necrotic rupture.

**Title:** Evaluation of intravenous acyclovir use and herpes simplex virus testing

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**Abstract/Case Study:** Background: The objective of this study was to evaluate the appropriateness of IV acyclovir usage and herpes simplex virus (HSV) laboratory testing at Carilion Roanoke Memorial Hospital, with the intent to identify areas for education of acyclovir use and justify onsite HSV PCR testing. Methods: This cross-sectional study reviewed patients who received IV acyclovir from October 2017 to October 2018. Collected data included: patient demographics; concurrent antiviral medications and fluids; acyclovir dose and duration; PCR data within 48 hours of admission; cost of PCR test and acyclovir therapy. Therapy was deemed appropriate or inappropriate for each patient encounter based on institutional and national guidelines. Data was analyzed using descriptive statistics. Results: Of the 169 patients included, 63.3% had CNS related indications. The median dose was 10 mg/kg and 20 mg/kg in adults and children respectively. A total of 1678 doses of IV acyclovir were administered during the 2017 fiscal year. Antiviral therapy was deemed appropriate in over 80% of patients, with incorrect dose the most common reason for inappropriate therapy. The cost of IV acyclovir was over \$8,000 and offsite PCR testing over \$35,000. The median time from PCR collection to results was 3.6 days for cerebrospinal fluid and 2.9 days for blood samples. The median time from negative PCR result to discontinuation of acyclovir was 0.44 days in adults and 0.78 days in pediatrics. Up to nine IV acyclovir doses could be avoided in adults, and six doses in children with onsite HSV PCR testing. Conclusions: Results indicate that education regarding appropriate IV acyclovir dosing regimens should be encouraged. Given prompt discontinuation of IV acyclovir following negative PCR results, in house HSV PCR testing should be pursued in an attempt to detect negative results earlier, avoid unnecessary acyclovir doses, minimize potential adverse effects, and reduce length of stay.

**Title:** Blood Pressure Control in the Setting of Vascular Ehlers Danlos

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**Abstract/Case Study:** Vascular Ehlers-Danlos Syndrome (EDS) results due to an autosomal dominant mutation of type III procollagen (COL3A1) leading to significant vascular complications including rupture of arterial vessels. Overall survival due to potential complications is shortened due to loss of connective tissue integrity in the blood vessels. Thus the question arises, what is the ideal blood pressure control for a patient suffering from vascular EDS? 42 year-old female with a PMHx significant for Type IV EDS complicated with an abdominal aortic aneurysm (11/2011), right carotid and right renal artery dissections, pericardial effusion, femoral-femoral bypass graft thrombosis, basilar hemorrhage, colon perforation, vascular graft infection on chronic ciprofloxacin presented with abdominal and back pain that began on day of admission. Underwent CTA chest/abdomen/pelvis found to have a left renal infarction of 30%, vascular surgery recommended no intervention at the time. Multiple attempts with metoprolol IV were attempted to lower blood pressure into the 100-120 systolic range but remained in the 160 range. During admission, patient developed ventricular tachycardia with new onset chest pain found to have ST changes in leads I, II, and V6. Cardiology decided to intervene with a catheterization, which revealed a left anterior descending distal/apical spontaneous coronary dissection with patency of the vessel, recommended medical management of distal LAD/apical infarct and a stent was not placed. She was medically managed with a heparin drip for 48 hours as per acute coronary syndrome protocol. Patient ultimately succumbed to her disease of EDS after a few hours. Our patient suffered a coronary artery dissection, which is described in 80% of 26 individuals with the disease when experiencing chest pain. Blood pressure monitoring on a regular basis is of vast importance in someone who suffers from Type IV EDS due to sheer stress and pressure on the arterial walls.

**Title:** Anomalous Right Coronary System with a Malignant, Intramural Course

**Authors:** Mit Patel, MD, Virginia Tech Carilion School of Medicine, Internal Medicine , mvpatel@carilionclinic.org; Bryant Self, D.O., Virginia Tech Carilion School of Medicine, Cardiology; Jacek Slowikowski, M.D., Virginia Tech Carilion School of Medicine, Cardiology

**Abstract/Case Study:** Introduction: An anomalous right coronary artery (ARCA) from the left coronary sinus with an interarterial (malignant) course is a very rare anomaly with an incidence of 0.23%. It may cause myocardial ischemia, arrhythmia, and has an increased risk of sudden cardiac death (SCD). We describe a case of ARCA with a malignant, intramural course presenting with chest pain and dyspnea. Case Presentation: A 46-year-old female presented with chest pain and dyspnea. ECG did not show acute ST abnormalities. Cardiac catheterization revealed no obstructive coronary artery disease. A CTA of the heart showed the RCA originating from left sinus of Valsalva with an interarterial course between the anterior wall of the aortic root and posterior wall of the main pulmonary artery. Initial portion of the RCA had intramural course, within the wall of the aortic root, which was significantly compressed with greater than 70% stenosis. While awaiting surgical evaluation, patient was started on aspirin and was advised to stop smoking, avoid strenuous exercise, and to continue to work towards optimal control of hypertension and diabetes. Discussion: Congenital coronary artery anomalies are rare with many different subtypes of varying clinical significance. Interarterial ARCA is associated with increased risk of myocardial ischemia, arrhythmia, syncope, and SCD due to restricted coronary blood flow. The possible mechanisms causing restricted coronary blood flow are suggested to be acute takeoff angle, slit-like orifice, and compression of the intramural segment by the aortic valve commissure. Coronary artery compression between the aorta and the pulmonary artery is another possible mechanism, especially during exertion, with increased aortic wall distensibility causing additional compression. Surgical repair is recommended for interarterial ARCA in patients with documented ischemia, though overall management is controversial. CTA or MRA are imaging modalities of choice. Exercise restriction to Class IA sports (golf, bowling, etc.) is recommended.

**Title:** Ischemic Duodenal Ulceration After Thoracic Endovascular Aortic Repair

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**Abstract/Case Study:** Ischemia is a rare cause of duodenal ulcers due to the duodenum's redundant blood supply. Aortic surgery is a rare risk factor for acute mesenteric ischemia. Identifying the cause of ischemic duodenitis can be difficult and result in high morbidity if diagnosis is delayed or untreated. Here we present a case of ischemic duodenal ulceration following thoracic endovascular aortic repair (TEVAR). An 82-year-old male presented with complaints of lightheadedness, dyspnea, and melena for several days. He had recently undergone TEVAR for a DeBakey type III aortic dissection distal to the left subclavian artery. His recovery was complicated by endovascular leak at the left subclavian artery, left renal artery dissection, and thrombosis of the superior mesenteric artery, which were repaired by coiling and stenting of the left renal artery and SMA. Hemoglobin on presentation was 6.7. Esophagogastroduodenoscopy (EGD) revealed duodenitis and a Forrest IIc ulceration in the duodenum with concern for underlying ischemia. Computed tomography angiography (CTA) of the chest and abdomen revealed a duodenal ulcer along the proximal descending segment with associated mural thickening and fat stranding. Additionally, the celiac trunk, right renal, and inferior mesenteric artery were patent along with the stented superior mesenteric and left renal artery. CTA reconfiguration identified stenosis at the bifurcation of common hepatic artery and stenosis of the celiac artery. The stenotic lesions were repaired using balloon angioplasty to the common hepatic artery and angioplasty with stenting to the celiac artery. The patient's hemoglobin stabilized post-operatively with complete symptom resolution. This case demonstrates an uncommon presentation of duodenal ulceration in the context of recent TEVAR resulting in ischemic changes. Review of current literature reveals few reports of ischemic duodenal ulceration following TEVAR, however this case highlights the importance of maintaining a wide differential diagnosis when evaluating suspected gastrointestinal hemorrhage following cardiothoracic surgical intervention.

**Title:** Pulmonary Hypertension in Sickle Cell Disease

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**Abstract/Case Study:** Sickle cell disease (SCD) is characterized by hemolytic anemia due to abnormal hemoglobin formation. Hemoglobin S polymerization results in hemolysis, vaso-occlusion, inflammation, anemia, and upregulation of hypoxic responses. When this process falls on the pulmonary vascular bed, pulmonary hypertension (PH) can develop. A poor prognostic factor and risk factor for death, PH affects between 6 to 11% of SCD patients. A 27-year old male with SCD homozygous for hemoglobin S (HbSS) presented with complaints of exertional dyspnea. He denied cough, chest pain, edema, orthopnea, fever, or chills. Exam showed a thin male without respiratory distress and clear lungs. His pulse was regular and a 1/6 systolic murmur was best auscultated over the left third intercostal space. Jugular venous distension was measured at 3 cm above the Angle of Louis and there was trace edema bilaterally. Labs were significant for an elevated NT-pro-BNP. CXR did not show a new infiltrate. An echocardiogram revealed right ventricular enlargement and tricuspid regurgitation. The patient underwent a right heart catheterization, which revealed an elevated mean pulmonary artery pressure, elevated pulmonary vascular resistance, and a normal left ventricular end-diastolic pressure. A diagnosis of PH was made and he was started on a prostacyclin agonist with marked symptom improvement. Chronic dyspnea in SCD can come from pulmonary fibrosis, asthma, acute and chronic venous thromboembolic disease, sleep-disordered breathing, and PH. PH can be subclassified into five groups, determined by the World Health Organization, according to the various etiologies by which it arises. Exertional dyspnea is the clue to the presence of PH. When patients with SCD present with new onset exertional dyspnea, PH should be within the differential. Screening echocardiogram is helpful in identifying patients who require referral to a specialist. If the diagnosis is made, therapies such as prostacyclin agonist or endothelin receptor antagonist can be helpful.

**Title:** A Rare Case of Native Valve Klebsiella Endocarditis

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**Abstract/Case Study:** Native valve endocarditis is a rare complication of Klebsiella pneumoniae bacteremia. Here we present a case of an elderly male patient with a chronic indwelling catheter that presents with purulent discharge from his catheter, altered mental status, and sepsis. He was determined to be bacteremic with positive blood cultures, and was subsequently found to have a 10mmx12mm mobile mass on the posterior mitral valve leaflet. He was started on empiric treatment of cefepime and vancomycin, but ultimately transitioned to ceftriaxone due to resultant sensitivities and the discovery of diffuse acute emboli on MRI. While Klebsiella pneumoniae is a ubiquitous organism known to cause urinary tract infections, Klebsiella endocarditis secondary to bacteremia with CNS emboli is highly unusual. The few reported cases of Klebsiella endocarditis highlight elderly, immunocompromised patients, notably with organ transplants. Other studies associate Klebsiella endocarditis with a primary liver abscess; however, PET scans of this patient revealed hypodense areas in the brain correlating with septic emboli without increased uptake in the liver. The patient was discharged in a stable condition with intent to follow up with multiple specialists to monitor resolution of disease but unfortunately, 4 days post discharge, the patient suffered a sudden cardiac arrest. While there was no follow up for this patient, it is key for clinicians to note the extensive pathology that can be caused by Klebsiella and perform necessary procedures to determine source, seeding, and eradication of bacteria.

**Title:** CDI Toxin Versus Molecular Assay Predicts Antibiotic Response In IBD

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**Abstract/Case Study:** Background: Clostridium difficile infection (CDI) is a common complication in inflammatory bowel disease (IBD) and has been associated with poor outcomes. The objective of this study was to examine response to antibiotics and IBD-related outcomes in patients with Toxin+ versus Toxin-PCR+. Methods: This retrospective study included patients at a tertiary academic center with an established diagnosis of IBD who developed CDI during the period from December 1, 2012 to December 31, 2017. The primary outcome measure was 30-day clinical response to antibiotics in Toxin+ versus Toxin-PCR+ patients. Secondary outcome measure was escalation of IBD-specific therapy within 90 days of CDI diagnosis. Comparisons of antibiotic response and IBD therapy escalation between the two groups were determined by Chi-square analysis. Multivariate regression analysis examined factors associated with antibiotic response. Results: 92 patients (47% females) were included, with a mean age of 44. 61% had Crohn's disease (CD); 39% had ulcerative colitis (UC). 30% tested Toxin+ and 70% tested Toxin-PCR+, with similar rates observed in CD versus UC patients. 82% of Toxin+ patients responded to antibiotics compared to 25% of Toxin-PCR+ patients ( $p < 0.001$ ). 21% of Toxin+ patients required IBD-therapy escalation compared to 63% of Toxin-PCR+ patients ( $p < 0.001$ ). Among the factors examined including positivity to toxin, therapy with metronidazole versus vancomycin or fidaxomicin, CD versus UC, immunosuppressed status, and use of recent antibiotics, only positivity to toxin (OR 14.85, CI 4.62-47.72) and lack of immunosuppression (OR 3.10, CI 1.11-8.67) were significantly associated with response to antibiotics. Conclusions: IBD patients with CDI diagnosis based on Toxin-PCR+ tests had a significantly lower rate of response to antibiotics and higher chances of requiring IBD therapy escalation compared to Toxin+ patients. Better methods are needed to distinguish true CDI from colonization in these patients. Future outcome studies of CDI in IBD patients should be stratified by modality of diagnosis.

Poster Session II (Faculty/ Professional and Residents)

Classroom 1

Nursing/ Education

**Title:** Engaging Nurses and Bedside Staff in Injury Prevention Efforts

**Authors:** Sarah Beth Dinwiddie, MPH(c), BSN, RN, Carilion Roanoke Memorial Hospital, Trauma Services, sehelms@carilionclinic.org; Stephanie Lareau, MD, FAWN, FACEP, DiMM, Carilion Clinic, Emergency Services; Randy Howell, DHSc, PA-C, Carilion Clinic, Emergency Services

**Abstract/Case Study:** Background: Few communities are equipped to offer basic safety and drowning prevention in moving water. Roanoke has several rivers commonly used for recreation. There is currently a national trend encouraging outdoor recreation<sup>4</sup> leading to a growing need for outdoor safety and injury prevention. Community resources for moving water drowning prevention while increasing health care provider education of the drowning patient are much need throughout the Roanoke Valley. Methods: Identify Problem: lack of basic moving water safety education. Set Goals and Objectives for Problem Solving: Develop a local training group of health care providers. Identify Stakeholders. Train Stakeholders: health care providers attended Swift Water Rescue Instructor course to gain certification River Safety and Rescue instructors. Develop Educational programing. Implement Education programing. Evaluate and Adapt Program. Share What Works/What Doesn't Work. Continuing Education. Results: A Moving Water Safety Program uniquely designed to promote a healthy lifestyle for the general population and professional education for the health care provider by incorporating outdoor recreation with best practices for the drowning patient was initiated. Course participants are aware of moving water hazards, understand risk mitigation, and are encouraged to safely enjoy local blue ways. Trauma Outreach Coordinators have a broader scope of expertise by partnering with stakeholders to provide quality, evidence-based moving water safety. Conclusion: Incorporating best practice standards for the drowning patient into Moving Water Safety Programming can encourage and empower health care providers to improve work/life balance and pursue outdoor recreation within their skill set while also gaining value insight for patient care.

**Title:** They're breathing aren't they? Why Counting Respirations is Important

**Authors:** Donna C. Bond, DNP, RN, CCNS, AE-C, CTTS, Carilion Clinic, Nursing, DCBond@Carilionclinic.org; Deborah J. Robinson, AS, RRT, ACCS, MA, MCC, DMin, Carilion Clinic, Respiratory Therapy

**Abstract/Case Study:** Respiratory rate (RR) is an independent predictor of adverse outcomes and is part of early warning systems (such as Paratrend') for hospitalized patients. However it has been reported in the literature that RR is often inaccurately documented. According to these papers RR is accurately recorded in less than one quarter of patients as opposed to other vital signs being recorded accurately greater than fifty percent of the time. Nurses also feel that they are forced to provide false documentation to meet organizational requirements. In 2017 Badawy found that using statistical histograms, skewness and kurtosis to analyze the distribution and variation of RR comparing to the distribution and variation of the heartrate would determine if both vital signs were normally distributed (accurate recording) or skewed (clustered, inaccurate) readings. In his research he discovered that heart rate was normally distributed and respiratory rate was skewed to the right with the majority of RR clustered between 18 and 20 breaths per minute. This is a descriptive, observational study of electronic medical records of patients who experienced either a cardiac/respiratory arrest (code blue) or a rapid response at a 703 bed academic medical center. Objectives: 1. To determine distribution of RR across a population of adults experiencing compromise. 2. To determine if external equipment used to monitor for respiratory compromise (Capnography, Oximetry) is utilized in this patient population. 3. To identify the percentage of patients who experience a 'code blue' or 'rapid response' following administration of an opioid or narcotic medication. 4. Describe the population of patients who experience a "Rapid Response" or "Code Blue" by demographics and clinical variables (presence of monitoring equipment such as end tidal CO2 or pulse oximetry, and Rothman Index), and opioid administration 72 hours prior to the event.

**Title:** Implementing a Simulation-Based Program for Nurse Leader Patient Rounding

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**Abstract/Case Study:** Although leader rounding has been shown to improve overall patient experience, this was not observed at our organization. Shadowing and data analysis yielded insight into process deficiencies for preparing leaders to round resulting in an inconsistent rounding culture. Since implementing leader rounding, education for leaders consisted of training with an online education module primarily focused on how to use our digital rounding solution. While the education in the learning management system was standardized and tapped the cognitive domain of learning, little or no education was provided to develop affective and psychomotor domain learning. Three organizational departments (Nursing, Patient Experience, and the Center for Simulation, Research and Patient Safety) collaborated to develop a nurse leader patient rounding simulation with the goal of building a consistent culture of nurse leader patient rounding. In order to provide the best method for experiential learning, standardized patients were utilized. 108 nurse leaders participated in this simulation training. Summary statistics were used to analyze quantitative data, and themes were identified from qualitative data. Based on post-simulation participant evaluations, 89% of learners felt the education will impact their communication skills, 83% impact on leadership skills, 73% impact on confidence levels. On average, learners strongly agreed they feel more confident in their ability to care for real patients using skills they learned during the simulation activity, mean 4.7/5; that debriefing and group discussions were valuable, mean 4.8/5; that they benefit from being able to learn in an environment which allows mistakes, mean 4.8/5. Common positive qualitative themes included use of standardized patients, debriefing techniques, and having relevant scenarios. There is a gap in the literature examining the impact of simulation training on leader rounding. The use of simulation to build a consistent rounding culture for nurse leader rounding is innovative and creative.

**Title:** Ventilatory Associated Pneumonia Prevention in the Emergency Department

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**Abstract/Case Study:** Ventilator Associated Pneumonia (VAP) is a pneumonia that develops when a patient is receiving mechanical ventilation. The presence of an artificial airway increases the risk of aspiration from the mouth into the lungs. Research and hospital policies on prevention of VAP have been focused on inpatient settings. The risk of VAP begins as soon as a patient is intubated which frequently occurs in the Emergency Department (ED) or prior to admission. To obtain data on this issue, education and instruction were provided to ED staff on VAP prevention, including three elements of the VAP prevention bundle: tooth brushing, sub-glottal suctioning, and elevating head of bed 30 degrees. Staff were anonymously surveyed prior to, immediately following, and six months post education. Retrospective data was obtained prior to staff training over a six month period (10/1/2016 to 3/31/17) on all patients receiving mechanical ventilation in the ED. Data collection included date and time of intubation procedure, placement on mechanical ventilation, length of stay in the ED, length of time on mechanical ventilation while in the ED, and documentation of the identified three elements of VAP prevention. A duplicate chart review was performed following staff education and implementation of the three VAP prevention elements over a six month period (10/1/2017 to 3/31/2018) on patients receiving mechanical ventilation in the ED. Due to small sample of VAP attributed to the ED, no statistical difference was found between pre and post VAP intervention groups. Chart reviews and survey results statistically demonstrated an increase in performance of preventions, a significant increase in staff awareness of VAP preventions, and the ability to maintain knowledge for six months post education.

