# RESEARCH SYMPOSIUM
# ORAL PRESENTATIONS

**June 14th, 2018**
**7:00 – 8:15am**

**Laros Auditorium**

**St. Luke's University Health Network**

*Dental Residency*
*Emergency Medicine Residency*
*Family Medicine Residencies*
*General Surgery Residency*
*Internal Medicine Residency*
*Obstetrics & Gynecology Residency*
*Orthopedic Surgery Residency*
*Pharmacy Residency*
*Orthopedic Physical Therapy Residency*
*Podiatry Residency*

*Bariatric Fellowship*
*Cardiovascular Disease Fellowship*
*Geriatric Medicine Fellowship*
*Hospice/Palliative Care Medicine Fellowship*
*Interventional Cardiology Fellowship*
*Podiatric Dermatology Fellowship*
*Sports Medicine Fellowship*
*Surgical Critical Care Fellowship*
*Minimally Invasive Gynecology Fellowship*

**Sponsored by:**
**The Research Institute**
**Jill Stoltzfus, PhD, Director**
**Jill.Stoltzfus@sluhn.org**

# ORAL PRESENTATIONS

***Note: Residents' and fellows' names are bolded.***

1) Colonic Diverticular Disease in Polycystic Kidney Disease: Is There Really an Association?

**Rodrigo Chavez, MD;** Marcela Perez-Acosta, MD; Jill Stoltzfus, PhD; Cara Ruggeri, DO; Vikas Yellapu, MD: Ayaz Matin, MD; Kimberly Chaput, DO; Noel Martins, MD; Berhanu Geme, MD

2) ISAR Scoring in Geriatric Trauma: Exploring Clinical Outcome Correlations

**Stephen Dingley, DO;** Christine Ramirez, MD; Holly Weber; Rebecca Wilde-Onia, MSN, RN; Ann-Marie Szoke, DNP, CRNP; Adam Benton, PA-C; Danielle Bennett, PA-C; Alaa-Eldin Mira, MD; Alyssa Green, MD; Stanislaw Stawicki, MD, MBA

3) Indicators Used for Mortality Prediction in Trauma Patients: Anything is Better than Nothing, But Lactate is Best!

**Ashley Jordan, MD; WT Hillman Terzian, MD;** Thomas Wojda, MD; **Marissa Cohen, MD;** Joshua Luster, MS4; Jacqueline Seoane, MS4; Philip Salen, MD; Holly Stankewicz, DO; Elizabeth McCarthy; Stanislaw Stawicki, MD, MBA

4) The Clinical Utility of Maceration Dressings in the Treatment of Hand Infections: An Evaluation of Treatment Outcomes

**Vince Lands, MD; Ajith Malige, MD;** Kristofer Matullo, MD

5) Primary Care Movement System Screen: a Multisite, Observational Study

**Christine Kettle, DPT;** Stephen Kareha, DPT, PhD; Jenna Cornell, DPT; Neeraj Khiyani, MS

6) Does Cranberry Extract Supplementation Change the Incidence of Urinary Tract Infections Following Pelvic Reconstructive Surgery?

**Michael Ting, MD; Andrew Brown, MD;** Vincent Lucente, MD

# ORAL PRESENTATION ABSTRACT

## Colonic Diverticular Disease in Polycystic Kidney Disease: Is There Really an Association?

***Rodrigo Chavez, MD; Marcela Perez-Acosta, MD; Jill Stoltzfus, PhD; Cara Ruggeri, DO; Vikas Yellapu, MD: Ayaz Matin, MD; Kimberly Chaput, DO; Noel Martins, MD; Berhanu Geme, MD***

### Introduction/Background

Autosomal dominant polycystic kidney disease (ADPKD) is caused by mutations in polycystin and is the most common inherited renal cystic disease. Diverticulosis is reported to be more common in patients with ADPKD. Alterations in polycystin function are believed to enhance the smooth-muscle dysfunction associated with diverticulosis. However, most of these associations were initially found in small studies in the 1970s and 1980s. Other studies have found no association or are inconclusive. Our study sought to further clarify the association between ADPDK and diverticulosis.

### Methodology and Statistical Approach

After Institutional Review Board (IRB) exemption was granted, we retrospectively reviewed the National Inpatient Sample database from 2003 – 2011. Abstracted data were obtained using ICD-9 codes and included diverticulosis, diverticulitis, kidney transplant (KT), ADPKD, constipation, smoking, and use of steroids. We conducted chi-square tests and calculated unadjusted odds ratios (OR) using 2x2 tables, followed by multivariate logistic regression modeling to adjust for potential confounders.

### Results

In our database, the prevalence of diverticulosis was 2.3%, and 35% of patients with diverticulosis developed diverticulitis, for a prevalence of 0.8% in the general population. In patients with ADPKD, the prevalence of diverticulosis increased to 4.4% when compared to the general population [unadjusted OR = 1.9, 95% confidence interval (CI) 1.95 – 2.02, $p < .0001$], while the prevalence of diverticulitis increased to 1.4% (unadjusted OR = 1.78, 95% CI 1.72 – 1.83, $p < .0001$) Table 1 presents these findings.

Since many patients with ADPKD require KT, we also evaluated diverticular disease in patients with KT. Both diverticulosis and diverticulitis were more prevalent in patients with ADPKD (4.1% for diverticulosis, unadjusted OR = 2.47, 95% CI 2.26 – 2.71, $p < .0001$; and 1.2% for diverticulitis, unadjusted OR = 2.80, 95% CI 2.38 – 3.30, $p < .0001$). Table 2 presents these findings.

In multivariate logistic regression analysis, ADPKD had the second highest adjusted OR for diverticulosis (1.9, 95% CI 1.88 – 1.95), with constipation having the highest adjusted OR of 2.4 (95% CI 2.40 – 2.42), although the Hosmer and Lemeshow test indicated poor model fit.

### Discussion and Conclusion

This is the largest study demonstrating an increased prevalence of diverticulosis in patients with ADPKD. Since the presence of diverticulosis is the sine qua non condition required for diverticulitis, it is important to be aware of the high prevalence of diverticulosis in patients with ADPKD. In particular, diverticulitis progressing to perforation in patients with KT can have devastating consequences. Limitations of this study include its retrospective nature and the poor fit model in the multivariate logistic regression analysis.

**Table 1**

| **Prevalence of Diverticular Disease in the General Population** | | | |
|---|---|---|---|
| | ***Cases*** | ***Percentage*** | ***Total Admissions*** |
| Diverticulosis in the general population | 8009915 | 2.3 | 351957482 |
| Diverticulitis in the general population | 2830268 | 0.8 | 351957482 |
| Diverticulosis in patients with ADPKD | 13022 | 4.4 | 294453 |
| Diverticulitis in patients with ADPKD | 4193 | 1.4 | 294453 |

**Table 2**

| **Prevalence of Diverticular Disease in Patients with Kidney Transplant** | | | |
|---|---|---|---|
| | ***Cases*** | ***Percentage*** | ***Total Admissions*** |
| Diverticulosis in patients with kidney transplant | 8760 | 1.7 | 507717 |
| Diverticulitis in patients with kidney transplant | 2205 | 0.4 | 507717 |
| Diverticulosis in patients with kidney transplant and ADPKD | 535 | 4.1 | 12825 |
| Diverticulitis in patients with kidney transplant and ADPKD | 155 | 1.2 | 12825 |

# ORAL PRESENTATION ABSTRACT

## ISAR Scoring in Geriatric Trauma: Exploring Clinical Outcome Correlations

***Stephen Dingley, DO; Christine Ramirez, MD; Holly Weber; Rebecca Wilde-Onia, MSN, RN; Ann-Marie Szoke, DNP, CRNP; Adam Benton, PA-C; Danielle Bennett, PA-C; Alaa-Eldin Mira, MD; Alyssa Green, MD; Stanislaw Stawicki, MD, MBA***

### Introduction/Background

The "identification of seniors at risk" (ISAR) score is a clinical screening tool developed for use in the emergency department. Since its introduction, ISAR has been shown to correlate with elevated six-month risk of death, functional decline, need for discharge to a nursing facility, and readmissions. The purpose of the current study was to explore the applicability of ISAR to elderly (age ≥ 65 years) trauma patients. We hypothesized that increasing ISAR scores would correlate with 30-day mortality, discharge destination, and patients' functional outcomes at our Level 1 Trauma Center (L1TC).

### Methodology and Statistical Approach

In this retrospective study, we analyzed clinical data for all geriatric patients who presented to our L1TC and underwent complete ISAR screening between August 2013 and December 2017. In addition to the ISAR score and 30-day mortality (our primary outcome), abstracted variables included patient demographics (age and gender), mechanism of injury, injury severity score (ISS), Glasgow Coma Scale (GCS), hospital/intensive care/step-down lengths of stay, all-cause morbidity, functional independence measures (FIM) on discharge, and discharge to facility. ISAR was stratified into 4 tiers: 0 = "lowest", 1-2 = "mild", 3-4 = "moderate", and 5+ = "highest". Estimates of ISAR's effects on outcome variables were adjusted for age, gender, GCS, and ISS using analysis of covariance (ANCOVA). Data were reported as frequencies, means with standard deviation, or medians with interquartile ranges (IQR), as appropriate. Statistical significance was set at $\alpha = .05$.

### Results

A total of 1,030 patients met out inclusion criteria. Median patient age was 80.1 (IQR 74 – 92) years, with 58% being female, 99% having blunt mechanism, and median ISS of 9 (IQR 4 –10). Overall, increasing ISAR scores were associated with greater 30-day mortality, substantially increased all-cause morbidity, longer hospital and ICU stays, lower FIM score on discharge, and decreased percentage of patients discharge to home ($p < .001$, Table 1).

**Table 1**: **Key Clinical Outcomes Stratified by Pre-Defined ISAR Tiers**

| Outcome Category | ISAR 0 (n=77) | ISAR 1-2 (n=489) | ISAR 3-4 (n=382) | ISAR 5+ (n=82) | P-value |
|---|---|---|---|---|---|
| Mortality (30-day) | 0.2% | 1.8% | 1.3% | 1.3% | < .002 |
| Morbidity (all cause) | 2.6% | 7.6% | 14.7% | 7.3% | < .001 |
| Hospital LOS (days) | 3.1±0.5 | 4.6±0.2 | 5.1±0.2 | 4.3±0.5 | < .001 |
| ICU LOS (days) | 0.37±0.15 | 0.64±0.11 | 0.81±0.13 | 0.67±0.27 | < .001 |
| FIM Score (discharge) | 18.5 | 17.1 | 15.8 | 14.4 | < .001 |
| Discharge to facility | 29.8% | 58.9% | 72.1% | 78.8% | < .001 |

**Statistical adjustments were made for age, gender, GCS, and ISS.*

## Discussion and Conclusion

This is the first large-sample study examining the relationship between ISAR score and outcomes in geriatric trauma patients. We found that increasing ISAR was associated with greater mortality and morbidity, longer hospital/ICU stays, lower functional outcome at discharge, and decreasing proportion of patients discharged directly to home. Further investigation of ISAR's utility in the setting of geriatric trauma is warranted.