**Title:** Impact of Use of Stroke and Dysphagia Severity Algorithm

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**Abstract/Case Study:** Introduction: Enteral feeding tubes, nasally inserted (NGT) or percutaneous endoscopic gastrostomy tubes (PEG) are used to provide nutrition and hydration to stroke patients with dysphagia. For patients with severe dysphagia, a PEG tube should be considered early in treatment. The purpose of this IRB-approved research was to determine the effect of a dysphagia severity and decision making algorithm on patient hospital length of stay, restraint use and cost. Methods: A retrospective chart review of 40 stroke patients hospitalized between August 14, 2016 and February 14, 2017 who required NGT feeding due to dysphagia was conducted. The algorithm was implemented for 36 stroke patients with dysphagia who required tube feeding from August 14, 2017 through February 14, 2018. Data collected included dates of nasally inserted tubes, number of tube re-insertions, number of abdominal x-rays performed for placement verification, dates of PEG consult and placement, restraint use and hospital length of stay. Non-equivalent T-Tests were used to determine differences between groups. Results The pre-algorithm group experienced more days prior to insertion of a nasal feeding tube (6 days) compared to the post-algorithm group (3.3 days;  $p=0.146$ ). Nasal tube replacements ( $p=0.009$ ) and repeat x-rays ( $p=0.0073$ ) both decreased in the post-algorithm group. There were no differences between the two groups in restraint use ( $p=.2621$ ) or length of stay ( $p=0.0746$ ), although the post-algorithm group experienced a mean seven day shorter length of stay and restraint use was decreased by an average of six days. Conclusion: Although not statistically significant, the shorter length of stay and restraint reduction, combined with fewer tube replacements and x-rays translates clinically to decreased cost. This algorithm is a promising tool to encourage early consult and placement of PEG tubes to impact reduced length of hospital stay, restraint usage, and cost.

**Title:** Pain Management through Art and Relaxation

**Authors:** Melissa Foster, BSN, RN, Carilion Clinic, Inpatient Rehabilitation, mmcooper@carilionclinic.org; Kimberly F. Carter, PhD, RN, NEA-BC, Carilion Clinic, Nursing Research, EBP, & Excellence

**Abstract/Case Study:** Literature is limited examining the effect of creative art activities as an adjuvant for pain management. This IRB-approved, RAP-funded study endeavored to identify the effect of creative art and relaxation classes on self-reported mood and pain scores, pain-related ED visits, and medication usage in ambulatory patients with chronic pain. Providers identified over 60 patients who were invited to participate. A one group pre- post quasi-experimental longitudinal design was planned. A no-cost extension was secured to implement revised strategies to attempt to secure additional study participants. Despite payment incentives, enrollment and completion numbers were low (n=3); therefore, the study findings were analyzed as a proof of concept. Quantitative data were collected using the Brief Pain Inventory (Short Form), Generalized Anxiety Disorder 7-item (GAD-7) scale, and the Personal Health Questionnaire Scale (PHQ-8). After providing informed consent, participants completed the measures and then participated in 8 creative art and relaxation classes over 4 weeks and were asked to submit their pain diaries and medication logs. The intervention used various art techniques and alternative therapies in addition to their prescribed pain medications. Recruitment problems included having to sign consent, frequency of the art classes, lack of transportation, and incentive amount (\$ 100). Subjects reported improvement in ability to focus on other tasks instead of pain. Pain and symptom severity and relief continued to fluctuate, but a downward trend in depression scores was noted. The sample size limited the ability to interpret the findings beyond a basic proof of concept. However, each subject experienced improvements on the depression scale, warranting further study to determine cause and effect. More work is needed to understand how to engage this risk population in research. Expanding the subject pool beyond the Pain Management division to participants with a variety of pain disorders could maximize sample size.

**Title:** A Descriptive Study from the International Quit & Recovery Registry

**Authors:** Bob Reese, PhD, Jefferson College of Health Sciences, Arts & Sciences, rcreese@jchs.edu; Sandesh Bhandari, PhD, VTCRI, Addiction Recovery Research Center; Warren Bickel, PhD, VTCRI, Addiction Recovery Research Center; Amanda Quisenberry, PhD, Ohio State University, College of Public Health; Derek Pope, PhD, VTCRI, Addiction Recovery Research Center

**Abstract/Case Study:** Recovery is a crucial component in the life cycle of addiction. Previous investigations of this phenomenon have used either longitudinal or cross-sectional studies requiring considerable cost and/or time. Crowdsourcing via the internet presents both a reliable and cost-effective method of gathering needed data. The International Quit & Recovery Registry (IQRR) <<https://quitandrecovery.org>> is an Internet-based registry that was launched by the Addiction Recovery Research Center (ARRC) at the Virginia Tech Carilion Research Institute (VTCRI) in 2011. As of November 14, 2017, there are over 7,700 registrants who provide both demographics and information about their recovery from addiction to tobacco, alcohol, drugs, or harmful behavior. A new psychometric assessment is posted each month and participants earn points toward Recovery Badges and chances to win an Amazon gift card. Data gleaned from these surveys has spawned studies as diverse as examining the relations between delay and probability discounting to investigating the length of time in recovery and its correlation to happiness in alcoholics. This report describes the demographics, self-reported addictions, and treatment histories of the IQRR registrants and constitutes cross-sectional descriptive results. The registrants are equally distributed by gender; 49.39% are recovering from alcoholism; the most effective method for quitting is 12-Step programs (38.12%), followed by in-patient therapy (30.98%). At least one additional dependency is reported by 93.14% of the sample. These results supplement recent Internet based, extend treatment-based research, and support the IQRR as an effective method to recruit individuals in recovery for research participation. Future directions of the IQRR should increase the functionality of the IQRR as a self-help tool in addition to a research data collection tool. Continuing and future research with this registry may be able to characterize the activities that contribute to long-term recovery, and prospectively phenotype individuals who are or are not able to remain in recovery.

**Title:** Basic Science Faculty Conception of Learning and Teaching

**Authors:** Helena Carvalho, PhD, VTCSOM, DBSE, helena@vt.edu; Francis C. Dane, PhD, Jefferson College of Health Sciences, Department of Arts & Sciences; Shari A. Whicker, PhD, Carilion Clinic and Virginia Tech Carilion School of Medicine, Office of Continuing Professional Development

**Abstract/Case Study:** Approaches to teaching can be placed on a continuum that ranges from teacher-centered (focus on knowledge transmission) to student-centered (focus on conceptual change in students). The educator's conception of learning and teaching (COLT) affects teaching and what students learn. We aim to research the COLT for Basic Science faculty who teach at VTCSOM. A survey was distributed via REDCap to 130 faculty who teach Basic Sciences (BS) at VTCSOM. It contains 3 scales: 1) Teacher Centeredness (TC); 2) Appreciation of Active Learning (AL); and 3) Orientation to Professional practice (OP). Teaching experience and teaching methodologies was also collected. Reliability for the survey was assessed with Cronbach's alpha test. Correlation and Chi Square were used to examine relationships between variables. Analysis of Variance was used to examine group differences. The 38% of survey responses showed overall BS faculty scored higher on AL ( $4.06 \pm 0.41$ ) and OP ( $4.2 \pm 0.45$ ) and lower in TC ( $3.12 \pm 0.6$ ) regardless of gender and degree. 17 disciplines were listed and 21 teaching modalities were reported. 80% of faculty lecture; laboratory teaching (20%) are used by faculty who scored high on TC ( $F=8.69$ ;  $p=.005$ ). Younger faculty (30-39y.o.) score lower than older (50-59y.o.) on TC ( $F=3.29$ ;  $p=.027$ ). More variety of teaching styles was observed among faculty with a lower score in TC ( $r = -.323$ ,  $p = .022$ ), a higher academic rank ( $r=.401$ ;  $p=0.006$ ), and more time teaching ( $r=.483$ ;  $p=0.001$ ). VTCSOM Basic Science faculty Conception of Learning and Teaching aligned with the school approach as faculty appreciate active learning more than teacher centered and offer a variety of teaching styles. This is relevant because it reaches a larger number of students as they are exposed to more diverse opportunities to learn actively.

**Title:** Liberalization of Concealed Carry Legislation Not Associated with Increased Crime

**Authors:** Mark E. Hamill, MD, VTC School of Medicine, Surgery, mehamill@carilionclinic.org; Matthew C. Hernandez, MD, Mayo Clinic, Surgery; Kent R. Bailey, PhD, Mayo Clinic, Biostatistics; Martin D. Zielinski, MD, Mayo Clinic, Surgery; Miguel A. Matos, DO, VTC School of Medicine, Surgery; Henry J. Schiller, MD, Mayo Clinic, Surgery

**Abstract/Case Study:** Introduction: Over the last 30 years public opinion and state level legislation regarding the concealed carry of firearms has shifted dramatically. Prior studies have yielded mix results making policy recommendations difficult. We investigated whether liberalization of state level concealed carry legislation was associated with a change in the rates of homicide or other violent crime. Methods: Data on violent crime and homicide rates were collected from the USDOJ UCR and CDC over 30 years from 1986-2015. State level concealed carry legislation was evaluated each study year on a scale including no carry, may issue, shall issue and unrestricted carry. Data was analyzed using general multiple linear regression models with the log event rate, and an autoregressive correlation structure was assumed with GEE estimates for standard errors. Results: During the study period all states moved to adopt some form of concealed carry legislation, with a trend towards less restrictive legislation by the end of the study period. After adjusting for state and year, there was no significant association between shifts from prohibited towards unrestricted carry on UCR homicide ( $p=0.92$ ), UCR violent crime ( $p=0.33$ ), CDC homicides ( $p=0.23$ ) or CDC firearm homicide ( $p=0.19$ ) rates. Conclusions: Our study demonstrates no statistical association between the liberalization of state level firearm carry legislation over the last 30 years and the rates of homicides or violent crime. Policy efforts aimed at injury prevention and the reduction of firearm related violence should likely investigate other targets for potential intervention.

**Title:** Title: With Hydroxychloroquine Use, The "Eyes" Have It!

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**Abstract/Case Study:** Hydroxychloroquine (HCQ) is commonly used in Rheumatology, but can be associated with retinal deposits causing irreversible blindness. Recent guidelines from the American Association of Ophthalmology for screening are aimed at preventing these retinal complications. We intended to determine if educational intervention provided in 2016 regarding these guidelines had the desired effect on HCQ screening. We require documentation in the past medical history (PMH) section of the electronic medical record (EMR). This would ensure that we are meeting the current standard of care improving the quality of treatment provided to our patients. This was a retrospective, single center, hospital-affiliated outpatient cohort study. A list of patients was generated with the help of the technology service group. Data was collected from eligible patients seen between June-October 2015 (487 patients) and June-October 2017 (583 patients). Data related to risk factor including pre-existing eye disease, body mass index, liver disease, renal disease and age above 65 were also collected. The location within the EMR and date of the visual field examination (VFE) was also collected and documented. Only 16% of patients prescribed HCQ in 2015 had a documented VFE and this rose to 51% in 2017. In 2017, 62.4% of patients had the VFE documented in the PMH as required, as compared to 14.1% in 2015. In patients with pre-existing eye disease which is a risk factor for HCQ related eye disease only 16% of patients in 2015 had VFE documented and this only rose to 29% in 2017. There was significant improvement in total number of patients receiving VFE's on HCQ and the documentation of VFE after the educational intervention provided in a team based approach. The desired quality improvement was achieved, however it is unclear if updates will be needed to sustain this improvement and will be monitored further.

**Title:** Attitudes of VA mental health professionals towards LGBTQ veterans

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**Abstract/Case Study:** Objective: To study the attitudes of VA mental health providers using an anonymous 20-question survey and the need for provider education in relation to the LGBTQ patient population. Methods: An anonymous 20 question survey based on the LGBT-DOCSS was emailed to psychologists and psychiatrists, including trainees in each of these disciplines, in the VA system. Results: The data set is composed of 118 responses. We were interested in two main issues: do respondents believe a LGBTQ lifestyle is immoral and do they feel prepared to professionally treat LGBTQ patients? Just over 10% (12 of 118) of the respondents indicated that they believed an LGBTQ lifestyle is immoral but none of the descriptors were predictive for indicating this belief. Just under 39% (46 of 118, CI: .3898+- .0888) said they felt unprepared in some capacity to treat the LGBTQ community. While none of the predictors were statistically significant, it was interesting to see that 45% (31 of 69) of females responded they felt unprepared while only 31% (15 of 49) of males said so (2-sample proportion, p-val = 0.1677). Further, 50% (10 of 20) of the under 30 age group felt unprepared which was higher than the any of age groups. Among the professional groups, the psychiatry residents felt the most unprepared with 61% (16/26) indicating so (Chi-Square test for independence, p-val = 0.07169). Conclusion: This is the first study examining mental health providers' attitudes towards the LGBTQ population in the VA system. The data show that VA mental health providers generally have positive views towards LGBTQ veterans. There were mixed responses about whether the current LGBTQ clinical training at the VA is adequate. This pilot study may be used to develop future curricula for VA providers to increase their awareness of their biases towards the LGBTQ population.

**Title:** Improving confidence of internal medicine residents in treatment of depression:

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**Abstract/Case Study:** Introduction: Depression is one of the most debilitating mental illnesses and the first leading cause of Years Lived with Disability based on the World Health Organization report. Studies show that the early effective treatment of depression will decrease the burden of the disease and yield better outcomes. Primary care providers are often on the front lines of addressing depression however they may not feel confident evaluating and treating effectiveness of their treatment. Method: Thirteen internal medicine residents participated in a 90-minute workshop designed by psychiatry residents under the supervision of an attending physician board certified in both internal medicine and psychiatry. Participants rated their confidence in prescribing antidepressants and took a pre- and post-test examining their knowledge regarding psychopharmacology of this class of medications. Results: On average, test scores increased after the presentation (average increase of 2.09 out of 6, P value 0.0039). Eleven participants completed both pre- and post-test assessments. In this group, the self-reported comfort level of participants in prescribing antidepressants significantly increased after the workshop (average difference of 0.92 on a scale of 1 to 5, P value = 0.0021). In addition, mean test scores increased after the presentation (average increase of 2.09 correct answers out of 6, P value = 0.0039). Discussion: This pilot study shows that a brief workshop led by psychiatry residents can potentially increase the knowledge and comfort level of internal medicine residents in prescribing antidepressants.

## Classroom 2

Case Studies/ Basic Science/ Education/ Surgery/ Medical Education

**Title:** Rare Case of Moyamoya Syndrome Associated with Graves' Disease

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**Abstract/Case Study:** Moyamoya Syndrome is a rare cerebrovascular condition with progressive stenosis of the bilateral internal carotid arteries and their proximal branches, which subsequently leads to compensatory development of collateral vessels. Moyamoya Syndrome presents with the characteristic moyamoya vasculopathy along with an associated condition such as sickle cell disease, neurofibromatosis type I, Down's syndrome, or rarely Graves' disease. This case illustrates a unique presentation of Moyamoya Syndrome in a 37-year-old African American male with thyrotoxicosis from newly diagnosed Graves' disease. He presented with a two-day history of right-sided weakness, slurred speech, and expressive aphasia. The patient was found to be thyrotoxic and imaging of the head confirmed a left, subacute infarct. Arteriography revealed a moyamoya distribution pattern, with well-developed collateral vasculature secondary from the high grade stenosis of bilateral internal carotid arteries, extending to the proximal segments. The patient was initially managed medically with methimazole and aspirin, but later treated with radioactive iodine and underwent revascularization surgery with a left frontotemporal craniotomy and indirect encephalo-dural synangiosis. A case series report in 2016 identified a total of 87 cases of Moyamoya Syndrome with Graves' disease, though there has yet to be a documented case of an African American male with the two coexisting medical conditions. Due to the rarity of the concomitant disease processes, the pathophysiology and treatment guidelines remain unclear, but there appears to be an increased incidence of stroke and risk of recurrent ischemia in Moyamoya Syndrome with Graves' Disease. No controlled studies have directly compared medical and surgical therapy for ischemic Moyamoya Syndrome; however, a more recent survey in Japan revealed those initially managed medically (with anti-platelet therapy) ultimately underwent revascularization surgery due to progressive symptoms. This case report hopes to contribute to the development of treatment guidelines for this irreversible, rare, and progressive cerebrovascular condition.

**Title:** Arresting dental caries with silver diamine fluoride: a case report

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**Abstract/Case Study:** According to the American Academy of Pediatric Dentistry, cavities are one of the most widespread chronic infectious diseases among children in the U.S. Over the past several years, there has been movement towards a less invasive, non-surgical approach to managing caries in children. With the introduction of Silver Diamine Fluoride (SDF), more attention has been brought to this chemotherapeutical agent, as a non-invasive treatment for controlling caries progression. SDF is a liquid containing silver particles and 38% (44,800 ppm) fluoride ion that at pH 10 is 25% silver, 8% ammonia, 5% fluoride, and 62% water. In August 2014, SDF was cleared by the US FDA as a desensitizing agent. SDF arrests active carious lesions painlessly, on asymptomatic teeth. Research has shown that 38% SDF applied at least once per year effectively arrested more than 65% of active caries. In Oct 2018, a three year-old female presents to Carilion Pediatric Dental Clinic with a chief complain of teeth sensitivity for several weeks, and difficulty eating. Mother reported that sensitivity was manageable with analgesics. Limited clinical examination revealed multiple active extensive carious lesions. Radiographic exam was not possible and restorability of teeth was not addressed due to patient's combative behavior. Advantage Arrest SDF 38% agent was used as an interim treatment to arrest caries progression and control sensitivity. SDF agent was applied on all teeth with active opened carious lesions. In December 2018, the patient was taken to the operating room for definitive treatment. Radiographic examination was obtained and diagnosis of Severe Early Childhood Caries (S-ECC) was confirmed. Clinical examination revealed that carious lesions were arrested and had not progressed to involve the pulp which allowed for conservative treatment. The clinical effectiveness of SDF was evident in this case report by arresting dental caries, controlling pain, and preventing more aggressive treatment.

**Title:** Intraoperative Visual Evoked Potentials and Post-Operative Visual Acuity

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**Abstract/Case Study:** Intraoperative Neurophysiological Monitoring (IONM) is a growing healthcare specialty that aims to protect various aspects of patients' nervous system during surgical procedures while under anesthesia. IONM is used primarily in neurosurgical care, including transphenoidal pituitary tumor resection surgery. During transphenoidal surgery, a surgeon works up through the nasal cavity of the patient to remove a tumor on the pituitary gland in the brain. While performing this surgery, the optic nerve is at a direct physical risk of manipulation and injury. Visual evoked potentials (VEPS) is an IONM modality (test) that can be performed during transphenoidal surgery in order to monitor the functional integrity of the optic nerve throughout the procedure and prevent a post-operative patient visual acuity deficit. This project examines the use of VEPS during 12 transphenoidal pituitary tumor resection surgeries and compares the patient visual acuity outcomes with 12 patients who underwent the same surgical procedure without VEPS monitored. While a statistical significance could not be proven with only 24 patients ( $p=0.09$ ), further examination of the expanded use if VEPS should be explored. In addition, a correlation of the VEPS signals intraoperatively with the post-operative visual acuity outcome reported by the patient is found in this patient population ( $r=1.0$ ,  $p<0.05$ ). Separately examined, mean arterial blood pressure did not directly correlate to visual acuity outcome, but surgical duration did. Expanding the use of IONM to include VEPS during transphenoidal surgery has the potential to reduce the number of patients' with post-operative visual acuity deficits, decrease healthcare expenditures treating visual acuity deficits that result from surgery and increase surgeon and patient confidence in a positive surgical outcome.

**Title:** Comparison of PRP Systems Utilized In Orthopaedic Applications

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**Abstract/Case Study:** Introduction Platelet Rich Plasma (PRP) has emerged as a novel treatment for orthopedic conditions. Its popularity has increased substantially and many commercially available PRP systems have emerged. The purpose of this systematic review is to provide an extensive evaluation of each of the known commercially available PRP systems. Methods To characterize the commercially available PRP systems, data were consolidated from numerous resources into a single database, primarily utilizing web search technology and previously published literature. The technical aspects of each system (volume of whole blood drawn, volume of PRP obtained, platelet concentration, factor increase of platelet concentration, centrifugation time and speed, white blood cell concentration, red blood cell concentration, activator utilized, and fibrinogen concentration) were obtained from manufacturer's webpages, product brochures, and marketing pamphlets, as well as personal communication with product representatives. Results Points of data collected to describe the efficacy of each of the 42 PRP systems included: volume of whole blood necessary for system processing, volume of PRP obtained, volume of whole blood drawn versus volume of PRP obtained, platelet concentration, factor increase of platelet concentration, centrifugation time and speed, white blood cell concentration, red blood cell concentration, activator utilized, and fibrinogen concentration. Discussion As expected, a high degree of heterogeneity between the characteristics of the PRP systems was observed through this systematic review. First, there was a difference in ratio of whole blood drawn to PRP obtained by system. Not only were there variable amounts of whole blood required for each system, but the volume of whole blood required did not directly correlate to volume of PRP obtained. Second, the centrifugation process for each system, including time and number of spins, varied. Finally, there were discrepancies between the theoretical yield of PRP as reported by the manufacturer or product representative versus the actual yield of PRP in clinical literature.