# ORAL PRESENTATION ABSTRACT

## Indicators Used for Mortality Prediction in Trauma Patients: Anything is Better than Nothing, But Lactate is Best!

***Ashley Jordan, MD; William Terzian, MD; Thomas Wojda, MD; Marissa Cohen, MD; Joshua Luster, MS4; Jacqueline Seoane, MS4; Philip Salen, MD; Holly Stankewicz, DO; Elizabeth McCarthy; Stanislaw Stawicki, MD, MBA***

### Introduction/Background

Mortality prediction in trauma is challenging. Unexpected deaths continue despite improved understanding of pathophysiology and management of trauma-related shock. Several laboratory variables have been evaluated for their ability to quantitate mortality risk in injured patients. Popular indicators of physiologic stress include serum bicarbonate, anion gap (AG), base deficit (BD), and lactate. The aim of this study was to compare the utility and predictive value of each of these variables in a large subset of trauma patients.

### Methodology and Statistical Approach

After Institutional Review Board (IRB) approval, we queried patient records from our Level 1Trauma Center registry. Variables included patient sex, age, injury severity score (ISS), Glasgow Coma Scale (GCS), mortality, and initial laboratory assessments. Our primary outcome was 30-day mortality, and we analyzed the impact of stratified AG ($\leq$ 3, 6, 9, etc); BD ($\geq$ 16, 12, 8, etc); serum bicarbonate ($\leq$ 10, 14, 18, etc); and lactate ($\leq$ 1, 2, 3, etc) on 30-day mortality. Additionally, we assessed the ability of these variables to predict mortality using receiver operating characteristic (ROC) curves and employing DeLong methodology. Data were reported as mean ± standard deviation (SD) or median with interquartile range (IQR). Area under the curve (AUC) values were reported as area ± standard error (SE). Statistical significance was set at $\alpha < .01$.

### Results

Our study included 2,811 patients, of whom 70% were male with a median age of 44 years (IQR 26 – 58 years). Median ISS was 9 (IQR 4 –16), with an overall mortality rate of 5%. Descriptive characteristics of laboratory values are as follows: mean serum lactate = 2.83 ± 2.51 (n = 371); mean BD = 1.27 ± 5.01 (n = 1,167); mean serum bicarbonate = 24.80 ± 5.29 (n = 2,165); and anion gap = 11.20 ± 6.80 (n = 2,128). Mortality increased significantly with escalating physiologic stress; serum lactate was the best predictor of mortality (AUC = .75 ± .04 SE), followed by BD (.72 ± .03), serum bicarbonate (.68 ± .03), and AG (.66 ± .03).

### Discussion and Conclusion

All of the variables examined demonstrated predictive value for trauma-related mortality; however, initial serum lactate and BD were superior to serum bicarbonate and AG. Our data indicates that initial serum lactates $\geq$ 3 are associated with doubling of mortality, while lactates $\geq$ 7 more than quadruple baseline mortality. For BD, mortality increased from < 5% for BD < 4 to > 40% for BD > 16. Trauma practitioners should consider serum lactate and BD as the primary assessment options for mortality risk estimation.

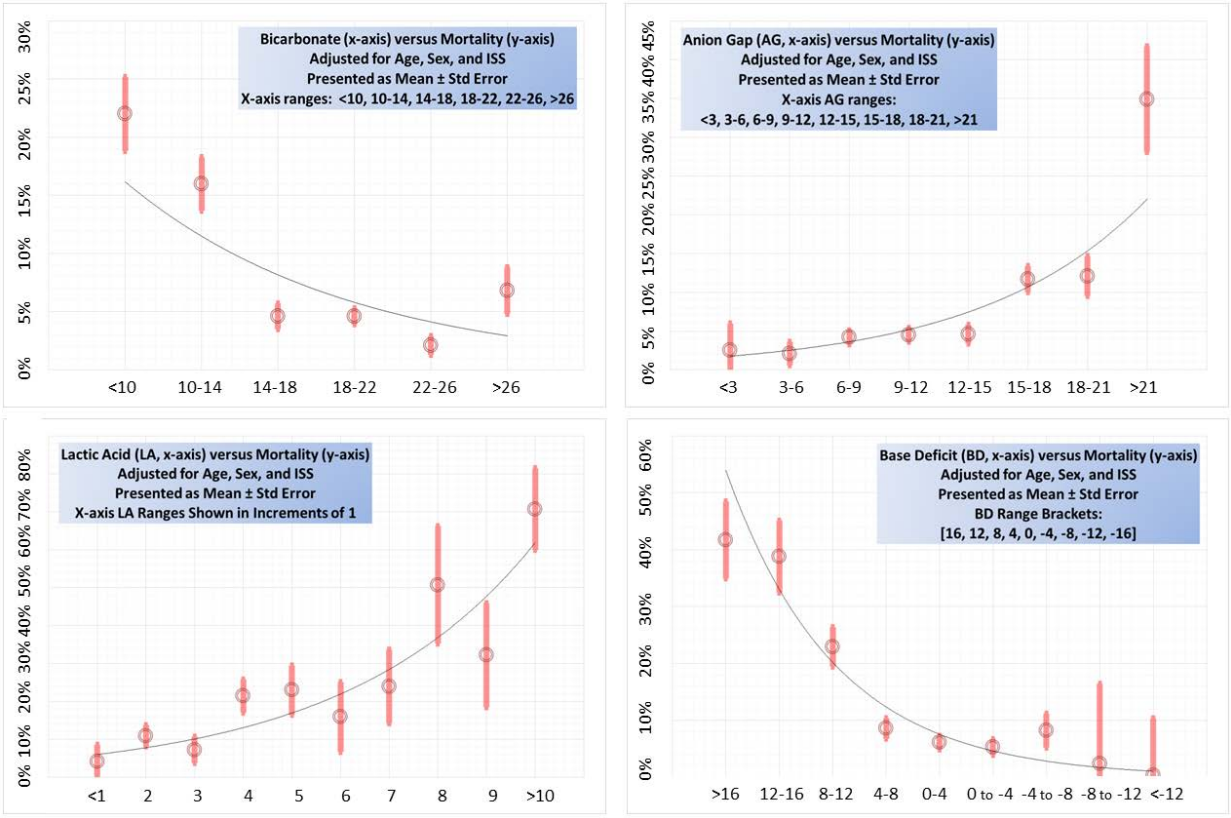


**Figure 1**. Primary study results shown as mean ± standard error (SE) by each respective endpoint, including an exponential trend line (thin black line); [top left] bicarbonate; [top right] anion gap; [bottom left] lactic acid; [bottom right] base deficit (x-axis shown in reverse order)

# ORAL PRESENTATION ABSTRACT

## The Clinical Utility of Maceration Dressings in the Treatment of Hand Infections: An Evaluation of Treatment Outcomes

*Vince Lands, MD; Ajith Malige, MD; Kristofer Matullo, MD*

### Introduction/Background

Maceration dressings have been documented previously in wound management treatment for diabetic skin ulcerations, perioperative wound complications, and gangrenous tissue. However, there are no documented studies evaluating the clinical utility of these dressings in the treatment of hand infections. This study sought to validate the authors' hypothesis that using a maceration dressing would significantly improve hand infection treatment and clinical course due to increased vasodilatory effect, as well decrease infection eradication time.

### Methodology and Statistical Approach

We conducted a prospective, randomized controlled trial centered at a single suburban hospital and recruited all patients 18 years or older who presented with a primary hand infection. Patients were randomized to either the control group (intravenous antibiotics, aqua K pad, and standard dressing) or the maceration dressing group (intravenous antibiotics, damp gauze, webril, aqua K pad, and standard dressing). All patients were followed throughout their clinical course to determine response to their dressing, with patients either being transitioned to oral antibiotics after significant improvement or being taken to the operating room for formal incision and drainage with debridement if they became unstable or did not clinically improve after 72 hours. We used Student's t tests and Fisher's exact tests to analyze our data.

### Results

A total of 25 patients gave informed consent for study inclusion; 12 patients were randomized to receive maceration dressing, and 13 were randomized to standard infection dressing as controls. Maceration dressing patients had a significantly shorter duration of required intravenous antibiotics to improve their clinical picture (median = 24 hours) compared to controls (median = 48 hours) ($p = .03$). Maceration dressing patients also experienced significantly shorter hospital length of stay (median = 2.5 days) compared to controls (median = 3.0 days) ($p = .05$). There was no significant between-group difference in preventing the need for formal incision and drainage in the operating room due to an unstable or non-improving clinical picture (16.7% for maceration dressing versus 30.7%, for no dressing, $p = .64$). Finally, there was no significant difference in infection recurrence rates between the maceration dressing (0%) and control groups (0% versus 23.1%, respectively, $p = .22$).

### Discussion and Conclusion

Maceration dressing significantly decreased the amount of intravenous antibiotic time and hospital length of stay, but it did not significantly affect infection clearance rates, the need for formal incision and drainage, or infection recurrence.

# ORAL PRESENTATION ABSTRACT

## Primary Care Movement System Screen: a Multisite, Observational Study

*Christine Kettle, DPT; Stephen Kareha, DPT, PhD; Jenna Cornell, DPT; Neeraj Khiyani, MS*

### Introduction/Background

Movement of the human body is essential for allowing individuals to interact with their environment. The prevalence of movement system disorders is currently unknown, and there are no screening methods to appropriately detect these disorders. An easy to use and reliable screening tool would facilitate earlier initiation of treatment, which could prevent the transition of acute movement system disorders to chronic conditions and subsequently improve both patient care and unnecessary medical expenses.

The primary aim of our study was to evaluate whether a screening tool used in the primary care setting could accurately identify patients with movement system disorders. The secondary aim was to understand why people do not discuss these problems with their primary care physician.