**Title:** Ethnomedicinal uses of stingless bee honey from Nepal

**Authors:** Chet P. Bhatta, PhD, Jefferson College of Health Sciences, Biomedical Sciences, cpbhatta@jchs.edu;

**Abstract/Case Study:** Indigenous and non-indigenous peoples in tropical and subtropical areas of the world use stingless bees for diverse purposes. Scattered information indicates that people keep stingless bees and utilize its honey for therapeutic practices in different region of Nepal. Ethnographic research was conducted across the Terai and Pahad regions (9 districts and 7 zones) of Nepal through field visits and informants interviews in the summer months of 2016 and 2017. This research documented indigenous nomenclature, medicinal uses, and its traditional management practices of only one provisionally identified species *Tetragonula iridipennis* (Smith) in Nepal for the first time. It is found that local people in Nepal are using stingless bee honey and propolis in combination with other natural ingredients to cure as much as eleven different ailments. Therapeutic uses ranges from simple application for wound healing and common cold to stomach ulcer, gastroenteritis, and cancer. However, clinical trials and further research are required to confirm the medicinal potentials of stingless bee honey and propolis.

**Title:** Effects of Aqueous American Mistletoe Extracts on Cultured Cancer Cells

**Authors:** Robin L. Davies, Ph.D., Jefferson College of Health Sciences, Arts and Sciences - Biomedical Sciences Program, rldavies@jchs.edu; Elena Swick, M.S., Auburn University, Biological Sciences

**Abstract/Case Study:** Aqueous extracts of the European mistletoe, *Viscum album*, are commonly used as complementary and alternative medicine therapy for cancer patients. Studies have reported suppression of cancer cell growth in vitro when exposed to European mistletoe extracts. Very few studies have investigated the effects of the American mistletoes (genus *Phoradendron*). In this preliminary study, aqueous extracts of the American mistletoe, *Phorodendron leucarpum*, were prepared and tested against human cancer cell lines. Three different preparation methods were employed. Extracts of whole leaves and of gently crushed leaves were each prepared by soaking the leaves in double-distilled water at 4 degrees Celcius for 18 hours. A third portion of mistletoe leaves was subjected to brief homogenization in a laboratory blender prior to incubation at 4 degrees Celcius for 18 hours. All three extracts were subjected to filtration through 0.2 micron filters and were stored at 4 degrees Celcius. A human fibrosarcoma line, HT1080, and a human colon cancer line, HCT-15, were exposed to the three different extract preparations for 48 hours and subjected to a MTT (3-(4-dimethylthiazolyl-2)-2,5-diphenyltetrazolium bromide) cytotoxicity assay. All three preparations had statistically significant effects upon the growth of both cell lines. For HT1080, the blended leaf preparation had the greatest effect, reducing cell survival to 57% of control values. For HCT-15, the whole leaf extract had the greatest effect, reducing cell survival to 81% of control values. Further studies will involve a collaboration with a natural products chemist to enable the exploration of alternative extraction strategies. Chemical characterization of extracted products will be conducted. Comparison of the extracted American mistletoe compounds with the well-characterized compounds extracted from European mistletoe will follow. Finally, whole extracts and isolated compounds will be tested for anticancer activity on additional human cancer cell lines.

**Title:** Lithium toxicity following bariatric surgery

**Authors:** Suzanna C. Jamison, MD, FACP, Carilion Clinic, Internal Medicine, scjamison@carilionclinic.org; Kelley D. Hale, PharmD, Carilion Clinic, Internal Medicine

**Abstract/Case Study:** A patient with morbid obesity and several psychiatric comorbidities underwent laparoscopic sleeve gastrectomy and experienced success with weight loss. However, she experienced lightheadedness, nausea, and a fall, and was admitted to the hospital for encephalopathy due to lithium toxicity. The pharmacokinetics of lithium change following bariatric surgery. The patient's lithium therapy was adjusted, levels were reduced to therapeutic range, and she continued with no further issues. Mechanisms of lithium toxicity following bariatric surgery and a monitoring protocol to prevent toxicity are discussed.

**Title:** Teaching Excellence Academy for Collaborative Healthcare (TEACH)

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**Abstract/Case Study:** Background: The future success of academic medicine relies heavily on faculty recruitment, development, and retention. However, faculty often do not feel supported in their roles as teachers. Clinicians often participate in faculty development activities related to their given specialty but lack opportunities to foster their development related to teaching. All health professions faculty share the common need to educate future professionals and the pedagogical practices are consistent. Methods: Using a collaborative approach among three institutions and a 'for the faculty, by the faculty' model the Teaching Excellence Academy for Collaborative Healthcare (TEACH) was formed. The mission of TEACH is to promote learning excellence at Carilion Clinic, the Virginia Tech Carilion School of Medicine and Research Institute, and Jefferson College of Health Sciences by creating a community of educators and fostering their development as teachers, learners, and educational researchers. Ongoing development and implementation is led through an active steering committee with representation throughout each profession and their primary related disciplines. Results: Three levels of membership were developed with benefits and responsibilities outlined for each level. Faculty led subcommittees were identified to begin implanting new programs, research, and ideas. With over 190 members, TEACH continues to grow and flourish within our system. TEACH holds several faculty development related to teaching programs each year and hosts a yearly 'Education Day.' TEACH members are involved in education scholarship throughout the organization and are provided with several resources for development in their role as educators through the academy. Discussion: The development of an interdisciplinary, inclusive teaching academy has created a robust community of practice. TEACH provides members with several resources for the development in their role as educators including live sessions, asynchronous online learning opportunities, and tailored offerings specific to the needs of an individual or department.

**Title:** Using group peer review for national grant review process

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**Abstract/Case Study:** Background: Expertise of multiple reviewers is often sought for review of manuscripts, grants and scholarly submissions for purposes of quality control and assurance. The peer-review process, a commonly independently driven activity, has recently been flipped with the advent of Group Peer Review. Group review relies on the complementary expertise of a small team, requires the active exchange of ideas, and necessitates ongoing collaboration. A team of health professions educators recently deployed the Group Peer Review process for the review of national grant submission. Methods: A study team member was asked to independently review a group of proposals for a national grant. Instead, a group of several experts was recruited to independently score and comment on each grant proposal. Individual scores were averaged and comments from each reviewer were distributed. The group met to summarize, discuss, dissect, and share thoughts on each proposal. The group came to a consensus for a recommendation. Results: Anecdotal feedback from members of the grant review team demonstrated the value of participating in a group peer review exercise. Contributions from all members of the group resulted in an aggregate score for each proposal as well as robust feedback. The process served as a meaningful faculty development exercise for reviewers who ranged in levels of experience with the peer review process. Discussion: By bringing together individuals with different levels of experience and unique but complementary areas of expertise, the review process evolves into a less siloed, more holistic, faculty development opportunity with the result of a more thorough and quality review.

**Title:** GME Core Curriculum

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**Abstract/Case Study:** Background: The Accreditation Council for Graduate Medical Education Common Program Requirements is a set of requirements in training and preparing residents and fellows. These requirements are periodically reviewed and enhanced to meet the evolving needs of learners. To help meet new accreditation requirements, the Office of Continuing Professional Development and the Office of Graduate Medical Education partnered to develop a standardized curriculum for all GME trainees and faculty. Methods: This 8-session series focuses on patient safety, quality improvement and teaching concepts. It is required for all residents and fellows. Sessions are 1.5 hours and focus on the new ACGME common program requirements. Sessions are facilitated by internal experts, offered quarterly, and repeated three times to accommodate busy schedules. Each 90-minute session consists of a mix of facilitated didactic instruction followed and hands-on direct skill application. Live sessions offerings are complimented with self-directed learning through the completion of online modules or related readings. Results: Six unique sessions have been offered and 687 evaluations received. Overall, participants noted each session met the stated objectives. Majority rated the 'ease of scheduling' and 'relevance of pre-materials' as excellent. Overall, participants found that the sessions were relevant to their current GME experience, training, and practice. Anecdotal feedback from Program Directors demonstrated the importance of these sessions and the benefit of centralizing the efforts of meeting these new accreditation standards. Discussion: Overall, the structure and content of these sessions is highly valued by residents, fellows, and faculty. The centralized format of these offerings removes administrative burden from individual departments while still allowing compliance with accreditation standards.

**Title:** Stressors and coping mechanisms of medical students

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**Abstract/Case Study:** Background: Research has documented significant levels of psychological distress and burnout in medical students. Some research has found that medical school can erode the students' natural resilience to stress. The goal of this project is to identify self-reported coping mechanisms, compare them with the stressors and determine how the medical students are caring for themselves and present opportunities to provide timely and critical interventions. Methods: A two-part survey was administered to students during spring semesters of Academic Years 2015-2016, 2016-2017, and 2017-2018. Students were provided with an informed consent form prior to taking. Survey consisted of COPE scale and 'Perceived Stress Scale.' Data was handled by an honest broker and de-identified prior to being provided to investigators. Qualitative themes were derived from the open-ended response question. Item means were compared using the T-test procedure, with a significance level of  $p=.05$ . Results: 242 responses were collected using the brief electronic survey. Statistically significant changes were identified for four items. For all years, majority of students responded 'very often' when asked 'How often have you felt confident about your ability to handle your personal problems?' Students were asked to identify three events/experiences that have caused stress, response themes include: research expectations; personal/family; step exams; and residency selection. Discussion: Using a survey comprised of validated instruments to measure stress and coping the authors were able to identify medical students' key stress experiences and identify key positive coping mechanisms utilized. For this longitudinal study, the same survey tool will again be given electronically to all medical students in 2019 and 2020. Future analyses will investigate relationships between stress levels, coping mechanisms, and performance. We will also further investigate the trends across education status and cohort. Ultimately, findings will be used to educate students on positive coping mechanisms that have been found to be effective.

**Title:** Perception/Reality: Physicians Overestimate Resource Utilization When Working With Residents

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**Abstract/Case Study:** Background: Attending physicians work closely with residents as they transition into independent practitioners. Literature regarding the perception of how practice patterns are affected by resident learners is sparse. We hypothesized that physicians perceive an increase in resource utilization while educating residents. Methods: Attending physicians at an urban academic center were individually administered a survey regarding practice patterns (admission rate, disposition time, advanced imaging utilization, and cardiology consultation rate) and the perceived effect of teaching residents on shift. Results were analyzed against 86,000 emergency department (ED) visits with and without residents for the academic year July 1, 2017 to June 30, 2018, to compare electronic health record (EHR) data with perceptions of resource utilization. Results: After excluding patients seen by non-ED residents and attendings who did not complete the survey 45,379 visits were eligible for analysis. The survey completion rate was 89% with 40 of 45 physicians responding. Attending physicians utilized fewer resources than they perceived when working with residents. However, physician perception overestimated the change of admission rates when working with residents (actual admission rate by EHR 35%, 95%CI 31-38; perceived rate by survey 48%, 95%CI 42-54;  $p < 0.001$ ), time to disposition (EHR 11%, 95%CI 5-17; survey 65%, 95%CI 60-69;  $p < 0.0001$ ), less utilization of imaging for abdominal pain (EHR 36%, 95%CI 31-41; survey 56%, 95%CI 51-60;  $p < 0.0001$ ), and fewer cardiology consultations for chest pain (EHR 31%, 95%CI 27-35; survey 54%, 95%CI 48-60;  $p < 0.0001$ ). Comparison of survey data to EHR data exhibited discrepancies in perceived ordering with the presence of a learner compared to actual ordering practices. Conclusion: While attending physicians practice differently when working with a resident, they overestimate the impact of the residents on workflow. Further study is needed to elicit the cause of this altered perception. These findings may be utilized to guide resident education/faculty development.

### Classroom 3

#### Pharmacy/ Pharmacology/ Infectious Diseases

**Title:** Evaluation of missed antibiotic doses in hospitalized patients undergoing hemodialysis

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**Abstract/Case Study:** This retrospective, single-center, pre-post study was designed to determine if revision of a nursing policy in November 2017 impacted the number of missed antibiotic doses in hemodialysis (HD) patients. A random sample of inpatients on HD at Carilion Roanoke Memorial Hospital (CRMH) during October 2017 and February 2018 were reviewed if they received scheduled antibiotics on days of HD. Patients who received antibiotics dosed per pharmacy protocol, antibiotics given only perioperatively, or on continuous renal replacement therapy were excluded. The primary outcome was the incidence of missed antibiotic doses before or during HD. Secondary outcomes included the percentage of inappropriately timed antibiotics, percentage of missed antibiotic doses for intensive care unit (ICU) conducted dialysis versus the dialysis unit, and incidence of nursing requests for retiming of doses. Of the 138 patients evaluated in the October group, 53 patients met inclusion criteria. One hundred nine patients were evaluated in the February 2018 group, with 38 patients meeting inclusion criteria. Of those patients included, 261 and 133 antibiotic doses were reviewed in the October 2017 and February 2018 group, respectively. Two percent of antibiotic doses were missed in each group, and 16% (42/261) versus 23% (30/133) were timed inappropriately in the October 2017 and February 2018 group, respectively. Non-ICU patients had a higher incidence of inappropriately timed antibiotic doses compared to ICU patients (49 versus 24). Administration of antibiotics at inappropriate times occurred more often when dosed every 24 hours or more, compared to frequencies of every 12 hours and every 8 hours or less (40 versus 24 versus 9). While the incidence of missed antibiotic doses was lower than anticipated, there is an opportunity to improve the timing of antibiotic doses around HD. Future directions include optimization of the clinical surveillance system used by pharmacy and revision of the nursing policy.

**Title:** Emergency department prescribing changes in response to parenteral opioid shortages

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**Abstract/Case Study:** Pain is one of the most common chief complaints for emergency department (ED) visits. Parenteral opioids have been a mainstay of therapy to provide safe and effective pain control in the ED. A national parenteral opioid shortage in the last quarter of 2017 significantly impacted Carilion Roanoke Memorial Hospital (CRMH). Due to this shortage, a hospital-wide hard stop was implemented in the ED at the beginning of 2018, which prohibited the administration of parenteral hydromorphone. The purpose of this study was to look at how prescribing practices changed and how these changes affect pain relief outcomes in ED patients. This retrospective, single-center, pre-post study was approved by the Institutional Review Board as a quality assurance and quality improvement project. Patients were included if they were over the age of 18 and if they received pain medication in the ED during June 2017 or June 2018. Patients who were pregnant, hospice or palliative care, incarcerated, had sickle cell disease, or presented to the ED as a CRMH alert were excluded. The primary outcome was the median opioid administration per patient, measured in oral morphine milligram equivalents. Secondary outcomes included the pain score at initiation of pain treatment and 30 minutes after administration, total number of opioid doses administered in the ED, incidence of rescue opioid analgesia within 60 minutes of initial administration, incidence of a return ED visit within 72 hours for pain control, mean patient satisfaction score in relation to pain treatment during ED visit, percent of opioid analgesics administered out of all pain medications administered, percent of oral analgesic formulations administered out of all analgesic formulations administered, and a composite safety outcome of incidence of respiratory depression, over-sedation, and use of naloxone. Total of 220 patients were randomly selected for review. Descriptive statistical results are pending.

**Title:** Medication use evaluation of sedative infusions utilized in subarachnoid hemorrhage

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**Abstract/Case Study:** Aneurysmal SAH (aSAH) carries a risk for cerebral vasospasm, which causes reduced cerebral blood flow and delayed ischemic injury (DCI). Previous studies have demonstrated alpha 2 adrenergic agonism improves histomorphological and neurological outcomes before and during cerebral ischemia. The only sedative with this selective activity is dexmedetomidine, a commonly utilized infusion in critically ill patients. The purpose of this project is to determine if dexmedetomidine has an impact on vasospasm when compared to other sedative medications, such as propofol and benzodiazepines. This was a retrospective cohort review of adult ICU patients admitted between July 2014 and June 2018 with a diagnosis of SAH. Patients were excluded if they were pregnant or transitioned to comfort care within 24 hours. Baseline demographics included site/size of subarachnoid hemorrhage, sedative choices used, pharmacological/non-pharmacological interventions, frequency and duration of vasospasms, adverse events associated with medication administration (hypotension, bradycardia, hypertriglyceridemia), and rate of delirium. Outcomes to be analyzed include occurrence and duration of vasospasm, incidence of delirium, hospital and ICU length of stay (LOS), disposition and in-hospital mortality. Preliminary data results include: 240 patients met the study inclusion criteria. The mean age of the study population was 58.5 years, 47% of patients were male with a mean GCS of 12. Almost half of the patients were on mechanical ventilation and had an extraventricular drain in place. Approximately 32% of patients experienced vasospasms for an average of 6 days with 67% of patients receiving nimodipine. The mean hospital LOS was 18 days and ICU LOS was 10.4 days. Propofol followed by dexmedetomidine and midazolam were the most common agents utilized for sedation. Delirium was documented in 28% of patients during hospitalization and the rate of in-hospital mortality was 24%.

**Title:** Evaluation of bivalirudin anticoagulation in patients receiving extracorporeal membrane oxygenation

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**Abstract/Case Study:** Extracorporeal membrane oxygenation (ECMO) requires systemic anticoagulation to prevent systemic thrombosis and thromboembolism originating in the circuit. The 2014 ELSO Anticoagulation Guideline recognizes unfractionated heparin as the most widely used systemic anticoagulant. At Carilion Roanoke Memorial Hospital (CRMH), bivalirudin is the primary anticoagulant for patients receiving ECMO support. The purpose of this single-center, retrospective, cross-sectional study was to characterize the use of bivalirudin in ECMO and establish a pharmacist-driven monitoring protocol. Patients were included if they were adults who received bivalirudin for systemic anticoagulation while receiving venoarterial (VA) or venovenous (VV) ECMO for at least 24 hours between January 1, 2015 and July 31, 2018. Primary objectives of this study were to characterize the patient population receiving bivalirudin for ECMO and describe institutional prescribing patterns. Secondary objectives included percentage of therapeutic aPTT values and rate of bleeding and thrombotic events. Thirty-eight patients were included with 94.4% receiving VA ECMO support. About 40% of patients had a baseline coagulopathy and 50% were receiving concomitant renal replacement therapy. Bivalirudin was initiated a median of 17 hours after start of ECMO support with a variety of initial bivalirudin doses and aPTT goals prescribed. Therapeutic aPTT was achieved 73% of the time when receiving bivalirudin. A change to the circuit was required in 21.1% of patients with only 7.9% requiring an oxygenator exchange. Major bleeding events occurred in 21.1% of patients. The present study represents one of the largest cohorts of adult patients receiving bivalirudin for ECMO anticoagulation. In an effort to standardize the initial bivalirudin dose based on renal function and initial aPTT goal prescribed in this patient population, a pharmacist-driven protocol is under review at CRMH.

**Title:** Medication Use Evaluation of Methylene Blue

**Authors:** Ashley E. Fontan, PharmD, Carilion Clinic, Pharmacy, aefontan@carilionclinic.org; Bradford McDaniel, PharmD, BCCCP, Carilion Clinic, Pharmacy; Corey Goodwin, PharmD, BCPS, Carilion Clinic, Pharmacy

**Abstract/Case Study:** Methylene blue is an agent that is approved by the Food and Drug Administration for reversal of methemoglobinemia due to its ability to hasten the conversion of methemoglobin to hemoglobin. It is also used off-label as a diagnostic agent, for vasoplegia, and for patients with refractory hypotension due to septic shock, among others. The objective of this study was to evaluate the usage of methylene blue at Carilion Roanoke Memorial (CRMH) and determine the hemodynamic effects of methylene blue in patients with septic shock. A retrospective cohort study was conducted of all adult patients (at least 18 years of age) admitted to CRMH who received methylene blue between January 1st, 2013 and July 31st, 2018. At CRMH, the most common indication for methylene blue was septic shock at 61%. Other common indications were vasoplegia and for diagnostic purposes, at 16% and 17% respectively. For patients with septic shock, the average mean arterial pressure (MAP) increased slightly from 66 to 69 mmHg and the total vasopressor dose remained unchanged through 60 minutes. At 12 and 24 hours after methylene blue administration, the average vasopressor dose was reduced by 29% and 55% from baseline. The average intensive care unit length of stay was 2 days and the average hospital length of stay was 3 days, which is likely indicative of the high mortality rate of 85.2%. There were no adverse events recorded during the study period. In conclusion, methylene blue use at CRMH is primarily in septic shock patients. Minimal clinical benefit was demonstrated during the first 60 minutes after initiation of methylene blue, mortality remained high, and there was still a significant vasopressor requirement by 24 hours.