### Methodology and Statistical Approach

We developed a screening tool to assess whether patients with movement system disorders could be accurately identified in the primary care setting, using data from a previously conducted pilot study that identified the prevalence of movement system disorders in the primary care setting. Based on these data, we required a minimum sample size of 998 to achieve power $(1 - \beta)$ of 80% and $\alpha = .05$. Patients in selected primary care offices were asked to fill out a brief survey, which were then analyzed to identify the prevalence of movement system disorders. We entered and stored data in REDCap, a secure data capture system. We conducted multivariate logistic regression to explore the relationship of co-morbidities with movement system disorders. We also applied a qualitative approach utilizing a thematic analysis to determine why patients do not discuss these issues with their primary care provider.

### Results

A total of 385 participants were included in our study (mean age $\pm$ standard deviation = $49.8 \pm 16.5$), with 75.9% of patients having a movement system disorders. Sensitivity of our screening question was 0.72. From a sub-sample of 104 participants with complete data for comorbidities, multivariate logistic regression revealed a trend toward significant prediction of movement system disorders for gastrointestinal esophageal reflux disorder (GERD) ($p = .08$). Finally, based on our thematic analysis of 102 participants who did not discuss this issue with their primary care physician, the three most prevalent themes were reduced access to health care, perceived lack of importance of the problem; and the fact that it was a new condition.

**Discussion and Conclusion**

Our screening question's sensitivity for movement systems disorders was acceptable. If physicians are able to identify predictors and factors associated with movement system disorders, they may be able to screen for this outcome more effectively. In addition, earlier identification of movement system disorders may facilitate earlier treatment and therefore prevent costs associated with resulting chronic disorders.

# ORAL PRESENTATION ABSTRACT

## Does Cranberry Extract Supplementation Change the Incidence of Urinary Tract Infections Following Pelvic Reconstructive Surgery?

*Michael Ting, MD; Andrew Brown, MD; Vincent Lucente, MD*

### Introduction/Background

Urinary tract infections (UTIs) are common complications after gynecologic surgery. Amongst patients undergoing pelvic floor and anti-incontinence surgery, 10-64% developed a postoperative UTI. Cranberry extract has been shown in previous studies to decrease the risk of UTIs after general gynecologic surgery. We sought to determine if supplementation with cranberry extract in the immediate postoperative period reduced the risk of UTI in patients undergoing pelvic reconstructive and anti-incontinence surgery.

### Methodology and Statistical Approach

This was a retrospective cohort study approved by our Institutional Review Board (IRB). The study population included all patients who underwent anti-incontinence surgery and pelvic reconstructive surgery with or without a concomitant mid-urethral sling during two six-month intervals. Two patient groups were compared; the first group received standard postoperative instructions, while the second group was asked to take six weeks of postoperative cranberry supplementation in addition to receiving standard of care. All outpatient and hospital charts were retrospectively reviewed for demographics, perioperative data, and urine cultures up to six weeks postoperatively. A UTI was defined as a positive urine culture or urinary symptoms treated with antibiotics after evaluation by a physician. We compared the two cohorts on an intention-to-treat basis using chi-square tests.

### Results

A total of 560 patients were evaluated; 287 patients with postoperative cranberry extract supplementation and 273 receiving only postoperative standard of care. The two cohorts were similar regarding age, BMI, menopausal status, race, history of recurrent UTIs, procedures performed, surgical complications, and postoperative urinary retention requiring the placement of an indwelling catheter. There were statistically significant but minor differences between the supplementation and non-supplementation groups in age (63.2 years versus 65.2 years, respectively, $p = .05$) and self-reported sexual activity (49.1% versus 40.3% respectively, $p = .04$). However, the incidence of postoperative UTI was not significantly different between groups (8.4% versus 7.7%, respectively, $p = .77$)

### Discussion and Conclusion

Postoperative supplementation with cranberry extract did not reduce the incidence of UTIs after anti-incontinence and pelvic reconstructive surgery. This finding is contrary to more recent literature suggesting a benefit with cranberry supplementation after general gynecologic surgery. We attribute our low postoperative UTI rate to the utilization of a chlorohexidine vaginal prep before surgery and an aggressive bladder retraining protocol to prevent unnecessary catheterizations. Although cranberry extract may provide some protection from the development of UTIs, a larger sample size may be needed to detect a potential benefit in our patient population.

# ACKNOWLEDGEMENTS

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- Residency and fellowship program directors, attending physicians, and program coordinators
- Drs. Sanjiv Agarwala, Maher El Chaar, and Kathy Dave, Research Symposium judges
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- Ms. Dania Mosquera, Research Integration Coordinator
- Ms. Jayne Silva, Institutional Review Board (IRB) Administrative Coordinator
- Dr. Joel Rosenfeld, Chief Academic Officer, and Dr. James P. Orlando, Associate Chief Academic Officer
- Dr. Jim Anasti, Director of Student Activities, Temple University/SLUHN School of Medicine

# RESEARCH SYMPOSIUM
# POSTER PRESENTATIONS

**June 14th, 2018**
**9:45 – 10:45am**

**Education Center Room 101**

**St. Luke's University Health Network**

*Dental Residency*
*Emergency Medicine Residency*
*Family Medicine Residencies*
*General Surgery Residency*
*Internal Medicine Residency*
*Obstetrics & Gynecology Residency*
*Orthopedic Surgery Residency*
*Pharmacy Residency*
*Orthopedic Physical Therapy Residency*
*Podiatry Residency*

*Bariatric Fellowship*
*Cardiovascular Disease Fellowship*
*Geriatric Medicine Fellowship*
*Hospice/Palliative Care Medicine Fellowship*
*Interventional Cardiology Fellowship*
*Podiatric Dermatology Fellowship*
*Sports Medicine Fellowship*
*Surgical Critical Care Fellowship*
*Minimally Invasive Gynecology Fellowship*

**Sponsored by:**
**The Research Institute**
**Jill Stoltzfus, PhD, Director**
**Jill.Stoltzfus@sluhn.org**

# POSTER PRESENTATIONS

***Note: Residents' and fellows' names are bolded.***

1) Fascia Iliaca Block for Peritrochanteric Femur Fractures: Can It Reduce Immediate Post-Operative Narcotic Usage?

**Anshul Agarwala, MD; Shane McGowan; MD;** Matt Rae, MD; Christopher Roscher, MD; Chinenye Nwachuku, MD

2) The Impact of Continuity on Breastfeeding Rates

**Brianne Allerton, DO**; Diane Jacobetz, MD; Andrew Goodbred, MD; **Brittany Kuperavage, DO**; Yamini Kathari, MS4

3) Maternity Complications in Women with Hypertrophic Cardiomyopathy

**Rasha Aurshiya, MD;** Amitoj Singh, MD; Srilakshmi Vallabhaneni, MD; Afsha Aurshina, MBBS; Jamshid Shirani, MD

4) Syncope Management and Cost Analysis

**Patrick Callaghan, DO; Matthew Carey, DO; Hesham Tayel , MD; Hussam Tayel, MD;** Vikas Yellapu, MD; Nora Ko, MS3; Cara Ruggeri, DO; Justin Psaila, MD

5) Echocardiographic Findings in 102 Centenarians

**Bhavin Dumaswala, MD;** Kunal Bhagatwala, MD; Komal Dumaswala, MD; Jamshid Shirani, MD

6) The Effect of Oral Anticoagulation Agents on Hemoglobin Levels in Reproductive Age Women

**Aaron Herrera Gonzalez, MD;** Alexandra Stough, MS; Danica Palacio, MS; **Vijay Palvia, MD;** James Anasti, MD

7) Face to Name

**Devyn Graham, DO; Heather Krasa, DO;** Cara Ruggeri, DO; **Ben Veres, DO**

8) Bone Markers in Charcot Neuroarthropathy

**Brandy Grahn, DPM;** Brent Bernstein, DPM

# POSTER PRESENTATIONS

***Note: Residents' and fellows' names are bolded.***

9) Sonographic Assessment of Optic Nerve for Evaluation of Sports Associated Concussion

**Adam Kobialka, DO; Peter Murphy, DO;** Maheep Vikram, MD; Celestine Nnaeto, MD

10) Readmission Rates in Anemic Patients Undergoing Knee and Hip Surgeries

**Andrew Konopitski, MD;** Vikas Yellapu, MD; Nora KO, MS3; **Anshul Agarwala, MD**

11) Comparing Shoulder and Cervical Spine Surgical Intervention in Shoulder Pain

**Ajith Malige, MD;** Paul Morton, MD; Gbolabo Sokunbi, MD

12) A Double Blind Randomized Controlled Equivalence Study Comparing Intra-Articular Corticosteroid to Intra-Articular Ketorolac Injections for Osteoarthritis of the Knee

**Shane McGowan, MD;** Paul Morton, MD; William Rodriguez, MS3; Vikas Yellapu, MD; Tim Visser, MS4; Gregory Carolan, MD

13) Quality Improvement of Asthma Symptom Control Documentation

**Margaret Mintus, DO; Eginia Franco, MD; Satinderpal Kaur, MD; Piotr Zembzruski, MD; Abby Rhoads, DO; Elspeth Black, MD**

14) Provider Prescription Patterns for Acute Sinusitis: a Call for Antibiotic Stewardship in the Outpatient Setting

**Priya Patel, MD;** Thomas Wojda, MD; **Pradeep Patel, MD;** Derek Tang, MS3; Eugene Decker, DO

15) Acute Bronchitis: Prescription Patterns of Healthcare Providers in an Outpatient Clinic

**Sidra Sindhu, DO;** Thomas Wojda, MD; **Naffie Ceesay, MD;** Chris Michel, MS4; Jessica Smith, MS3; Eugene Decker, DO

16) Impact of Having a Multidisciplinary Team in Nursing Homes to Improve Psychotropic Medication Prescribing Practices

**Hemlata Singh, MD; Emelia Perez, MD;** Alaa-Eldin Mira, MD; William Kuehner, MD; Lou Czechowski, RPh

# POSTER PRESENTATIONS

***Note: Residents' and fellows' names are bolded.***

17) Body Mass Index in Trauma Patients: Relationships between Obesity and Injury Patterns

**WT Hillman Terzian, MD;** Alyssa Green, MD; Franz Yanagawa, MD**; Ashley Jordan, MD;** Thomas Wojda, MD; Elizabeth McCarthy; Jacqueline Seoane, MS4; Colleen Taylor, MS4; Brian Hoey, MD; William Hoff, MD; Stanislaw Stawicki, MD, MBA

18) A Comparison between Laparoscopic and Robotic Hysterectomy in Obese Patients: Effect on Cost, Operating Time, and Estimated Blood Loss

**Jessica Ton, MD**

19) Clinical Significance of Paradoxical Hypotension during Dobutamine Stress Testing