**Title:** Evaluation of Fixed-Dose Four Factor Prothrombin Complex Concentrate (4F-PCC)

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**Abstract/Case Study:** Four-factor prothrombin complex concentrate (4F-PCC) is utilized to stop or prevent bleeding in various populations, but is associated with thrombotic complications. In a previous study at Carilion Roanoke Memorial Hospital (CRMH), rates of thrombotic events (TE) occurred in 15.5% of patients within 14 days of 4F-PCC administration utilizing weight-based (WB) dosing. Due to TE complications, several studies have evaluated fixed dose (FD) strategies of 4F-PCC, which have yielded similar efficacy, but reduced TE, time to 4F-PCC administration, and costs. Subsequently, CRMH revised 4F-PCC dosing for urgent vitamin K antagonist (VKA) reversal and cardiothoracic surgery (CS) bleeding to 1,500 units. The purpose of this study was to evaluate the efficacy of FD 4F-PCC compared to WB dosing. This IRB approved, single-center, retrospective cohort study evaluated adult patients who received at least one dose of 4F-PCC from January 2014-May 2016 and April 2018-September 2018 for VKA reversal or CS bleeding. Patients with bleeding disorders or those who refused blood products were excluded. Baseline demographics, past medical history, severity of illness scores, relevant laboratory parameters, 4F-PCC dosing, and administration of additional reversal agents and/or blood products were collected for data analysis. The primary endpoint is bleeding reversal efficacy using FD 4F-PCC versus WB dosing for VKA reversal based on International Normalized Ratio (INR) and hemostasis, or a reduction in chest tube output without a return to the operating room for CS patients. Secondary endpoints include time-to-administration, protocol adherence, and rates of TE. The study included 213 patients in the WB group and 61 in the FD group. Of those patients, 77% in the WB group and 74% of patients in the FD group received 4F-PCC for VKA reversal. The average dose in the WB group was 2,381 units compared to 1,536 units in the FD group. Final data analyses are ongoing.

**Title:** Evaluation of Antibiotic Prescribing Practices at Hospital Discharge

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**Abstract/Case Study:** Background: Antimicrobial stewardship programs remain an integral part of providing optimal patient care. Historically, antimicrobial stewardship efforts have largely been focused on the inpatient setting, despite the majority of antibiotic courses being completed following discharge from the hospital. The objective of this study was to evaluate antibiotic prescribing practices at discharge for specific disease states and identify factors associated with inappropriate prescriptions at an acute care hospital. Methods: This was a single-center cross-sectional study. Patients that were discharged with oral antibiotics for the treatment of respiratory tract, skin and soft tissue (SSTI), or urinary tract infections (UTI), between January 1, 2017 - December 31, 2017 were evaluated for inclusion. Patients were excluded if they were discharged against medical advice, admitted for a procedure or for <24 hours, or the indication and/or duration cannot be determined. The primary endpoint was a composite of the appropriateness of discharge antibiotic(s) based on the antimicrobial choice, indication, dose, duration, and frequency as defined by institution specific treatment guidelines. Secondary endpoints included antibiotic classes prescribed, 30-day readmission rate, and days of unnecessary antibiotics. Results: A total of 150 patients were randomly selected, 50 from each disease state. Over one-half of treatment durations were completed after patients' discharge. Cefdinir was the most commonly prescribed antibiotic for respiratory tract infections (18/50, 36%) with a median duration of 7 days. Clindamycin was the most commonly prescribed antibiotic for SSTIs (25/50, 50%) with a median duration of 10 days. Cephalexin was the most commonly prescribed antibiotic for UTIs (15/30, 30%) with a median duration of 7 days. Duration of treatment was the most common reason for an inappropriate antibiotic regimen, with 595 days of excess antibiotic therapy. Thirty-day readmission for recurrent infection was 7%. Conclusion: Future antimicrobial stewardship efforts should be aimed at optimizing treatment durations at discharge.

**Title:** Evaluation of Implementation of Rapid Diagnostics Testing

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**Abstract/Case Study:** Background: Rapid molecular diagnostics have emerged as an important aspect of effective antimicrobial stewardship practices. The delay of identification and susceptibilities of a causative organism is often responsible for delays in tailored antimicrobial therapy. Rapid molecular diagnostic technologies for infections have dramatically reduced the time to pathogen identification, allowing for earlier implementation of pathogen-directed treatment. In March 2017, Carilion Roanoke Memorial Hospital (CRMH) initiated the use of rapid microarray assays, the Verigene® Gram-negative (BC-GN) and Gram-positive (BC-GP) and Cepheid Xpert® MRSA/SA. These rapid diagnostic tests detect the most commonly encountered blood pathogens and common resistance genes. The objective of this study was to assess the impact of Verigene tests (BC-GP and BC-GN) for rapid pathogen identification on clinical and antimicrobial therapy-related outcomes in patients with bloodstream infections. Methods: This is a single-center, quasi experimental study. Adult patients with positive blood cultures identified via rapid diagnostic assays from October 1, 2017 ‘ September 30, 2018 were evaluated for inclusion. These were compared to a historical control group with organism identification performed by conventional methods over the same calendar months in the previous years (October 1, 2015 ‘ September 30, 2016). Patients were excluded if they were discharged, expired, or declared to be palliative or comfort-care prior to speciation of the index blood culture. The primary endpoint was the mean time to appropriate antibiotic therapy, as defined by institution-specific recommendations. Secondary endpoints included time to optimal antibiotic therapy, 30-day readmission rate for recurrent infection, hospital length-of-stay, intensive care unit length-of-stay, time to organism identification and 30-day Clostridioides difficile infection rate. Nominal variables will be analyzed using chi-squared or Fisher’s exact tests where appropriate. A Student t-test and Mann-Whitney U test will be used for continuous variables, as appropriate. Results in process

**Title:** Evaluating Diabetic Ketoacidosis Protocol Usage

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**Abstract/Case Study:** Purpose: The purpose of our study is to evaluate overall compliance rate and safety of Carilion's DKA protocol. Methods: This is a single center, retrospective chart review of DKA patients started on insulin drips. Patients were included if they were 18 years of age or older and treated for DKA with an insulin drip at CNRV between January 1, 2016 and December 31, 2017. Data collected included: demographics, past medical history, lab values, insulin dosing, fluid selection, start time of subcutaneous insulin, and stop time of insulin drip. The primary outcome is overall compliance rate and safety of Carilion's DKA protocol. Secondary outcomes include: appropriate insulin drip duration relative to anion gap closure, insulin drip to subcutaneous insulin overlap time, maintenance fluid selection to maintain safe electrolyte levels, and blood glucose reduction in response to aggressive initial insulin drip rate. Results: The study evaluated 100 patients, 63% were female, 89% were Caucasian, and 60% were type I diabetics. Adherence to the DKA protocol algorithm was 83% and fluids were ordered per protocol in 88% of patients. The insulin drip was re-initiated in 16% of patients and glucose declined faster than 100 mg/dL/hr in 37% of patients. Overlap time of insulin drip to subcutaneous insulin was on average 58 minutes. Conclusion: Although overall compliance rate to the DKA protocol algorithm was high, a number of patients had rapid reductions in their blood glucose possibly indicating either the initial dosing or protocol adjustments were too aggressive. Additionally, several patients required re-initiation of their insulin drip which could indicate that the drip was stopped too early. Future studies should focus on patients with hourly blood glucose checks to determine if fault lies with the algorithm or delays in care.

**Title:** Evaluation of epoetin use in chronic kidney disease

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**Abstract/Case Study:** Purpose: The FDA updated labeling of erythropoiesis stimulating agents (ESAs) for chronic kidney disease (CKD) in 2011. Labeling warns of increased mortality, myocardial infarction (MI), stroke, and venous thromboembolism (VTE) with no additional benefit when target hemoglobin is >11 g/dL. The purpose of this study was to assess prescribing practices and identify opportunities for therapeutic optimization of epoetin administration. Methods: This was a single-center, retrospective, cross-sectional study of adult patients who received epoetin while hospitalized between May 2018 to July 2018. Patients were included if they received at least one dose of epoetin for anemia of CKD. The primary objective was to characterize the patient population receiving epoetin. Secondary objectives included: appropriateness of epoetin use, prescribing practices, and rates of adverse events. Data collection included baseline demographics, relevant past medical history, laboratory parameters, length of stay (LOS), and epoetin administration information. Descriptive statistics were used to represent the primary and secondary endpoints. Results: The study included 246 patients who received epoetin; 59% of patients were male and the median age was 66 years. Over 60% were on dialysis, while 11% had no known history of CKD. Only half of the patients requiring iron supplementation received therapy. The median patient dose was 123 units per kilogram. The median change in hemoglobin from baseline to hospital discharge was 0.2 g/dL with a median LOS of 7 days. Epoetin dose was appropriate in 78% of patients. There were 8 incidences of VTE, 2 incidences of MI, and mortality was 10% during hospitalization. Conclusions: Most study patients received higher than recommended doses of epoetin. With the minimal change in hemoglobin, the role of epoetin within the first seven days of hospitalization is unknown. Risks versus benefits of ESAs need to be considered in the acute setting, as demonstrated by the incidence of VTE.

**Title:** Intravenous agents in atrial fibrillation with rapid ventricular rate

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**Abstract/Case Study:** Purpose: The 2014 American Heart Association/American College of Cardiology/Heart Rhythm Society Management of Atrial Fibrillation (AF) guidelines recommend the use of intravenous (IV) medications or electrical cardioversion when rapid control of ventricular rate is required. The guidelines recommend IV beta blockers or non-dihydropyridine (DHP) calcium channel blockers, but do not favor one over the other. The primary objective of this study was to compare the efficacy of IV diltiazem, IV metoprolol, and IV esmolol on rapid ventricular rate control in AF in the emergency department. Methods: This was a single-center, retrospective, cohort study consisting of three cohorts: IV diltiazem, IV metoprolol, and IV esmolol. Patients age 18 years or older who presented to the Carilion Roanoke Memorial Hospital (CRMH) ED from January 2018 to July 2018 and were treated with one of the three cohort medications for atrial fibrillation were evaluated for inclusion. The primary outcome was the proportion of patients achieving rate control (heart rate of <110 beats per minute) within 30 minutes of drug administration. Secondary outcomes included rate control at additional time points, emergent or spontaneous cardioversion, adverse events, and length of hospital stay. Data collection included baseline demographics, relevant past medical history, prior to admission medications, initial cardiac rhythm, administration information for study medications, vital signs, and adverse events. Both descriptive and inferential statistics were used to represent the primary and secondary endpoints. A p-value of less than 0.05 was considered statistically significant. Results: Data collection is currently in progress. Final results will be presented.

**Title:** Comparing Two Hydrocortisone Regimens in the Treatment of Septic Shock

**Authors:** Brandi L. Wian, PharmD, Carilion Clinic, Pharmacy, blwian@carilionclinic.org; Corey Goodwin, PharmD, BCPS, Carilion Clinic, Pharmacy

**Abstract/Case Study:** Background: The Surviving Sepsis Campaign recommends IV hydrocortisone 200-300mg/day for septic shock patients unable to restore hemodynamic stability with adequate fluid resuscitation and vasopressor therapy. Currently there is no standard dosing regimen for hydrocortisone. This study was designed to assess the efficacy of hydrocortisone 50 mg IV q6h compared to 100 mg IV q8h in patients with sepsis and septic shock. Methods: This was an IRB approved single center, retrospective, randomized cohort study of patients with septic shock admitted between July 1, 2016 and June 30, 2018. Patients included were 18 years and older, received vasopressors, and received either hydrocortisone 50 mg IV q6h or hydrocortisone 100 mg IV q8h for at least 24 hours. Patients were excluded if they had known adrenal insufficiency, negative response to a cosyntropin stimulation test, chronic steroid use within the 6 months prior to admission, steroid indication other than sepsis or septic shock, etomidate administration within 24 hours of hydrocortisone initiation, hydrocortisone administration in the emergency department, mean arterial pressure goal less than or equal to 65 mmHg, withdrawal of life support within 24 hours of hydrocortisone initiation, or were pregnant. The primary endpoint was the percent change in cumulative vasopressor requirements within the first 24 hours of hydrocortisone initiation. Additional endpoints included the percent change in cumulative vasopressor requirements before each hydrocortisone administration, time from hydrocortisone initiation to discontinuation of vasopressors, hospital and ICU length of stay, hyperglycemia, and in-hospital mortality. Results: A total of 55 patients will be analyzed, with 36 patients in the 50 mg IV 6 hour group and 19 in the 100 mg IV q8h group. Data analysis pending.

**Title:** Impact of Infectious Diseases Consultation on Staphylococcus aureus Bacteremia Management

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**Abstract/Case Study:** Background: Staphylococcus aureus is a common, virulent pathogen implicated in bloodstream infections (BSI) and is associated with significant morbidity and mortality. Previous literature has demonstrated that infectious diseases consultations (IDC) and adherence to quality measures improved patient outcomes. The objective of this study was to identify areas of improvement in the management of S. aureus bacteremia. Methods: This was a single center, cross-sectional study. Inclusion: Greater than or equal to 18 years of age and a positive blood culture for S. aureus. Exclusion: Left against medical advice or were comfort care prior to completion of bacteremia work-up. Patients with an IDC were compared against patients managed without an IDC. Achieving all elements in a quality measure bundle served as the primary composite outcome including: documented negative blood cultures, echocardiography performed, and appropriate antibiotic duration based on BSI classification. Secondary outcomes included: mortality, 30-day readmission rate, and length of hospital stay. Descriptive statistics and chi-squared tests were used for analysis. Results: A total of 161 patients were included. Overall, 71% (116/161) of patients were managed with an IDC and 71% (115/161) of patients met all treatment bundle measures. Patients with an IDC were most likely to meet bundle measures than patients without IDC: 81% (93/115) v. 50% (23/46)  $p < 0.001$ . Additionally, 90-day mortality rate was lower in patients who had an IDC: 14% v. 35%  $p = 0.003$ . Both the 30-day readmission rate (40% v. 28%) and mean length of stay (17.8 v. 14.5) were similar between groups. Conclusion: Patients with an IDC had higher rates of appropriate S. aureus treatment bundle achievement. This difference was driven by higher achievement of all components in the bundle for patients managed with an IDC. A decrease in mortality associated with patients receiving an IDC warrants further investigation as lack of severity of illness assessment limits interpretation.

**Title:** Impact of pharmacist review on continuation of stress ulcer prophylaxis

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**Abstract/Case Study:** Background: Transitions of care pose one of the greatest risks to inappropriate medication usage or lapses in therapy. Stress ulcer prophylaxis (SUP) is used to prevent ulceration and bleeding in the stomach after high stress events. Once no longer indicated and the insult has resolved, SUP should be discontinued. Reducing inappropriate usage of SUP at care transitions can reduce adverse effects and improve patient outcomes. Methods: This was a retrospective, single-center, quasi-experimental study that obtained IRB approval as quality assurance/quality improvement. Patients newly started on a proton pump inhibitor (PPI) or histamine-2 receptor antagonist (H2RA) for stress ulcer prophylaxis during hospitalization and discharged from five pre-specified units between October 1, 2016 and February 1, 2017 were eligible to be included in the pre-study. Patients discharged from the same units between October 1, 2018 and February 1, 2019 were eligible to be included in the post-study. Between the two study periods, pharmacist involvement became more prominent through attendance of interdisciplinary rounds and implementation of a clinical decision support surveillance platform. Patients were excluded if they were less than 18 years old, taking a PPI or H2RA prior to admission, or started on a PPI or H2RA for indications other than SUP. The primary endpoint evaluated the percentage of patients discharged on SUP. Secondary endpoints evaluated the percentage of pharmacist recommendations accepted by providers, cost avoidance analysis, and incidence of adverse events. Data analysis will be done through descriptive statistics, Fisher's exact, and Mann Whitney U. Results: Of 76 patients in the pre-group started on SUP, 17% had the drug continued upon discharge. One patient developed a Clostridium difficile infection and one patient developed hospital-acquired pneumonia. Post-group data collection and analysis is in process and will be completed prior to research day. Conclusion: Conclusions are pending completion of data collection and analysis.

**Title:** Beers medications and their association with non-geriatric falls

**Authors:** Adam Maerz, MBBS, Carilion, General Surgery, ahmaerz@carilionclinic.org; Ben Walker, BS, Carilion, VTC SOM; Mark Hamill, MD, Carilion, Surgery ; Allison TEgge, PhD, Carilion, VTCRI

**Abstract/Case Study:** The Beers Criteria: not just for geriatrics anymore? Analysis of Beers medications in non-geriatric trauma patients and their association with falls. Objective: in 1991 Dr Mark Beers and colleagues published a list of Potentially Inappropriate Medications (PIMs), now known as the Beers Criteria. This list enumerated medications whose side effects were thought to often outweigh their benefits in the geriatric population. To our knowledge there has been no investigation of the prevalence of, or association with, these PIMs in the adult non-geriatric trauma population. Methods: Records from our level one trauma center database were queried for all adult traumas between 1/2014 and 9/2017. Those records with completed medication reconciliations were stratified by age (18-34, 35-44, 45-54, 55-64) and evaluated for prevalence of PIMs, PIM class, and association of PIM with trauma type. Results: 3701 records were included, and a substantial number (65.4%) were taking at least one medication on the PIM list (Table 1). Furthermore, several classes of medications at various age stratifications purported significant odds that traumatic injury would be the result of a fall. Conclusions: These preliminary data indicate that PIMs are associated with falls in the non-geriatric population across all age groups studied. Given the extremely high prevalence of these medications in our study population, we believe that further research is warranted to evaluate if the Beers Criteria should be expanded beyond the geriatric population. Table 1 ' Beers PIM use across adult trauma patients. Table 2. Prevalence and fall risks associated with specific PIM class in different age brackets (incomplete list, only statistically significant associations shown)

**Title:** Clostridium Difficile Infection in the Elderly: Beyond the Gut

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**Abstract/Case Study:** Background: Advanced age is a risk factor for Clostridium difficile infection (CDI), and elderly patients have more severe CDI and worse outcome. The gut microbiota composition changes with aging, and there is evidence of cognitive impairment due to antibiotic-induced gut dysbiosis. However, there is little data about the relationship between functional or cognitive status and CDI. Aim: To determine the association between CDI and functional status, change in cognitive status, readmission and late mortality in elderly patients. Methods: We performed a retrospective case-control study of CDI occurring in hospitalized patients >60yo during 2013-14 at 2 hospitals, one in Virginia (USA) and the other in Madrid (Spain). Cases were matched to controls by age, sex, and Charlson comorbidity index score. Results: 106 cases were identified (54 USA, 52 Spain) with mean age 76.2 (74 USA, 79 Spain), 32 women: 74 men (1:53 USA, 31:21 Spain), mean Charlson comorbidity index score 3.67 (5.0 USA, 2.0 Spain). 71 (66.9%) cases were healthcare facility (HCF) onset, 25 (23.6%) community onset HCF-associated, 10 (9.4%) community acquired CDI. There was increased functional debility in cases at baseline ( $p=0.014$ ) compared to controls, and increased delirium during hospitalization ( $p<0.028$ ). We observed increased outcome of functional decline/death at discharge ( $p<0.001$ ), and of Decreased dwelling (discharge to a nursing home/long term care facility (LTCF) or death) in all cases ( $p<0.001$ ). There was increased late mortality in cases (death by any cause) at 90 ( $p=0.002$ ) and 180 days ( $p=0.006$ ). Conclusion: CDI in the elderly is associated with functional decline and death or discharge to a nursing home/LTCF. It occurs more frequently in those with baseline functional debility and is complicated by delirium. The relationship between functional and cognitive changes and CDI warrants further study to improve outcomes of the disease, especially in the elderly host.