**Srilakshmi Vallabhaneni, MD; Matthew Carey, DO; Rasha Aurshiya, MD;** Jamshid Shirani, MD

20) Radiographic Parameters Associated with Acromial Stress Fractures after Reverse Total Shoulder Arthroplasty

**Shawn Yeazell, MD; Ajith Malige, MD;** Hannah Milthorpe, MS3; Gregoray Carolan, MD

***Medical Student Poster***

1) Epidural Ketamine Infusion for Pain Management in Trauma Patients with Rib Fracture

**Emily Du, MS4;** Heather Alban, MSN; Alyssa Green, MD

# POSTER PRESENTATION ABSTRACT

## Fascia Iliaca Block for Peritrochanteric Femur Fractures: Can It Reduce Immediate Post-Operative Narcotic Usage?

*Anshul Agarwala, MD; Shane McGowan; MD; Matt Rae, MS; Christopher Roscher, MD; Chinenye Nwachuku, MD*

### Introduction/Background

Regional blocks have been shown to be effective adjuncts or even alternatives to postoperative narcotics. The goal of this study was to evaluate the effectiveness of the fascia iliaca block (FIB) as a mode of pain control for peritrochanteric fracture care, particularly as a tool to help reduce the amount of narcotic medication required in the immediate postoperative period.

### Methodology and Statistical Approach

We conducted a prospective, randomized, double blind study with 59 consecutive closed peritrochanteric fracture patients > 18 years of age who underwent fixation for peritrochanteric femur fracture from August 2016 to February 2018 at a single center. One group received preoperative ropivacaine FIB, and the other received saline. Patient data were reviewed for narcotic use at 1, 6, 12, and 24 hours postoperatively. Medication was administered in the postoperative period using a hospital specific order set with outcomes for a patient-reported pain scale (0 – 10) taken every 4 hours by nursing staff. We conducted repeated measures analysis of variance (ANOVA) with the between-groups factor of treatment assignment in order to determine the magnitude of change in postoperative narcotic usage over time.

### Results

Of the 59 patients randomized, 17 were saline, 24 were ropivacaine, and 18 were enlisted but did not receive FIB due to anesthesia staffing limitations. Postoperative narcotic use was measured in standardized morphine equivalents. At 1 hour postoperatively, saline versus ropivacaine blockade showed a morphine equivalent median and range of 5.0 (0 – 12.5) versus 0 (0 – 26.8); at 6 hours, median and range was 8.8 (0 – 17.5) versus 2.5 (0 – 35.1); at 12 hours, median and range was 10.0 (0 – 20.9) versus 2.5 (0 – 40.1); and at 24 hours, median and range was 10.0 (0 – 24.2) versus 5.5 (0 – 47.6). The group that did not receive a block showed morphine equivalent medians and ranges at 1, 6, 12, and 24 hours of 0 (0 – 15.4), 5.2 (0 – 21.7), 6.6 (0 – 26.7), and 13.8 (0 – 38.4), respectively. Results revealed a statistically significant effect only for time, meaning the amount of narcotic usage increased from 1 hour to 24 hours postoperatively across all 3 groups ($p < .0001$). However, the magnitude of change between groups over time (measured by the group*time interaction) was not significant ($p = 0.15$), indicating that changes in narcotic use over time did not differ based on group assignment.

### Discussion and Conclusion

In our study, the use of FIB for peritrochanteric fractures did not demonstrate a difference in narcotic usage in the immediate postoperative period between ropivacaine and saline groups. However, there was a noted trend towards increased narcotic usage at 24 hours in the group that did not undergo the procedure.

# POSTER PRESENTATION ABSTRACT

## The Impact of Continuity on Breastfeeding Rates

***Brianne Allerton, DO; Diane Jacobetz, MD; Andrew Goodbred, MD; Brittany Kuperavage, DO; Yamini Kathari, MS4***

### Introduction/Background

There are numerous factors that influence a mother's decision to breastfeed her newborn, including her physician's opinion and information provided prenatally about breastfeeding and formula-feeding; family support; and employment considerations, among other factors. Physicians are able to impact a mother's decision to breastfeed or formula feed by starting the conversation about the benefits of breastfeeding early in the pregnancy. This relationship is well developed between family medicine physicians and their patients and may result in higher rates of breastfeeding among their female patients, compared to the rates of breastfeeding in women receiving their prenatal care from obstetricians and subsequent follow up of the infant with a different physician. Our study sought to clarify differences in breastfeeding rates based on the above considerations.

### Methodology and Statistical Approach

This retrospective chart review included mothers who received their prenatal care at the St. Luke's Family Medicine Center or in the Obstetrics department of the St. Luke's University Health Network. Data were collected using REDCap and analyzed with separate chi-square tests at each of the following time points: two weeks, six weeks, six months, and one year.

### Results

Breastfeeding rates in patients seen by family physicians were 71.4% at two weeks, 63.6% at six weeks, 53.5% at six months, and 56.4% at one year. Breastfeeding rates in patients seen by obstetricians were 29.6% at two weeks, 14.8% at six weeks, 14.6% at six months, and 13.2% at one year. The above differences between patients seen by family physicians versus obstetricians were statistically significant ($p < .0001$).