**Title:** Cost savings associated with potential monoclonal antibody dose rounding protocol

**Authors:** Collin Strunk, PharmD, Carilion Clinic, Pharmacy, cstrunk@carilionclinic.org; Megan Goodwin, PharmD, BCPS, Carilion Clinic, Pharmacy; Jason Hoffman, PharmD, BCPS, Carilion Clinic, Pharmacy

**Abstract/Case Study:** Purpose: Estimate the potential cost savings and waste reduction possible with implementation of a 10% dose rounding protocol for monoclonal antibodies. Methods: This was a retrospective cohort study, evaluating monoclonal antibody use at Carilion Roanoke Memorial Hospital and the associated infusion center from May 2016 to April 2018. Patients '18 years of age were identified from an electronic database. Possible dose rounding, within 10% to the nearest vial size, was used to estimate medication waste and cost savings for the following medications: abciximab, cetuximab, daratumumab, golimumab, infliximab, tocilizumab, and trastuzumab. Data collected included baseline demographics, height, weight, BSA, indication and dose of the monoclonal antibody, and total doses administered. Costs were estimated based on average wholesale price (AWP). Results: Of the 2,994 administered doses of the included monoclonal antibodies, 912 doses were evaluated for the 10% dose rounding criteria. Of these 912 doses, 462 were eligible for dose rounding. With the implementation of the rounding protocol, a potential \$367,449 could have been saved, based on AWP. Of the 450 doses that were not eligible, 371 (82.4%) were ordered as manually rounded doses to the nearest vial size. Only 79 of the 912 (9%) doses included were found to be outside of the proposed 10% dose rounding range. Conclusions: This study evaluated 912 monoclonal antibody doses administered from May 2016 to April 2018. Of the 462 eligible doses evaluated, the average amount rounded was 4.8% to the nearest vial size. Further extrapolation of infliximab to include all 2,279 doses predicted a potential saving over the study period of \$2,246,019, based on AWP. The implementation of a 10% automatic dose rounding protocol to the nearest vial size for weight or BSA-based monoclonal antibodies has the potential to significantly decrease financial burden on pharmacy expenditure, without significantly impacting the total dose administered.

**Title:** Utilization of Beta Blockers in Patients with Traumatic Brain Injuries

**Authors:** Collin Strunk, PharmD, Carilion Clinic, Pharmacy , cstrunk@carilionclinic.org; Sandra Rummyantsev, PharmD, Carilion Clinic, Pharmacy ; Mimi Liu, PharmD, MBA/HSA, Carilion Clinic, Pharmacy; Robert Howitt, PharmD, BCPS, Carilion Clinic, Pharmacy; Janie Faris, PharmD, BCPS, BCCCP, Carilion Clinic, Pharmacy

**Abstract/Case Study:** Background: Current literature supports the use of beta adrenergic receptor blockers (BB) in patients with a traumatic brain injury (TBI) to reduce inflammation and mitigate the catecholamine surge post injury, which may result in decreased mortality rates. There is a paucity of data with regard to dosing timing of BB initiation post injury, and duration of BB therapy. The purpose of this study is to evaluate the use and prescribing practices of BB in adult patients admitted to the neuro trauma intensive care unit (ICU) with a TBI at a rural level 1 trauma center in southwest Virginia. Methods: This is a single center retrospective cohort evaluating adult ICU patients admitted with a TBI from July 2015-July 2018. Patients were excluded if they were pregnant, transitioned to comfort care within 24 hours of admission, or meet criteria for organ donation. Baseline demographics, severity of injury scores, relevant vital signs and medication administration records were evaluated for BB regimens. Outcomes including length of stay, disposition and in-hospital mortality were collected. Descriptive statistics will be utilized to analyze data. Preliminary Results: During the study period, 276 patients met criteria for study inclusion. Preliminary results are as follows: males accounted for 67% of patients with a median age of 48 years. During hospitalization, 144 of patients received a BB with 76 (53%) receiving propranolol. The median Glasgow coma scale (GCS) on admission was 3 while the median Injury Severity Score (ISS) was 18. Overall average hospital length of stay was 17 days and in-hospital mortality was 30%.

Poster Session III (Student)

Classroom 1

Orthopaedics/ Trauma/ Surgery

**Title:** Nonspecific, Refractory Elbow Pain in an Adolescent Male

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**Abstract/Case Study:** This 13-year-old male presented to his primary care provider after experiencing one month of posterior right elbow pain that was exacerbated by elbow extension. Examination was only remarkable for mild tenderness along the olecranon process and lateral elbow joint line. The right elbow was not erythematous or edematous, had intact sensation, and full strength and range of motion. The pain was not aggravated by resisted elbow supination, pronation, flexion, or extension. Right elbow radiographs were negative for any irregularities, ruling out olecranon fracture or avulsion. The patient was treated conservatively for concerns of olecranon apophysitis or other soft tissue injuries, however the pain was refractory to two years of conservative management. Repeat right elbow x-rays were negative, therefore a MRI was obtained, demonstrating OCD of the capitellum with bone marrow edema. Afterwards, he was evaluated by a pediatric orthopaedist, who recommended surgical intervention due his persistent symptoms. He is scheduled to undergo an elbow arthroscopy with debridement and drilling, with possible osteochondral autograft transplantation (OATS) procedure depending on the size of the OCD lesion, with hopes for long-standing pain relief and preservation of function. OCD of the capitellum is an uncommon diagnosis of elbow pain, with a reported prevalence of 1-3% in adolescent baseball players, and even fewer in the general population. It is critical to recognize OCD to prevent enlargement of the defect and degenerative changes to the joint. Non-surgical management with rest, activity modification, physical therapy, and anti-inflammatory medications remains a reasonable initial plan for stable lesions and open capitellar growth plates; however, nearly 50 percent of cases develop persistent symptoms requiring further intervention. There are several operative treatment options, including arthroscopic debridement with fragment removal or fixation, microfracture or drilling, and OATS procedure.

**Title:** Efficacy of Intraoperative Marcaine Adductor Canal Block during TKA

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**Abstract/Case Study:** Pain management is an essential aspect of rehabilitation and recovery after a total knee arthroplasty (TKA). Appropriate treatment of perioperative pain allows patients to engage in early ambulation and physical therapy. The benefits of the adductor canal block are improved quadriceps strength and early ambulation, while providing equivalent analgesia as the femoral nerve block. Recently, a cadaver study showed that it is feasible and safe for the arthroplasty surgeon to perform an intraoperative adductor canal block at the time of surgery. This would decrease overall time requirements and costs as compared to having the anesthesia team provide the block via ultrasound guidance prior to the surgical procedure. We hypothesized that the addition of the adductor canal block would provide additional pain relief and reduce narcotic usage compared to the periarticular injections alone. The study is a retrospective chart review with a historical control group. The study population include 130 patients divided into two study groups. The historical control group of 65 patients underwent surgery with spinal anesthesia and periarticular injections with 60 mL of standard bupivacaine. The study group of 65 patients underwent surgery with spinal anesthesia and periarticular injections with 40 mL of bupivacaine and 20 mL of bupivacaine into the adductor canal. The population included: males and females, patients 18 years and older, who underwent total knee arthroplasty for management of primary osteoarthritis of the knee. The data was extracted via chart review. Results: Average pain score, daily narcotic usage, length of stay, and distance ambulated were calculated for each group. The daily narcotic usage (morphine equivalents) was decreased in the group that received the adductor canal block at 12.9 compared to the control group narcotic usage at 67.2 ( $p < 0.01$ ). Average pain scores, length of stay, and distance ambulated did not show statistical difference between two groups.

**Title:** Effects of Clinical Experience Variation on Physical Therapy Licensure Outcomes

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**Abstract/Case Study:** The Radford University Doctor of Physical Therapy (RUDPT) program's clinical experiences encompass one-third of the curriculum's credit hours, yet clinical experiences as possible predictors of the program's success have not been considered. Therefore, this study has two purposes: (1) examine whether variation in clinic experience location predicts first-time license exam passage, and (2) explore whether variation in population densities between student reported home residence and final clinic site location predicts first-time license exam passage. Data specific to cohorts 2017 and 2018 were accessed via the RUDPT database. Additionally, the United States Census Bureau database was accessed to categorize student reported home residence and clinic site location by county into mostly urban, mostly rural, or entirely rural. Retrospective analysis using SPSS version 24 is in progress to elucidate relationships via chi-square and predictors via binomial logistic regression. Demographics, relevancy, and power will be reported. This study suggests that alternative predictors of license exam success may inform curriculum in all medical and allied health education programs that include clinical experiences, internships, and residencies.

**Title:** Yield Strength Evaluation of TXA exposed bone cement

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**Abstract/Case Study:** BACKGROUND: Tranexamic acid (TXA) is an antifibrinolytic drug used topically and intravenously to reduce blood during total knee arthroplasty and total hip. However, there has never been a study evaluating potential effects of its administration on the structural properties of bone cement. Potential effects on yield strength by TXA on the bone cement used in these surgeries are worth evaluating as they directly predict rates of implant degradation and fracture risk. OBJECTIVE: Determine potential mechanical changes in bone cement exposed to topical TXA. Evaluate potential differences in yield strength between high concentration TXA exposed bone cement, low concentration TXA exposed bone cement, and samples without exposure using mechanical testing. METHODS: All Simplex P Stryker bone cement samples were mixed a standardized protocol used in practice at RMH and cast into 11x40mm cylindrical silicone molds. The control group consisted of 20 samples not exposed to TXA and was allowed to cure directly after pouring into molds. The first experimental group of 20 samples was poured into molds then continuously exposed for 15 minutes to 20g/L TXA via pipette flushing of the molds. The second experimental group of 20 samples was poured into molds and continuously exposed for 15 minutes to 165g/L TXA via pipette flushing of the molds. After samples were allowed to cure, yield point evaluation was conducted by Instron mechanical testing to generate stress vs strain scatter plots. Results will be used to determine statistical differences in yield strength in TXA exposed or unexposed groups. GOALS AND EXPECTED OUTCOMES: We expect to demonstrate non-inferiority of yield strength in TXA exposed samples compared to non-exposed samples. A lack of statistically detectable differences in yield strength will support current clinical practice of using TXA for hip and knee arthroplasty to prevent post procedural blood loss.

**Title:** Use of Visual Evoked Potential (VEP) Monitoring during Spine Surgery

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**Abstract/Case Study:** Perioperative vision loss (POVL) is a potentially devastating complication of spine surgery. Ophthalmic complications are reported to occur in 0.13-1% of spinal surgeries, but this number is believed to increase with advances in spinal instrumentation and rise in annual spinal operations. No standard of care exists to directly monitor ophthalmic changes intraoperatively. Visual Evoked Potential (VEP) is a clinical tool that measures electrical signals in the occipital cortex in response to a light stimulus. Intraoperative VEP amplitude has been correlated with postoperative visual function, which gives us the opportunity to limit the significance of POVL. This prospective cohort study evaluates VEP changes intraoperatively and visual function postoperatively for surgical spine patients. Patients indicated for open lumbar, thoracic, and cervical spine surgery are grouped based on positioning intraoperatively. One week preoperatively, patients undergo visual acuity testing, visual field testing, and optical coherence tomography testing. Intraoperatively, VEPs are monitored. When an event, a 50% decrease in amplitude or 10% increase in latency, is detected, a standardized corrective action protocol is initiated. If VEP returns to baseline, it is a technical event. If not, it is a non-technical event. Six weeks postoperatively, patients repeat the visual tests. The number of events are compared to visual test results using logistic regression. Seventeen patients have enrolled and ten have completed the study. We expect a low incidence of VEP change non-technical events and an increase in total VEP change events in prone procedures compared to supine. We expect VEP non-technical events to be associated with an increase probability of visual change. Injury to the visual pathway is not noticed until after surgery, when few treatment options are available. These results could suggest that VEP monitoring is an effective tool during spine surgery that can reduce injury to the visual pathway and limit complications.

**Title:** Systems factors influence operative duration and turnover time

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**Abstract/Case Study:** Purpose: To determine if system factors including team familiarity, nighttime, day of week, and month/year will influence operative duration or turnover time beyond patient factors. Methods: Retrospective analysis of 807 elective open and laparoscopic colectomies performed by 34 surgeons at two Carilion Clinic hospitals between 2011 and 2016. Final sample after exclusion criteria included 609 cases by 18 surgeons. Post-hoc analyses were performed, focusing on 5 surgeons with most operations and cases with operative durations faster than mean (n=227). Linear mixed-effects models (LMEM) identified interactions between system factors and duration. Factors included patient factors (age, BMI, gender, race, procedure type, ASA score, and wound class) and system factors (night surgery, facility, day-of-week, month, and cumulative dyadic familiarity scores). Physician ID acted as random effect to accommodate surgeon-specific differences in speed. Cumulative dyadic familiarity scores were calculated via summed number of cases worked together in each dyad of physician, anesthetist, circulator, and surgical tech. Results: For operative duration, LMEM of final sample (n=609) showed associations with system factors including day-of-week (Tuesday, -18.8min, p=0.013), nighttime (-10.3min, p=0.047), and specific years including 2014 (+14.6min, p=0.020), 2015 (+16.7min, p=0.010), and 2016 (+18.5min, p=0.006). For turnover time in post-hoc analyses (n=227, 5 surgeons with most operations and cases faster than mean), LMEM found associations with system factors including facility (+7.1min, p=0.041), day-of-week (Sat+Sun, +11.6min, p=0.051), and team familiarity (+0.003 min, p=0.017). Conclusion: System factors including team familiarity, nighttime, day of week/ weekend, and year of operation, influence operative duration or turnover time. Familiarity has a statistically significant impact on turnover time, but clinical significance requires further study.

**Title:** Perioperative anxiety in a pediatric surgery cohort: A preliminary analysis

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**Abstract/Case Study:** Anxiety has been shown to negatively affect surgical recovery in select populations. However, this can be difficult to assess in a pediatric population, where caregivers can influence both child and provider perceptions. The relationship between pediatric patient and caregiver anxiety has not been examined in a pediatric general surgical population, nor has this relationship been examined for influence on post-operative outcomes. This prospective, consecutively enrolled cohort includes pediatric patients receiving elective operation at Carilion Roanoke Memorial Hospital and their caregivers. Participants complete a series of surveys during three routine visits: pre-surgical appointment, day of surgery, and at post-operative follow-up. Surveys include age-appropriate anxiety and pain scales. The primary objective is assessment of the relationship between pediatric and caregiver anxiety. Secondary outcomes include measuring relationships between anxiety and surgical outcomes of pain, healthcare utilization, narcotic use, and patient satisfaction. The study aims to examine the development and effects of perioperative anxiety in a pediatric population, and identify potential targets of preventative therapies for enhanced post-operative outcomes. Power analysis demonstrates that 128 patient-caregiver teams are required for adequate statistical calculation. At time of preliminary analysis, the cohort includes 96 patient-caregiver dyads. Mean patient age is 7.2 years, median is 6 years, with 59 male patients (62%) and 15 male caregivers (16%). At the initial visit, 22% of children and 18% of caregivers have clinically significant state anxiety scores, 37% of children report pain, and 29% of caregivers report pediatric pain. Though caregiver rating of pediatric pain was generally consistent with child rating, caregivers tended to report higher pain scores for the patient when there was discordance. Preliminary analysis suggests higher rates of anxiety in children preparing for surgery compared to what is expected in the general population (5-12%), though adult anxiety scores were consistent with what is expected in the general population.

**Title:** Anatomical, Diagnostic Considerations in Tracheostomy Management for Emergency Medicine Providers

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**Abstract/Case Study:** Background: Each year, over 100,000 tracheostomies are placed in the United States. Although uncommon, complications in the tracheostomy patient are associated with significant morbidity and mortality. Emergency medicine physicians must be well acquainted with pertinent neck anatomy, the tracheostomy appliance, and necessary tracheostomy supplies, in addition to life-threatening potential causes of presentation to the emergency department. Methods: A review of the current tracheostomy literature was performed. PubMed and CINAHL databases were both queried for articles related to pertinent neck anatomy, tracheostomy appliances, and potential complications that may arise in these patients in both the acute post-operative and chronic periods. Results: Penetration of several cervical fascial layers along with division of the well vascularized thyroid isthmus is required for tracheostomy placement. The appliance consists of an obturator, an outer cannula with a cuff, an inner cannula, and a collar. These appliances serve an important role in the function of the appliance and may malfunction. In addition to equipment issues, a variety of complications may occur depending on the time frame of presentation. The most common complication in the tracheostomy patient is bleeding, which may be due to a variety of causes, some of which can be fatal. Other complications that may occur in the acute period include appliance dislodgement, obstruction, stomal site or respiratory infections, and pneumothorax. Late-stage complications include tracheomalacia, tracheal stenosis, and the development of a tracheoesophageal fistula. Conclusion: Although rare, tracheostomy patients may present with a variety of complaints that may be acutely life-threatening. As such, it is essential that emergency care physicians be well acquainted with neck anatomy, the tracheostomy appliances used at their institution, and potential diagnostic considerations in order to adequately care for the emergent tracheostomy patient.

**Title:** Confirmatory Analysis of Prenatal Screening Tool for Self-Efficacy Hospital EBMF

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\* Student's Mentor: Amanda B. Murchison, MD, Virginia Tech Carilion School of Medicine, Obstetrics and Gynecology

**Abstract/Case Study:** Title: Confirmatory Analysis of a Prenatal Screening Tool to Assess Self-Efficacy for Hospital Exclusive Breast Milk Feeding Abstract: Hospitals across the nation are challenged by The Joint Commission perinatal measure for hospital exclusive breast milk feeding (EBMF) performance at 70%. Even when hospital-based strategies are implemented, appropriate prenatal intervention could increase hospital EBMF rates. The study purpose was to confirm the psychometric properties of the newly developed, evidence-based prenatal Self-Efficacy for Hospital Exclusive Breast Milk Feeding (SE-Hospital EBMF) screening tool. A cross-sectional study (N = 171) was conducted with a convenience sample of pregnant women receiving prenatal care in southwest Virginia. Validity was demonstrated with a confirmatory factor analysis for a respecified 4-factor model. R2 values showed high reliability for all scale items. Internal consistency was high at 0.94. Cronbach alphas, when tested for equality, showed equal reliability for the English and Spanish version, and varied reliability across parity sub-samples. Significant difference was found between the SE-Hospital EBMF score and (a) self-efficacy theory domain of physiological feedback (excitement) and (b) prenatal intention. Logistic regression confirmed the SE-Hospital EBMF score as a predictor for prenatal intention, controlling for age, race/ethnicity, education, and parity. Women with higher SE scores were 4% more likely to have prenatal intention to only breast milk feed one's baby in the hospital. Those with a sum score < 96 or mean score < 8 could be at risk for less optimal infant feeding. The prenatal SE-Hospital EBMF scale is a valid and reliable tool for quantitatively assessing the strength of self-efficacy for hospital EBMF and can be used to guide prenatal intervention and education in the study population. Keywords: hospital exclusive breast milk feeding, prenatal self-efficacy, prenatal screening tool, SE-Hospital EBMF, confirmatory factor analysis

<b>Title:</b> MUC2, BMP4, & CDX2 as Markers of Barrett's Esophagus
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<b>Abstract/Case Study:</b> BACKGROUND: Esophageal adenocarcinoma (EAC) is a major cause of cancer death in the United States and throughout the world. Most cases of EAC are detected after symptoms present, when the disease has progressed to an advanced stage with a poor prognosis. EAC originates as Barrett's Esophagus (BE), which is asymptomatic in more than 50% of patients. BE and EAC can be cured with minimally invasive endoscopic techniques if treated early. Therefore, sensitive and specific biomarkers for BE are needed to noninvasively detect BE and EAC. OBJECTIVES: The objective is to evaluate the genetic expression of MUC2, BMP4, and CDX2 in BE using esophageal brushing and RT-qPCR. The primary goal of this study is to develop of a scientific basis to support the development of a non-invasive office-based screening test for BE to detect and treat asymptomatic BE patients to reduce EAC mortality. We hypothesize that MUC2, CDX2, and BMP4 will have elevated expression in BE mucosa. METHODS: EGD with biopsy and brush cytology was performed as part of routine BE surveillance on 40 adult patients. The samples were assayed for messenger RNA (mRNA) expression of MUC2, BMP4, and CDX2 by RT-qPCR. Histology served as the gold standard of diagnosis. RESULTS: Histology demonstrated 17 patients with BE and 23 without. CDX2, BMP4, and MUC2 had significantly elevated expression in brushings taken from BE patients when compared to the control samples ( $p < 0.001$ ). Receiver Operating Curves for MUC2 and CDX2 showed a 98.2% accuracy for MUC2 and 88.1% for CDX2. CONCLUSIONS: The genetic expression of MUC2 and CDX2 as measured by RT-qPCR are promising biomarkers with high accuracy for identifying BE. Future studies in conjunction with noninvasive esophageal cell retrieval methods, such as the Cytosponge (Medtronic Inc.) hold great promise for a cost effective office-based screening test for BE diagnosis.

**Title:** Plasma cell-based cardiac tamponade: a case report and literature review

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**Abstract/Case Study:** Introduction: Multiple myeloma is an atypical plasma cell disorder of the bone marrow that comprises approximately 10% of all hematologic cancers. Extramedullary disease occurs 6-20% of the time and generally confers a poorer prognosis. Cardiac involvement occurs <1% of the time and progresses to cardiac tamponade in >60% of cases. Here, we report a plasma cell-based pericardial effusion leading to cardiac tamponade in a patient with known multiple myeloma and also describe a literature review of other reported cases. Methods: A systematic search using PubMed (National Library of Medicine) was used to identify a further 27 cases dating back to 1970. Case characteristics, treatment strategies, and survival time following tamponade are discussed. Results: The mean age at presentation was 61.5 (range 30-83). 46% of cases were female and 54% were male. Median survival time was 6 weeks. Multivariate linear regression demonstrated a weak but significant correlation between survival time following tamponade and treatment with steroids alone (beta = 16.1 weeks, p = 0.02) or treatment with systemic chemotherapy and steroids (beta = 16.8 weeks, p = 0.009). Conclusion: Although this manifestation of multiple myeloma is rare, the incidence is likely to increase in the coming decades due to the increasing proportion of the aging population in the U.S. who will be at risk for developing multiple myeloma and its extramedullary complications. Our data demonstrate a weak but significant association between survival and use of corticosteroids alone or chemotherapy with corticosteroids, so these interventions may be effective in prolonging life. However, considering that life expectancy following tamponade is still on the order of months regardless of intervention, it remains a very poor prognostic indicator and palliative care should be considered when discussing goals of care with these patients.

## Classroom 2

### Pediatrics

**Title:** Wearable Monitoring System in Infants with Neonatal Abstinence Syndrome

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**Abstract/Case Study:** Neonatal Abstinence Syndrome (NAS) is a condition characterized by neurologic hyperexcitability that occurs in neonates who have been exposed to opioid drugs in utero. Currently, the primary method of monitoring infants with NAS is a 21-point clinical assessment, the Modified Finnegan Score, which is time-consuming and subject to interobserver variability. The Finnegan scoring system uses characteristics such as tremors, temperature, pitch, and duration of cry to determine the severity of the infant's condition, as well as the corresponding treatment necessary. In order to minimize observer variability and maximize data collection, a wearable monitoring system prototype was developed to continuously track the movement, heart rate, and respiratory rate of an infant subject. Furthermore, an additional sensor system was added to the infant's bassinet to monitor cry frequency as well as record the ambient light and sound conditions of the environment. The monitoring system will include a data acquisition system and accompanying data display user interface system to be used by the medical personnel overseeing the infants. By allowing for continuous data collection and minimizing time required from nurses and physicians, the monitoring system will allow for an objective approach to better assess and treat infants with NAS. The prototype system will be validated in a simulated environment to be developed by the student team to ensure adequate accuracy between all sensors and systems. Target specifications have been outlined to ensure performance of the product meets the necessary criterion, developed through consultation with NAS personnel at Carilion Children's. Upon testing and verification of sensor integration, students will present the combined wearable monitoring device and bassinet sensor suite at Virginia Tech's Engineering Exposition in May 2019.

**Title:** Modification of a Fetal Monitor for Use in Malawi

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**Abstract/Case Study:** In 2015 the neonatal mortality rate in Malawi was 22/1000 live births, translating to 14,000 deaths that year. Birth asphyxia is attributed for 26% of these deaths. Fetal heart rate monitoring during labor is used to screen for potential disruptions in the fetal oxygenation pathway that could potentially lead to metabolic acidemia and birth asphyxia. Screening for such disruptions via fetal heart rate monitoring can lead to early conservative interventions to restore fetal oxygenation in utero, or trigger heroic efforts to facilitate precipitous delivery such as an emergent cesarean section or operative vaginal delivery. For healthcare providers in low- and middle-income countries, who desire to perform continuous fetal monitoring during labor, our electronic display is an alternative solution to thermally sensitive paper strip chart recorders on donated fetal monitors. This appropriate affordable solution requires a modest one-time investment in off-the-shelf hardware, unlike recurring purchase of highly specialized rolls of paper that are cost-prohibitive and difficult to find in places like sub-Saharan Africa. Through the process of community based participatory design (CBPD), we have refined our product, and determined additional needs in terms of provider and patient education. Based upon observations at multiple hospitals in low- and middle-income countries, and a specific request from obstetricians at Queen Elizabeth Central Hospital, Blantyre, Malawi, the concept of transforming the output of a fetal monitor from paper to a handheld digital device was explored, and a preliminary design created. As part of the iterative CBPD process, our design team returned to Malawi in January 2019 and conducted interviews of providers at four hospitals. The results of these interviews, and our observations of the variety of donated fetal monitors, has enabled us to refine our design specifications, and revealed the need for provider and patient education prior to implementation of this alternative for fetal monitoring.

**Title:** Relationship Between Socio-demographic Factors and Pediatric Obstructive Sleep Apnea Symptoms

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**Abstract/Case Study:** Background: Nearly ten percent of children in the United States aged 2-18 years old suffer from symptoms of obstructive sleep apnea (OSA) with one to four percent of children being diagnosed with this disorder each year. Pediatric OSA can lead to significant learning difficulties and behavioral problems, as well as a variety of metabolic impairments that may have a profound impact on a child's well-being. A large body of literature exists assessing the relationship between socio-demographic factors and symptoms of OSA in adults. However, there is a paucity of information regarding whether these associations are present in the pediatric population. Methods: A systematic review and meta-analysis of the literature related to the relationship between sociodemographic factors and pediatric OSA was conducted. Different permutations of the terms, 'ethnicity', 'demographics', 'children', 'pediatrics', 'obstructive sleep apnea', 'snoring', and 'sleep' were searched in PubMed and CINAHL databases. Twenty-three articles were identified published from 2002 to 2018 that addressed this topic. Results: There are significant associations between symptoms OSA and pediatric patients who have pre-existing pulmonary and/or sinus problems, are male, are of African American or Hispanic descent, or those who live in disadvantaged or distressing neighborhoods. Parental reports of symptoms of sleep apnea are significantly more common in African American and Hispanic children than in Caucasian children. There are discrepancies regarding the association between socio-demographic factors and differences in sleep patterns and behaviors in this population. Conclusion: There are significant associations reported in the literature between socio-demographic factors such as ethnicity, age, and gender, and symptoms of OSA in the pediatric population. However, studies on this topic are scarce. Further research is needed to ensure that children who have socio-demographic risk factors for OSA receive adequate diagnostic and preventative care.

**Title:** Hospital course and nutrition in pediatric patients with G Tubes

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**Abstract/Case Study:** Several publications have attempted to clarify the differences between percutaneous endoscopic gastrostomy (PEG) and laparoscopic gastrostomy (LAG) tube placement in the pediatric population. However, a definitive conclusion has yet to be reached. To help answer this question, we examined the length of hospital stay and time to goal feeds in a longitudinal pediatric cohort. As surgeons performing these interventions, usually in already nutritional deprived infants, physicians may need to consider the time to goal feeds between different approaches in addition to their known complications. We performed a retrospective chart review of all pediatric patients 0-17 years old who required gastrostomy tube insertion from 1998 - 2016 at a single institution. Data from all forms of gastrostomy tube placement were extracted and then filtered to include only PEG and LAG tubes. 53 LAG and 174 PEG cases were analyzed. The mean gestational age of the two groups was  $1.31 \pm 2.61$  and  $3.10 \pm 4.72$  years ( $p = 0.0007$ ) and weight at the time of procedure was  $7.35 \pm 6.56$  kg and  $13.00 \pm 16.00$  kg ( $p = 0.0002$ ), respectively. The mean time to initiation to full feeds were  $61.6 \pm 44.8$  hours and  $58.4 \pm 142$  hours, respectively. Through t-test statistical analysis, this data was not significant ( $p = 0.8066$ ). In terms of hospital stay length, the groups averaged  $9.67 \pm 24$  days and  $7 \pm 12.1$  days; again, this was not statistically significant between the two cohorts ( $p = 0.4713$ ). While there is no significant difference between LAG tubes and PEG placement in regards to initiation to full feeds and length of hospital post-operatively, the patients in LAG cases were significantly younger and smaller in comparison. These clinical characteristics make it difficult to compare the two techniques but do not reveal a favorable outcome in either approach.

**Title:** Effect of gender and prematurity on pediatric opiate use

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**Abstract/Case Study:** Previous studies have reported a differential response of males and females to opioid analgesics. However, there is limited data on whether this pattern applies to the pediatric population, and prematurity at birth may be a confounding variable. To investigate this question, we designed a population study based on a cohort of pediatric patients receiving gastrostomy (G) tubes in an attempt to exert greater control over the possible influence of age and surgical variables. A retrospective cohort study was performed by screening patients ages 0-17 years who received G-tubes between 1998 and 2016. Patients were stratified by sex and prematurity status. Premature (n = 70) patients were younger and smaller on average than full-term patients (n = 122) in our cohort (p < 0.05). Full-term patients received fewer laparoscopic G-tubes than premature patients (20% vs. 37%, respectively; p < 0.05). Length of hospital stay was not statistically different between the two groups, and the male:female ratios were similar. Premature patients had a higher number of narcotic doses within 48 post-operative hours ( $3.5 \pm 4.4$  doses) compared to the full-term group ( $2.1 \pm 2.8$  doses; p < 0.05). When males (n = 131) were compared to females (n = 94), there was no significant difference in total dose of narcotics used. Additionally, no significant difference in narcotic dosage was observed when only the premature patients were stratified by sex (47 premature males and 23 premature females). In both of these comparisons, there were no statistically significant differences in adjusted gestational age, weight, length of hospital stay, and procedure type. Our data suggests that prematurity may be a stronger predictor of increased narcotic usage than sex; however, differences could be potentially attributed to surgical approach (laparoscopic vs. percutaneous). Whether this principle can be generalized is an area requiring further investigation.

**Title:** Changing patterns of narcotic and antibiotics in pediatric G-tube patients

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**Abstract/Case Study:** Pediatric perioperative narcotic and antibiotic usage has often called for an aggressive approach to control pain and infection rates. As long-term complications have been called into question, this ideology has been debated. A vulnerable population to variation in these treatments are pediatric patients with gastrostomy tubes. The change in dosing in this particular population over time and the effect of the g-tube placement technique (PEG vs Laparoscopic) on dosing is unknown. We performed a retrospective chart review of pediatric patients requiring insertion of gastrostomy tubes from June 1998 to February 2016. The 1998-2009 cohort had a mean number of antibiotic doses during the perioperative period of  $1.91 \pm 2.61$  with cefazolin being the most used (72.92%). The 2010-2016 cohort had a mean number of antibiotic doses of  $2.24 \pm 2.35$  with cefazolin being the most used (93.68%). There was no significant difference in dosage amount found between the two cohorts ( $p=.3928$ ). In regards to narcotic use, there was a significant increase in the amount of perioperative narcotic doses administered in the latter cohort ( $p<.001$ ). Lastly, patients treated percutaneously with 2 attendings had significantly less antibiotic doses administered compared to those treated laparoscopically ( $p<.001$ ) even though there was no significant difference in perioperative infection rates ( $p=.098$ ). We show that while antibiotic usage has not changed over time, treatment with narcotics has increased over time. This may be a result of data supporting the safe use of narcotics in the pediatric population. It is also seen that the PEG with 2 attending approach lead to less antibiotic usage despite similar infection rates in the perioperative period. More research must be done to assess how these frequencies play a role on the long term outcomes of these patients.

**Title:** Longitudinal Retrospective Study of G-tube Outcomes in the Pediatric Population

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**Abstract/Case Study:** Two less invasive techniques for gastrostomy placements are percutaneous gastrostomy (PEG) and laparoscopic gastrostomy (LAG). Although previous studies have compared LAGs and PEGs in pediatric patients, they have been limited by length of follow up and confined to patients of greater age and weight. We present a large single-institution study on pediatric patients receiving gastrostomy tubes. We performed a retrospective chart review of patients 0-17 years old requiring G-tubes from June 1998-February 2016 at a single institution. We analyzed type of procedure, total procedure time, narcotic use, time-to-initiation of feeds, length of hospital stay, and short and long-term complications. We found 174 (70.73%) PEG placements done by two attendings (pediatric gastroenterologist + pediatric surgeon), 3 PEG placements done by one attending (1.22%), 53 LAGs (21.54%), and 11 open G-tubes (4.47%). There was one LAG (0.41%) and one PEG (0.41%) converted to open G-tube. No PEG placements were converted to a LAG. Overall average gestational age at time of surgery was  $2.52 \pm 4.28$  years. 55.51% of patients were males and 44.08% were female. Average weight and BMI was  $11.25 \pm 14.22$  kg and  $15.78 \pm 12.21$  kg, respectively. Average operating room and procedure times were  $77.28 \pm 64.56$  minutes and  $22.08 \pm 27.87$  minutes, respectively. Average length of post-operative hospital stay was  $7.61 \pm 15.26$  days, and average length of follow up was  $3.76 \pm 3.59$  years (maximum 18.58 years). Using this large dataset, we can begin to investigate other data regarding this population such as complication rates and types, specifically comparing LAGs and PEGs. We also plan to stratify by weight as we have an adequate number of patients weighing  $<5$  kg, which is considered a high-risk group.

**Title:** Affordable Valved Holding Chambers for Pediatric Asthma Therapy

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**Abstract/Case Study:** Inhaled corticosteroids (ICS) are the most effective therapy for asthma at all ages. The most common delivery method for ICS is metered dose inhalers (MDI) that require coordination of breathing and actuation to be effective. The addition of a valved holding chamber, commonly referred to as a spacer, can double airway deposition, while reducing deposition in the mouth and pharynx, a source of potential side effects. MDIs can be used with infants and children if a face mask is added to the spacer. Due to the high cost of commercial spacers, pediatric patients in low- and middle-income countries do not have access to effective asthma treatment with the MDI-spacer-mask combination. We have developed an affordable spacer and face mask for pediatric use. Our design is the result of systematic research regarding asthma physiology, particle physics, the electrostatic properties of fabrication materials, and configuration of commercially available spacers. We have utilized this knowledge to design a spacer with face mask using locally sourced materials in Malawi. Automobile inner tube material is being used for the one-way valves and adjustable face mask attachment of the spacer. A standard sized plastic Coca Cola bottle serves as the spacer's chamber, due to its global availability, electrostatic properties, and overall shape. The components of the spacer are held together by adhesive and are easily assembled. Testing of our prototype spacer will be performed using aerosolized fluorescein dye in order to track movement of particles into, within, and out of the spacer. We predict that our spacer will have a particle delivery profile similar to those that are commercially available, at a fraction of the cost. Our final product will include an open source set of fabrication and user instructions.

**Title:** Outcomes with Third-Line Vasopressors on In-Hospital Mortality in Septic Shock

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**Abstract/Case Study:** Septic shock is defined as circulatory dysfunction secondary to a dysregulated immune system's response to infection. Norepinephrine and vasopressin are commonly utilized vasopressors for septic shock; however, there is a paucity of clinical data to support the choice of a third-line vasopressor. This study aimed to determine the effect on in-hospital mortality of a third vasopressor compared to the combination of norepinephrine and vasopressin (NE+V), as well as patient demographics on in-hospital mortality and estimated in-hospital mortality with various vasopressor combinations. 7,646 patient charts, between January 2008-March 2018, with diagnoses of sepsis, severe sepsis, or septic shock (ICD 9/10 codes) were extracted from the electronic health record database as a retrospective chart review. Septic shock was defined as a coded diagnosis of sepsis, severe sepsis, or septic shock, plus the administration of vasopressors. 2,630 patients composed this study population. RStudio® was used to conduct statistical analyses. Overall septic shock mortality was 41.0%. Each third-line vasopressor (dobutamine OR 3.615, dopamine OR 4.752, epinephrine OR 5.152, phenylephrine OR 4.558, methylene blue OR 8.327x10<sup>6</sup>) exhibited higher odds of in-hospital mortality compared to NE+V alone. APACHE II and qSOFA scores were not significantly different within the groups. Among the 5 third-line vasopressors, a Kruskal-Wallis rank sum test demonstrated no significant difference in average in-hospital mortality ( $p=0.7615$ ). Kaplan-Meier estimates demonstrated no significant difference in survival based on third-line vasopressor administered, both from time of admission ( $p=0.36$ ) and from time of receiving the third-line vasopressor ( $p=0.62$ ). Adding dobutamine, dopamine, epinephrine, phenylephrine, or methylene blue as a third-line vasopressor for refractory septic shock increases odds of mortality compared to that of NE+V alone. Among third-line vasopressors used in this study, there was no significant difference in in-hospital mortality for any combination compared to NE+V alone. Additionally, the choice of third-line vasopressor did not significantly affect survival.

**Title:** Use of an Early Warning System to Improve Patient Outcomes

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**Abstract/Case Study:** To determine the effect of an early warning system (EWS) on mean rate of ICU recidivism, ICU length of stay (LOS), overall LOS, code-blue events, and mortality. Failure to Rescue (FTR) is defined as the failure to identify complications. Medical errors and FTR events were responsible for 60,000 deaths per year and approximately \$6.9 billion in excess healthcare costs between 2005 and 2007. Many patient deaths are preventable (AHRQ, 2017). Early Warning Systems assist healthcare providers with early detection of subtle changes in order to prevent clinical deterioration. The IRB approved this quasi-experimental study. An early warning system was implemented in January 2017. The pre-intervention and post-intervention data were analyzed to determine the effectiveness of the implementation of the warning system. The population included adult (over 18) acute care patients in the inpatient setting. Patients under the age of 18 and over 89, women's inpatient services, palliative care, patients with an ICU stay > 25 days and patients with overall LOS > 50 days were excluded. Pre-intervention data were collected as a baseline. Post-intervention data were collected to determine the effect on the outcomes related to the intervention. Study analyses focused on the effect of the early warning system on ICU recidivism, ICU length of stay (LOS), overall LOS, Code Blue events, and mortality. Mean ICU LOS decreased from 3.6 days to 3.3 days ( $p < 0.01$ ). Code blue events decreased by 25% ( $p = 0.003$ ). Rapid response events decreased by 22.4% ( $p = 0.005$ ). There were no differences in the mean rate of ICU recidivism, overall LOS, or mortality. This research supports continued use of an early warning system based on specific hospital and patient outcomes to establish best practice for patient safety. Findings demonstrate that the early warning system could improve communication between nurses to evaluate, and address earlier, clinical deterioration.

**Title:** Anti-inflammatory effects of extracorporeal membrane oxygenation (ECMO). More than support?

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**Abstract/Case Study:** Rationale: Maladaptive cytokine response is a poor prognostic indicator in patients receiving extracorporeal life support, although, detailed characterization of this response has not been conducted. Moreover, it is debated whether ECMO itself provides therapeutic benefit beyond oxygenation. Thus, we sought to characterize the inflammatory profile of ECMO over the early course of therapy and quantify its effect on cytokine levels. Methods: Fourteen patients initiating ECMO therapy at Carilion Roanoke Memorial Hospital were enrolled over 19 months. Of these, we measured cytokines pre- and post-oxygenator in 8 patients over 72 hours. Comparisons of cytokine levels were made with Fishers-exact and ANOVA tests. Results: The average age of patients was 64.3 years with 75% being male. Centrally cannulated patients had higher IL-6 levels (820.43 vs 6907.53 pg/mL,  $p < 0.05$ ), whereas femorally cannulated patients had higher IL-12p70 levels (7.73 vs 2.59 pg/mL,  $p < 0.05$ ). Cytokine levels on day one included IL-12p70 ( $3.22 \pm 3.54$ ), IL-6 ( $4971.23 \pm 8569.88$ ), TNF (undetected), IL-8 ( $346.68 \pm 670.18$ ), IL-1B (undetected), and IL-10 ( $72.27 \pm 87.9$ ). Cytokine levels increased over 72 hours, however, no significant differences were appreciated despite blood product transfusion. On day 3, IL-12p70 levels were significantly lower post-oxygenator ( $p < 0.05$ ). Conclusion: The inflammatory profile of ECMO therapy does not change significantly over the early course of illness when accounting for transfusion. However, the decrease in IL-12p70 specifically at day 3 of ECMO may indicate an adsorptive therapeutic effect on specific inflammatory markers by the Maquet oxygenator. ECMO therapy with the use of polysulphone oxygenators may provide therapeutic benefit beyond cardiopulmonary support.

**Title:** Ultrasonographic Discrimination of Cellulitis versus Pseudocellulitis

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**Abstract/Case Study:** Cellulitis is a common bacterial infection affecting the deep dermis and subcutaneous fat, routinely diagnosed clinically. Recent research indicates a misdiagnosis rate of up to 33% in emergency departments, where patients admitted for cellulitis are, instead, found to have pseudocellulitis (e.g. lymphedema, stasis dermatitis). Possible repercussions include hospital crowding, financial strain, unnecessary interventions, and increased complication risks. Suggested methods to improve diagnosis include increased vigilance during patient assessment, dermatologic consult, and novel diagnostic modalities. Although cellulitis is known to present ultrasonographically with subcutaneous changes, classically interstitial edema with 'cobblestoned appearance,' this finding is nonspecific. Power Doppler ultrasound testing for hyperemia associated with inflammation from cellulitis has been suggested to exclude non-infective edematous pseudocellulitides, though this has not been tested. We propose that combined ultrasonographic assessment for subcutaneous changes and hyperemia can serve as a diagnostic tool for cellulitis. Patients with suspected cellulitis and/or pseudocellulitis will be recruited from the Carilion Roanoke Memorial Hospital Emergency Department or inpatient wards. Ultrasonography will be performed during the patient stay in the emergency department or within 24 hours of admission with a conventional 13 MHz transducer in greyscale and power Doppler to assess for subcutaneous changes and hyperemia respectively. Ultrasound recordings will be interpreted by blinded ultrasound-proficient physicians for degree of subcutaneous changes and degree of hyperemia, the presence of both being suggestive of a diagnosis of cellulitis. Ultrasound-based diagnoses will be assessed for test performance against final diagnoses, confirmed by a 30-day post-discharge chart review. Obtained recordings will also be examined observationally for any novel diagnostic markers. We anticipate that presence of specific subcutaneous changes and hyperemia on ultrasound will diagnose cellulitis with improved test performance outcomes. We are confident that routine incorporation of ultrasound in patient care will thereby diminish negative outcomes and unnecessary interventions in patients suspected to have cellulitis.

## Classroom 3

### Psychiatry

**Title:** Should We Prescribe Different Dosages of Psychotropic Medications by Sex?

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**Abstract/Case Study:** Abstract Objective: To discuss the evidence for sexually dimorphic expression of Cytochrome P450 (CYP 450) liver enzymes and implications for the prescription of psychotropic medications. Background: Pharmacogenomic testing is becoming increasingly available in psychiatric settings. Frequently used with complex or treatment-resistant patients, this testing helps to determine which medications a patient is likely or unlikely to respond to. A growing body of research suggests that CYP 450 activity may vary by sex. This difference has implications for the dosing of many psychotropic medications because CYP 450 enzymes are responsible for the metabolism of a large number of psychotropics. Methods: Overview of studies conducted on sex differences in the expression of CYP 450 retrieved from computerized databases. Discussion: The overview discusses six of the most relevant CYP 450 genes for the prescription of psychotropic medications (CYP1A2, CYP2D6, CYP3A4, CYP2B6, CYP2C9, CYP2C19). It provides research findings for sex differences in the metabolism of substrates of these enzymes from multiple studies published in online databases. This review provides information on the implications of suggested sex differences for the prescription of psychotropic medications metabolized by CYP 450 enzymes. Conclusion: The synthesis of research surrounding the relationship between sex and CYP 450 enzymes increases accessibility to this information. The review shows support for the finding that men, on average, metabolize CYP1A2 slightly faster than women. It also supports the finding that women generally metabolize CYP2D6, CYP3A4, and CYP2B6 faster than men. Key Indexing Terms: CYP 450, CYP1A2, CYP2D6, CYP3A4, CYP2B6, CYP2C9, CYP2C19, Sex

**Title:** Medical Students' Knowledge and Perception of Deep Brain Stimulation

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**Abstract/Case Study:** Deep brain stimulation (DBS) is an emerging well-established neurosurgical procedure FDA approved for its use in movement and psychiatric disorders including Parkinson's Disease, Essential Tremor, and Obsessive-Compulsive Disorder. Its widespread clinical implementation may not be commensurate in medical education. DBS requires a multidisciplinary approach and it is essential that its indications and complications are integrated into the training of future physicians. Existing literature concerning medical student knowledge level or bias towards DBS as a treatment option for indicated conditions is sparse. The aim of the present study is to explore the current knowledge and attitudes of medical students, in a single academic medical center, towards DBS as a treatment modality. **Methods:** A comprehensive questionnaire was designed to assess bias, knowledge, and self-assessment of knowledge in DBS. First through fourth year medical students (n=55) at VTCSOM were asked to complete this electronic survey containing 20 items. Of surveyed students, 34% were unsure of whether or not DBS was an FDA approved treatment; 61.7% of students believed they have not been adequately educated about DBS and its application to medicine; 10.6% of students state that DBS is associated with severe adverse effects and/or brain damage. Paired test analyses to determine significance of demographic variables and perception on actual fund of knowledge are in progress. Pre-clinical and clinical years are separately analyzed to describe changes in knowledge associated with clinical exposure. Although DBS is a highly effective treatment modality for various neurological and psychiatric conditions, there remains a lack of awareness and understanding for its implications by medical students. Further studies are indicated to design medical education curricula which focus on training future physicians in identifying patient populations who would most benefit from this novel therapeutic procedure.

**Title:** Neuromodulation and Suicidality: A Review of The Literature

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**Abstract/Case Study:** Neuromodulation, a field that alters the circuitry of the nervous system to influence movement, behaviors, and emotions, is quickly becoming a powerful tool for clinicians to treat various neuropsychiatric disorders. In the context of treating suicidality, research in neuromodulatory procedures, which include Electroconvulsive therapy (ECT), Transcranial Magnetic Stimulation (TMS), Deep Brain Stimulation (DBS), and Vagus Nerve Stimulation, has been sparse but growing. As these procedures gain more attention due to their increasing efficacy, many institutions are investing time researching how these procedures can help to quickly resolve suicidality in patients. Many patients suffering from severe depression often still experience suicidality refractory to first line treatments of psychotherapy and psychopharmaceuticals and it is important that both clinicians and patients are informed as to what neuromodulatory options are available to treat suicidality. It is necessary that a concise literature review be performed to consolidate and present the indications, side effects, cost, and efficacy of these various treatments. A review of the current literature regarding ECT, TMS, DBS, and VNS was performed to condense the research available. Of all the neuromodulatory techniques, only ECT, TMS and VNS have been FDA approved for the treatment of depression and have been strongly linked to reduction in suicidality scores. DBS is FDA approved for the treatment of OCD, and studies have explored its efficacy in treating depression and suicidality. The anatomical targets, mechanism of action, side effects and financial burden of each are discussed. There is a growing body of evidence supporting the use of neuromodulation for treatment of suicidality. Clinicians must have access to the growing body of research involving neuromodulation as well as the indications, mechanism of action, and potential complications.

**Title:** Current Advances for Treating Substance-use Disorders with Transcranial Magnetic Stimulation

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**Abstract/Case Study:** Transcranial magnetic stimulation (TMS) is a non-invasive brain stimulation technique that manipulates a magnetic field to cause electromagnetic induction towards a targeted area of the brain, thereby modulating cortical excitability. In 2008, repetitive TMS (rTMS) was FDA-approved for treatment-resistant major depressive disorder (MDD), and in 2014, single pulse TMS was FDA-cleared for migraine headaches. Within the past 10 years, dozens of studies' most with null result or promising results' have evaluated TMS for treating various substance use disorders (SUD). In this study, we first review the basic methodology and results of all 29 published randomized clinical trials of TMS for reducing cravings and treating nicotine, alcohol, cocaine, opioid, and other recreational drugs. Second, we compare different TMS protocols such as the use of single continuous stimulation frequency to modulate cravings versus theta burst stimulation, which has been shown to attenuate depressive symptoms and may alter neural activity in a fraction of the length of time. Additionally, we compare the different areas of the brain that can be targeted with TMS; while stimulating the dorsolateral prefrontal cortex (DLPFC) to target the dorsal striatal circuit may enhance executive control, targeting the ventromedial prefrontal cortex (VMPFC)-caudate circuit may disrupt the reward circuit and limbic arousal loop, resulting in improved efficacy for treating addiction. Third, we describe our randomized clinical trial of 50 participants who will receive TMS or sham-TMS and who will all be enrolled into Carilion Clinic's outpatient office-based opioid treatment (OBOT) program and receiving buprenorphine/naloxone medication-assisted treatment (MAT). To our knowledge, we will be the first investigation to evaluate TMS for treating opioid use disorder while tracking long-term clinical outcomes and measures for delayed discounting and drug craving.

**Title:** Case Report of Late Onset Catatonia

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**Abstract/Case Study:** Catatonia is a neuropsychiatric syndrome characterized by motor, behavioral, and autonomic signs. It is associated with psychiatric disorders, neurologic disorders, and medical conditions. Literature on catatonia in the elderly population is limited. We present a case report of 68-year-old female with a past history of major depressive disorder, bipolar I disorder, and chronic kidney disease who was admitted due to general progressive deterioration of health, which included social withdrawal, decreased food and water intake, and a decline in her activities of daily living. Additionally, she experienced several personal traumas over the past year leading to depression. On examination, patient exhibited psychomotor retardation, mutism, posturing, rigidity, staring, immobility, grimacing, rigidity, negativism, ambitendency, mitgehen, and gegenhalten. Rapport was difficult to establish. She had an initial score of 13/69 on the Bush-Francis Catatonia Rating Scale (BFCRS). With the diagnosis of Catatonia and MDD, oral lorazepam 1 mg BID and oral fluoxetine 20 mg QD was initiated. Lorazepam was gradually increased to 1.5 mg BID. Multiple attempts to increase its led to sedation of the patient, thus the patient was maintained on 1.5 mg BID. The patient was transferred on day 25 to the state mental institute where she scored 20/69 on BFCRS on admission. Lorazepam was changed to 1 mg TID. Subsequently, her BFCRS improved to 2/69. The team was able to establish rapport with the patient where she describe her lack of motivation for self care as her initiating factor for depression. The treatment plan adjusted to include addressing her self care needs. Catatonia can present in the elderly and treatment can be more difficult due to the comorbidities and metabolic changes. Benzodiazepaine continue to be used for diagnosis and treatment of the condition. The use of electroconvulsive therapy can also be beneficial in this patient population.

**Title:** Recurrent EBV in Patient with History of Post-Transplant Lymphoproliferative Disorder

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**Abstract/Case Study:** Post-transplant lymphoproliferative disorders (PTLD) are lymphoid or plasmocytic proliferations that occur in immunosuppressed patients in setting of solid organ or allogeneic hematopoietic cell transplant. Pathogenesis of PTLD is usually associated with B cell proliferation secondary to Epstein Barr Virus (EBV) due to immunosuppression and decreased T lymphocytes. A 42-year-old male with history of End-Stage Renal Disease secondary to Focal Segmental Glomerulosclerosis status-post Renal Transplant in 2007 on chronic immunosuppressive has a history of Post-Transplant Lymphoproliferative disease secondary to EBV in 2007 while on intravenous Acyclovir. He presented to the emergency department complaining of fatigue, watery stools and recurrent fevers for a week. During the hospitalization, he continued to have fevers of unknown etiology even after starting broad spectrum antibiotics (vancomycin, cefepime). Clostridium difficile toxin, stool lactoferrin, culture, and ova/parasites were negative. Antibiotics were discontinued after 48 hours of treatment and multiple negative blood cultures. HIV type 1 and 2, Hepatitis A and C, Cytomegalovirus, and Influenza tests were also negative. Infectious Disease recommended tests for Tuberculosis quantiferon, blood fungal cultures'which were negative. Patient had a history of recurrent EBV viremia with a viral load less than 2000 in 2012 while he was on oral valganciclovir. EBV IgM antibody was thus checked and was elevated. This was found to be a new recurrence of EBV because viral loads were negative in multiple tests between 2013-2018. This case illustrates that a patient with history of PTLD secondary to EBV remains susceptible to recurrence of EBV despite antiviral therapy. In this case, the patient's EBV was resistant to multiple therapies. There are few cases of recurrent multi-drug resistant EBV. Treatment of recurrent EBV has not previously been studied. Current recommendations are to continue supportive therapy or reduce immunosuppressive therapy. This patient was already on minimal immunosuppressive therapy per his renal transplant center.

**Title:** Escherichia coli Bacteremia and Sepsis: Biofilm Effect on Patient Outcomes

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**Abstract/Case Study:** Escherichia coli is commonly associated with bloodstream infections and death from sepsis. Virulence factors (VFs) may play a role in patient outcome by enabling the bacteria to migrate into the host and disseminate efficiently. There is paucity of data on how bacteremia from biofilm forming E.coli isolates affects patient prognosis. We evaluated the clinical characteristics and outcome of biofilm forming E.coli bacteremic patients, hypothesizing that patients with a biofilm forming isolate (bfi) would have a worse clinical outcome. E.coli isolates collected in a consecutive fashion from 110 unique adult patients at CRMH microbiology laboratory had biofilm formation assessed on them using glass tubes to facilitate biofilm formation in a three-dimensional environment. Biofilm formation was qualitatively visualized with crystal violet. Isolates were noted as biofilm forming (bf) or non-biofilm forming (n\_bfi). Patient demographics, admission source and disposition at discharge were compared based on biofilm formation of isolate. The chi-square was used for categorical data and the Student's-t test and Mann-Whitney U test for continuous variables as appropriate. Of the 91 patients who had biofilm formation data, mean age of patients who were infected with bfi was 67yrs (95% CI:62,73) while that for n\_bfi was 62yrs (95% CI:56,68). Females comprised 27 (64%) of patients with bfi and 36 (73%) of n\_bfi. The majority of patients with bfi and n\_bfi came from home for admission, 35 ( 85%) and 38 (79%) respectively. At discharge, patients who had had a bfi were more likely to die/go into hospice 11 (26%) compared to their n\_bfi counterparts 2 (4%). Also n\_bfi were more likely to be discharged home 32 (67%) compared to bfi patients 21 (50%). Bfi E.coli isolates causing bacteremia had poorer clinical outcomes: increased mortality. Rapid diagnostics to identify this phenotype early-on may help inform management protocols and improve the clinical outcome.

**Title:** Effects of Preoperative MRSA Colonization on Implant-Based Breast Reconstruction

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**Abstract/Case Study:** Background: Various studies have correlated preoperative Methicillin-Resistant Staphylococcus aureus (MRSA) nasal colonization with increased risk of postoperative complications. This data has driven many institutions to develop policies regarding the usage of nasal swabs preoperatively in all implant related cases. The goal of this study was to evaluate the relationship between MRSA colonization and complication rates in implant-based breast reconstruction. Methods: A retrospective review was performed on 218 patients (354 breasts) that underwent mastectomy with implant-based breast reconstruction by a single surgeon from 2013 to 2016. 126 patients had preoperative nasal swabs with 102 of them having an additional postoperative swab. Patients were identified as being colonized with MRSA, not colonized or converted during their operative course. No specific intervention was initiated based on MRSA carrier status. Complications rates were then analyzed and compared to MRSA colonization status. Results: 4.8% of patients were colonized with MRSA preoperatively, compared to 2.0% postoperatively. There was no statistically significant difference in complication rates of preoperative MRSA carriers (n=6, 50%) and non-carriers (n=120, 46.7%). Also, no significant difference in complication rate was noted between patients that converted from MRSA positive to negative (n=100, 45%) and patients that remained MRSA positive (n=2,100%) in the postoperative setting. Summary: MRSA colonization, in the preoperative and postoperative setting, does not increase the risk of complication following implant-based breast reconstruction. No specific therapy was instituted based on preoperative MRSA status. We therefore question the necessity of nasal swab being performed preoperatively as it pertains to postoperative complications.

**Title:** Identification of Bacterial Isolates from the Virginia Intercollegiate Anatomy Laboratory

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**Abstract/Case Study:** Purpose: To examine the progression of microbial contamination within a new anatomy laboratory facility (Virginia Intercollegiate Anatomy Laboratory) in order to identify the responsible organisms, their sources and eventually to prevent and control this progression. The opening of the Virginia Intercollegiate Anatomy Laboratory in May of 2015 at the Carilion Roanoke Community Hospital provided researchers the opportunity to study the progression of microbial contamination with an established baseline. Swab samples were collected from 22 environmental and 4 cadaver sites approximately every 120 days for three years. Bacterial and fungal media were inoculated. After examining the media and quantifying microbial growth, colonies were gram stained and transferred into glycerol to be frozen at -20 degrees Celsius. Identification of samples began February 2018. Selected samples were cultured in order to extract bacterial DNA. Amplification of the extracted DNA was performed using the polymerase chain reaction (PCR) with universal primers for 16s ribosomal DNA. The amplified PCR products were electrophoresed in order to establish that the correct DNA band sizes of 1250 base pairs were in fact amplified. The PCR products were purified using the Qiagen column chromatography protocol and the amplified samples were sequenced by Sanger sequencing technology (Genewiz). The Sanger sequences were analyzed using the NCBI BLAST program to identify the specific microbial organisms. Results indicated growth of various microorganisms within several environmental locations sampled. Previous gram stain results matched each identified organism. Four of the six organisms (Staphylococcus and Micrococcus species) are known to be carried on human skin and mucosa with one species known to be associated with opportunistic infections. The remaining two organisms (Bacillus) are common environmental inhabitants. These results provide the first insight into bacterial contaminants and their originations.

**Title:** Urinalysis Reflex Culture and Antibiotic Prescriptions in the ED

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**Abstract/Case Study:** Urinary tract infections (UTIs) are one of the most common diagnoses made in the emergency department. In the U.S. UTIs account for 8.3 million outpatient visits and 1 million hospitalizations every year. A substantial number of these UTIs are diagnosed through U.S. Emergency Departments. Worldwide UTIs are still significantly under-diagnosed and under-treated, but in the U.S., UTIs are grossly overtreated. Many institutions have implemented positive urinalysis (UA) reflex to urine culture (UC) as a method to decrease resource consumption of urine cultures and antibiotics. Although this process is being implemented and becoming a standard of care at many institutions, there are few studies that record and support that UA reflex to UC measures decreases inappropriate antibiotic prescriptions in the emergency department. Recently, the Carilion Roanoke Memorial Hospital Emergency Department implemented this UA reflex to UC as standard care of practice as well. With a limited data set that targets patients that have arrived in the emergency department for which urinary tract infection was a diagnosis, we will ameliorate the gap in regarding its impact on antibiotic prescriptions. Data will be collected from the electronic health record of patients above the age of 17 with a UA, UC, or UA reflex ordered between September and December in 2017 and 2018. The portion of positive UA, UC, and reflex UA's and antibiotic prescriptions will be recorded. In order to support evidence-based antimicrobial stewardship, we will determine the portion of antibiotics prescribed with a positive reflex UA in 2018 as compared to sole positive UAs or UCs in 2017. In addition, the change in resource consumption of Carilion labs will be assessed since the implementation of the new protocol in the emergency department.

**Title:** Rapidly fatal encephalitis associated with atypical lymphoid proliferation: Case report

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**Abstract/Case Study:** Introduction: The histopathological findings of atypical lymphoid proliferations (ALP) are associated with disease processes in which it is unclear whether the lymphoid proliferation is benign or malignant. Typically, ALP is associated with specific viral infections, autoimmune disorders, immunodeficiencies, and certain medications. Progression and timeline of ALP are variable; however, rapid deterioration is uncommon. We describe a case of rapidly progressive and fatal encephalitis associated with ALP in a patient recently treated for a ruptured posterior inferior cerebellar artery (PICA) aneurysm. Case Report: The patient is a 52-year-old female who presented to the emergency room with a severe headache. CT demonstrated aneurysmal subarachnoid hemorrhage and angiogram revealed left PICA aneurysm. Endovascular embolization was performed which was complicated by intraoperative rupture. Postoperatively, the patient did well with no focal deficits. 5 weeks later, patient presented with severe headache associated with nausea, vomiting, fever, and hypotension. She deteriorated quickly and was empirically treated for meningitis although CSF and cultures were not suggestive. Biopsy of the caudate nuclei showed perivascular lymphocytic infiltrate and patient was started on IVIG and IV steroids with suspicion of immune-mediated pathology and no improvement in her exam. After a long discussion with the family, and no meaningful chance for functional recovery, the patient expired on hospital day 23. Discussion: Mortality of a ruptured aneurysm approaches 50%, with each rupture leading to a more dismal prognosis. Postoperative complications are not uncommon, though most will happen within the first 2 weeks. Rapidly fatal encephalitis associated with ALP after an aneurysm rupture has not been reported. This case highlights the need to for a better understanding of the patterns of ALP etiology, chronology, and mortality. In particular, clarification of early signs and symptoms that may allow clinicians to obtain a timely diagnosis and provide treatment to prevent fatal progression is needed.

**Title:** Effect of Noise on Fine Motor Skills, Cognition, and Mood

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**Abstract/Case Study:** Background: The amalgam of noises inherent to the modern-day operating room has the potential of diluting surgeon concentration, which could affect surgeon performance and mood, and have implications on quality of care and surgeon resilience. Some surgeons choose to dilute this noise with background music played during cases in the operating room. Objective: We aimed to evaluate the impact of operating room environmental noises on surgeon performance including fine motor dexterity, cognition, and mood. Methods: 37 subjects were tested under three different environmental noise conditions including silence, a prerecorded soundtrack of a loud bustling operating room, and with background music of their choosing. We used the Motor Performance Series to test motor dexterity, a battery of neuropsychological tests to evaluate cognitive thinking, and Profile of Mood States to test mental well-being. Results: Our results showed that typical operating room noise had no impact on motor dexterity but music improved the speed and precision of movements and information processing skills. Neurocognitive testing showed a significant decrement from operating room noise on verbal learning and delayed memory whereas music improved complex attention and mental flexibility. The Profile of Mood States found that music resulted in a significant decrease in feelings of anger, confusion, fatigue, and tension along with decreased total mood disturbance, which is a measure of psychological distress. Loud operating room noise had a negative impact on feelings of vigor and no increase in total mood disturbance. Conclusion: Our results suggest that loud and unnecessary environmental noises can be distracting to a surgeon so every effort should be taken to minimize these. Music of the surgeons choosing does not negatively affect fine motor dexterity or cognition and has an overall positive impact on mood and can therefore be beneficial if practiced safely and considerably.

**Title:** Near real-time prediction of eye gaze in endoscopic surgeries

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**Abstract/Case Study:** Training residents surgeons on where to look during operation has the potential to improve surgical performance. Machine learning on eye-gaze data can simulate or predict where surgeons would look during medical procedures in a variety of circumstances. The capability to predict where surgeons would look could have three applications. First, this capability can inform instructors where learners tend to look by simulating their eye movements in real time. Second, this capability can instruct learners on where experts likely look for any given operation, thereby providing immediate guidance on visual attention. Finally, this capability can provide visual assistance (i.e., 'the second pair of eyes') to alert the physicians performing the operations on where additional attention appears warranted. To advance the application of machine learning for surgical training, we conducted an exploratory study developing and evaluating a computer vision deep neural network (DNN) adapted from the ADNet algorithm. We employed data from our prior study that tracked eye-gaze of experts, attendings, and residents viewing laparoscopic surgery videos. Using a subset of 38 videos incorporated with eye-gaze data, we trained the DNN to predict the eye gaze of the attending and resident surgeons separately. The eye-gaze prediction of the DNN yielded two significant findings. In our prior study, one finding was that eye-gaze of the expert agreed less with those of attendings than residents and thus implied a greater field of gaze and possibly awareness. In this study, the expert eye-gaze was marginally further away from the DNN predicted eye-gaze of the attendings than the predicted one of the residents ( $F(1,14)=3.68$ ,  $p=.076$ ). In addition, we also observed that the DNN predicted eye-gaze was more closely matched to those of residents than the attendings ( $F(1,14)=6.48$ ,  $p=.023$ ), indicating that resident eye-gaze was more predictable or learnable.

**Title:** Too Many Cooks? The Proliferation of Authors in Neurosurgical Papers

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**Abstract/Case Study:** A recent observation by the Carilion neurosurgery team was that neurosurgical papers of the past featured only one or two authors but now they oft feature over a dozen. We believe this to be caused by the burden to produce in the setting of academic medicine influencing the need for recognition in published articles. We sought to test this assertion and consider the possible factors behind such a trend if it does exist. We evaluated the Journal of Neurosurgery, Neurosurgery, JAMA, and NEJM for average number of authors per scientific paper each decade since the 1940's. The average number of authors per scientific paper in the Journal of Neurosurgery was as follows: 1940's- 1.73; 1950's ' 1.84; 1960's ' 2.02; 1970's- 2.38; 1980's ' 3.18; 1990's ' 4.24; 2000's ' 5.10; 2010 ' 5.38; 2018 ' 7.8. Results for JAMA were as follows: 1950's ' 1.91; 1960's ' 2.07; 1970's- 2.49; 1980's ' 3.21; 1990's ' 4.71; 2000's ' 7.41; 2010 ' 10.15; 2018 ' 12.90. Neurosurgery and the NEJM followed similar patterns. Over the decades, the number of articles per each issue in the JON increased, the number of articles per issue of JAMA decreased. The average number of authors per scientific paper in our two most prominent professional journals has expanded by a factor of 6 since the 1940's. Reasons are certainly multifactorial and the trend is not against the grain of other major journals. Nonetheless, the proliferation of authors suggests an inherent pressure on academic neurosurgeons, residents, and even medical students, to produce increasing numbers of publications. This may encourage a culture of quantity over quality in the process. The question is begged'should authorship be limited?

**Title:** Too Many Beers? Analyzing Beers Criteria Medications and Traumatic Falls

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**Abstract/Case Study:** Introduction: The Beers Criteria for Potentially Inappropriate Medication (PIM) use is a list of medications published by the American Geriatric Society that should be used with caution in older adults (‘ 65 years old) due to multiple risks. Our primary objective was to determine the local prevalence of PIM use as well as fall risk associated with specific PIMs in geriatric trauma patients. Methods: We conducted a retrospective analysis of PIM use in all geriatric patients evaluated at our level 1 trauma center between January 2014 ‘ September 2017. Patients that did not undergo medication reconciliation were excluded. After initial aggregate analysis, patients were stratified by age into three groups: 65-74, 75-84 and 85 or older. Multivariate logistic regression analyses were used to calculate odds ratios of fall risks associated with specific PIMs. Covariates controlled for in our analysis included comorbidities, age, sex, BMI, drug use, and alcohol use. Results: Out of 7,897 trauma patients, a total of 2,181 patients met inclusion criteria. Overall, 71.4% of geriatric trauma patients were prescribed at least one PIM. Specific PIMs associated with increased fall risk in all geriatric patients included antipsychotics, benzodiazepines, and diclofenac. For ages 65-74, antihistamines, diclofenac, proton pump inhibitors, and promethazine were significantly associated with falls. In older patients aged 75-84, alprazolam, antipsychotics, benzodiazepines, cyclobenzaprine, diclofenac, and muscle relaxants were implicated. When analysis of patients 85 and older was performed, no significant associations were found. Conclusion: PIM use in geriatric trauma patients at Carilion Clinic appears to be rampant and nearly triple the national average (71% vs 25%). Multiple specific PIMs were associated with increased fall risk. Based on these retrospective findings, we are designing a targeted educational program aimed at local Primary Care Providers that will attempt to decrease geriatric PIM use.

**Title:** Developing Educational Materials to Decrease Prescribing of Potentially Inappropriate Medications

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**Abstract/Case Study:** Introduction: The Beers Criteria for Potentially Inappropriate Medication (PIM) use is a list of medications published by the American Geriatric Society that should be used with caution in older adults (> 65 years old) due to multiple risks. Over 71% of geriatric trauma patients are on at least 1 PIM here at Carilion Clinic. The national average is approximately 25%. Our primary objective was to develop educational materials to help decrease this rate of PIM prescribing. Methods: We plan to distribute educational materials to all Carilion Clinic primary care providers (PCPs) regarding the findings from our recently completed study as well as the recommendations found in the Beers Criteria guidelines. Providers will then be sent a survey that will measure their previous knowledge regarding the Beers Criteria guidelines as well as their commitment to change regarding their current practice and prescribing habits. A 2-month follow-up survey will then be distributed to the same providers to determine if these changes were actually implemented. Descriptive statistics will be performed on these survey responses in order to determine the effectiveness of our educational materials. Additionally, we will utilize our trauma database to prospectively identify geriatric trauma patients taking at least 1 PIM. The PCP's of these patients will then be identified and their survey responses will be flagged. The responses from providers with a history of prescribing PIMs will then be compared to the responses from providers with no history of prescribing PIMs. This will allow us to determine if previous knowledge regarding the Beers Criteria and commitment to change differs between these two groups of providers.

**Title:** Multimodal Approach to Pain Management in Lumbar Spine Surgery

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**Abstract/Case Study:** Multimodal analgesic (MMA) approach is the use of two or more different methods or medications to manage pain. It was developed to decrease opioid use and avoid adverse effects. Recent research regarding MMA in lower extremity orthopaedic surgery has been shown to decrease opioid use, improve pain and function, and decrease length of stay (LOS). Due to the increasing number of spine surgeries annually, MMA approach to spine surgery, specifically lumbar spine surgery, can be beneficial to patients in hopes of providing the same outcomes. The purpose of this review is to quantitatively determine if MMA decrease pain and LOS in patients postoperatively, and qualitatively compare evidence of utilized regimens. The MEDLINE database was queried between 1990-2019 for the following: 'Lumbar spine,' 'multimodal analgesics', and 'preoperative/postoperative pain.' Inclusion criteria included studies with level I or II evidences, concurrent use of 2 or more analgesic therapies administered through any method, studies that used Visual Analog Scale (VAS) for pain, and either lumbar decompression/arthrodesis by any approach. Exclusion criteria were cadaveric, animal, and non-english studies. The primary outcomes were VAS score, ODI score and postoperative LOS. Secondary outcomes were complications, rate of nonunion/malunion, and pseudoarthrosis. Meta-analysis was performed on primary outcomes. Four articles met criteria. Two articles utilized COX-2 receptor selective antagonists, pregabalin, and oxycodone preoperatively, and intravenous morphine. Two articles utilized acetaminophen, NSAIDs, gabapentin, S-ketamine, dexamethasone, and epidural local anesthesia preoperatively. All articles reported significantly improved VAS scores compared to control. Two articles reported decreased incidence of nausea and dizziness in the MMA group compared to the control. Meta-analysis pending. MMA regimen in spine surgery will be an effective pain management approach and decrease postoperative LOS. In future studies, we hope to directly compare opioid use to MMA regimens to examine which method provides the best pain control and improved function.

**Title:** Does repeat compression by robotic staplers increase colonic anastomotic leaks?

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**Abstract/Case Study:** Introduction: The robotic-assisted stapler is a computer integrated stapler that measures the force of the stapler jaw across the tissue. If inadequate compression is detected, it prevents the stapler from firing. The impact of repeat tissue compression to allow firing of the robotic stapling device has not been thoroughly investigated. The purpose of this study is to provide a basis for optimizing currently used robotic-assisted surgical staplers. We hypothesize that repeat compression of the stapled anastomosis will lead to higher incidences of post-operative complications. Methods: This is a prospective study that evaluates adult patients undergoing elective left sided colectomies. The primary outcome is development of a post-operative leak. Association of repeat compression with post-operative leaks will be assessed via a logistic regression analysis adjusting for covariates. Results: Forty-seven patients meet eligibility criteria. Seven patients developed an anastomotic leak. A logistic regression analysis shows a non-significant relationship between the number of compressions per staple firing (OR 1.12, CI 0.45-2.8, p=.809), absolute number of compressions (OR 1.02, CI .81-1.29, p=.85) or absolute number of firings (OR 1.11, CI .51-2.43, p=.79) and anastomotic leakage. Conclusions/Future Direction: Currently, increased frequency of tissue compression with the robotic stapler appears safe, as increasing the number of compressions per staple firing in left sided colectomies failed to increase the risk of anastomotic leaks.

**Title:** Evaluating STAT3 and Aiolos in lymphocyte mimicry associated with metastasis.

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**Abstract/Case Study:** Inappropriate expression and function of cytokine and chemokine receptors by both hematopoietic and non- hematopoietic cell populations have been linked to human disease. One example of this is the expression of lymphocytic genes by metastatic cancers, termed lymphocyte mimicry. Specifically, the aberrant expression of chemokine receptors by cancer cells allows for inappropriate responses to immune signals, migration, and increased ability to survive in circulation. The mechanisms that regulate lymphocyte mimicry are currently incompletely understood. Our laboratory recently identified a novel transcriptional complex composed of the Ikaros Zinc Finger transcription factor Aiolos and STAT3 that regulates gene expression in CD4+ T cells, including that of chemokine receptors. Interestingly, Aiolos and STAT3 have been independently implicated in multiple cancers, including metastatic breast cancer. We hypothesized that Aiolos and STAT3 may cooperate to induce chemokine receptor expression in metastatic breast cancer cells. Our study observed increased Aiolos expression and STAT3 activation in metastatic breast cancer cells as compared to non-tumorigenic and non- metastatic controls. This correlated with increased expression of the chemokine receptor CXCR4, which has been previously linked to metastatic cancer. Importantly, shRNA knockdown of Aiolos in metastatic cells resulted in decreased expression of CXCR4. Collectively, these data support a role for Aiolos, possibly in collaboration with STAT3, in the induction of a metastatic gene signature in human breast cancer.

**Title:** PIK3CB and Connexin-43 Inhibition Sensitizes Glioblastoma Cells to Temozolomide

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**Abstract/Case Study:** Background: Temozolomide resistance and tumor recurrence are two major complications that glioblastoma patients are faced with. Recent research has found that connexin-43, a gap junction protein highly expressed in glioblastoma tissue compared to normal tissue, confers temozolomide resistance in glioblastoma. Treatment of glioblastoma cells with aCT1, a selective inhibitor of connexin-43, sensitizes them to temozolomide. The Sheng lab also identified PIK3CB, a catalytic subunit of the PI3K complex, as a diagnostic marker for glioblastoma recurrence. Given the fact that connexin-43 activates PI3K and recurrent glioblastoma is temozolomide resistant, it is imperative to investigate whether combined inhibition of connexin-43 and PI3KCB will yield a synergistic effect on temozolomide sensitization. Design/Methods: Glioblastoma cell lines and primary cells were plated in 96-well plates and treated with vehicle (DMSO), TMZ (50  $\mu\text{mol/L}$ ), varying concentrations of TGX-221 or aCT1, or a combination of all three drugs. Cell viability was measured using the MTS assay and the optimal dose of the triple combination was determined. U87MG and SF295 cell lines were tested first, followed by primary glioblastoma cell lines VTC-001, VTC-003, VTC-004, VTC005, VTC-037, and VTC-103. Normal human astrocytes were also tested to make sure there were no off-target effects. Results: We found that targeting PIK3CB and connexin-43 in glioblastoma cell lines and primary glioblastoma cells increases their sensitivity to temozolomide. The optimal dose of TGX-221 and aCT1, which was 20 $\mu\text{M}$  and 30 $\mu\text{M}$  respectively, significantly decreased cell viability in glioblastoma cell lines and primary cells while sparing normal human astrocytes. Conclusions: Our findings suggest that inhibiting PIK3CB and connexin-43 enhances therapeutic response to temozolomide and limits off-target effects in glioblastoma, thus laying the groundwork for a novel combination therapeutic.

**Title:** Selective Activation of PIK3CB in Glioblastoma Multiforme

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**Abstract/Case Study:** To determine how phosphoinositide 3-kinase (PI3K) subtypes become dysregulated in glioblastoma multiforme (GBM) Recurrence in glioblastoma multiforme is common and more resistant to treatment than initial GBM. The Sheng Lab has previously identified that PIK3CB gene expression levels, but not other PI3K subtypes, are higher in recurrent GBM and are associated with GBM recurrence in newly diagnosed individuals. PI3KCB encodes for enzymatically-active PI3K subunit p110-beta, and PI3K/AKT pathway activation is a well-known promoter of cell survival. Understanding mechanisms of PIK3CB activation in GBM may identify new therapeutic targets and improve GBM survival. Current knowledge of PI3K subtypes in GBM is insufficient and contradictory. U87MG cells, an established p110-beta-high GBM cell line, were used. Cells were starved overnight, then were treated with growth factors, promoters or inhibitors of several pathways. Cell lysates were collected and PI3K/AKT pathway activity was measured using Western Blot. The ratio of phosphorylated-AKT (pAKT)/AKT/beta-actin quantified PI3K/AKT pathway activity. Serum starvation of U87MG cells depleted pAKT, and incubation with 1% Fetal Bovine Serum (FBS) restored pAKT signaling in a time dependent manner. Neither epidermal growth factor (EGF) nor fibroblast growth factor-2 (FGF-2) activated PI3K/AKT signaling in U87MG cells after overnight starvation. Furthermore, gefitinib, an EGF-receptor inhibitor, failed to inhibit reactivation when co-treated with 1% FBS. G-Coupled Protein Receptor (GPCR) stimulation by Lysophosphatidic acid (LPA) increased pAKT/AKT signaling in a dose dependent manner. Additionally, Gallein, a GPCR inhibitor, inhibited PI3K/AKT signaling when co-treated with 1% FBS. Both 1% FBS and GPCR stimulation is sufficient to activate the PI3K/AKT pathway in p110-beta-high cells. Also, EGF and FGF-2 pathways have little effect on PI3K/AKT pathway activity.

**Title:** Feasibility of an Integrated Exercise Program for Patients Receiving Chemotherapy

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**Abstract/Case Study:** Rationale: Individuals receiving inpatient chemotherapy often have prolonged hospitalizations, and are at increased risk for physical and psychological deconditioning. While structured exercise programs are known to be safe and improve physical and psychosocial outcomes for patients receiving chemotherapy, no programs currently exist for otherwise healthy patients. Therefore, we aimed to assess the feasibility of implementing a longitudinal, supervised exercise program within an integrated healthcare setting on the 10 South cancer ward at Roanoke Memorial Hospital. Methods: Otherwise healthy, adult patients admitted for chemotherapy with no clinical indications for physical therapy were enrolled. Patients received an initial baseline physical fitness assessment on the oncology floor, consisting of a 30-second chair stand test (30CST) and 6-minute walk test (6MWT). They then received the opportunity to participate in weekly-prescribed exercise sessions with trained exercise physiologists. Adherence to exercise prescriptions was measured using daily pedometer steps, and maintained or improved physical strength were measured by repeat 30CST and 6MWT. Constitutional symptoms were measured weekly with the Edmonton Symptom Assessment Scale. Results: Since implementation of the study in November 2018, 4 of 8 eligible subjects have been enrolled (50%). Of these patients, their ages range from 41 to 68, and primary diagnoses include acute myeloid leukemia (3) and lymphoma (1). Average initial inpatient participation is 2-3 sessions, with an average of  $3933 \pm 2223$  steps per day. Therapy has been well tolerated to date. Conclusion: An integrated, longitudinal exercise program is available on the inpatient oncology ward at RMH for cancer patients who do not qualify for physical therapy. Proof of the program's feasibility will inform future implementation of routine inpatient care for cancer patients who have adequate performance status.