### Discussion and Conclusion

Our study findings will be helpful in developing better methods of encouraging mothers to breastfeed. Since our study was conducted prior to implementation of the St. Luke's Baby and Me initiative, it would be valuable to assess rates of breastfeeding after this program's implementation. St. Luke's Baby and Me promotes breastfeeding, rooming-in and skin-to-skin contact through education, teaching, and support for mothers, newborns, and families. While similar to the Baby Friendly Hospital designation, it includes modifications that allow families to make informed decisions that are respected and supported by their physicians and healthcare team.

# POSTER PRESENTATION ABSTRACT

## Maternity Complications in Women with Hypertrophic Cardiomyopathy

*Rasha Aurshiya, MD; Amitoj Singh, MD; Srilakshmi Vallabhaneni, MD;*
*Afsha Aurshina, MBBS; Jamshid Shirani, MD*

### Introduction/Background

There is increased risk of death and adverse cardiovascular outcomes in women with hypertrophic cardiomyopathy (HCM) during childbirth. However, data are scarce and limited to small number of patients reported from large tertiary care centers. We aimed to examine the maternal cardiovascular and obstetric outcomes of childbirth in women with HCM in the United States.

### Methodology and Statistical Approach

Our retrospective study population consisted of 422 mothers with HCM (age 29 ± 6 years, 53% Caucasian) admitted to a hospital for childbirth from 2003-2011 according to Nationwide Inpatient Sample database. We analyzed these data descriptively.

### Results

In 58% of mothers, the mode of delivery was Cesarean section (CS), and mean length of stay was 5 ± 9 days. No maternal mortality was reported, and serious cardiovascular complications were uncommon, including cardiac arrest [n = 5 (1.1%)], cardiogenic shock [n = 5 (1.1%)], and ventricular tachycardia [n = 20 (4.6%)]. Cardiopulmonary resuscitation, mechanical circulatory support (other than balloon counterpulsation), and temporary venous pacemakers were each required in 5 women (1.1%), while 14 (3.4%) needed mechanical ventilation. Acute respiratory distress syndrome, deep vein thrombosis, and acute renal failure were each reported in 5 women (1.1%). Obstetric complications included abruption placenta [n = 28 (7%)], preterm labor [n = 89 (21%)], premature rupture of membranes [n = 20 (5%)], pre-eclampsia/eclampsia [n = 19 (4.5%)], and gestational hypertension [n = 10 (2.3%)]. Postpartum hemorrhage occurred in 3.3% of patients, and maternal blood transfusion was needed in 5.8%. Labor was obstructed in 2.3% of patients, and 32% of vaginal deliveries required instrument assistance. Although there was no fetal mortality, fetal distress, abnormal fetal heart rate, and fetal growth retardation occurred in 15%, 14%, and 3.6%, respectively. Overall, 23% and 40% of patients suffered at least one adverse cardiovascular or obstetric complication, respectively.

### Discussion and Conclusion

The predominant mode of delivery for pregnant hypertrophic cardiomyopathy patients in the United States has been Cesarean section (CS). Although there is remarkably low maternal and fetal mortality in these patients, obstetric complications occur in ~40%. In contrast, maternal cardiovascular complications are relatively low. Large multicenter trials or registries must be initiated to further clarify these findings.

**Table 1: Baseline Demographic and Clinical Characteristics of Patients with HCM**

| Variable | Mean ± Standard Deviation or % |
|---|---|
| Age, years | 29.3 ± 5.7 |
| Hypertension | 2.4% |
| Diabetes | 2.4% |
| Hyperlipidemia | 0 |
| Smoking | 1.2% |
| Obesity | 2.4% |
| Morbid obesity | 1.1% |
| Coronary artery disease | 0.7% |
| Chronic congestive heart failure | 0 |
| Liver disease | 2.6% |
| Chronic kidney disease | 1.2% |
| Hypothyroidism | 3.8% |
| Fluid and electrolyte abnormalities | 6.5% |
| Chronic obstructive pulmonary disease | 4% |
| Coagulopathy | 4.8% |

**Table 2: Obstetric and Fetal Complications in Patients with HCM**

| Variable | % |
|---|---|
| **Mode of Delivery** | |
| Vaginal | 43.7% |
| Caesarian section | 56.3% |
| **Obstetric Complications** | |
| Maternal mortality* | 0 |
| Antepartum hemorrhage*<br>*Placenta previa*<br>*Abruption or vasaprevia* | 6.7%<br>0<br>6.7% |
| Postpartum hemorrhage* | 3.3% |
| Need for blood transfusion* | 5.8% |
| Gestational hypertension* | 2.3% |
| Preeclampsia / eclampsia* | 4.5% |
| Preterm / threatened labor | 21.2% |
| Premature rupture of membranes | 4.6% |
| Chorioamnionitis | 0 |
| Obstructed labor* | 2.3% |
| Obstetric/ delivery related trauma | 21.6% |
| Malpresentation* | 9.7% |
| Thromboembolic disease<br>Antepartum/postpartum deep vein thrombosis<br>Pulmonary embolism | 1.1%<br>1.1%<br>0 |

| | |
|---|---|
| Acute renal failure | 1.1% |
| **Assisted Vaginal Delivery** | |
| Forceps | 6% |
| Vacuum | 8% |
| Failed forceps/ vacuum* | 1.1% |
| **Fetal Complications** | |
| Still birth/ fetal mortality* | 0 |
| Fetal distress* | 15.1% |
| Fetal growth retardation* | 3.6% |
| Abnormal fetal heart rate | 14.2% |
| Any MOFC | 40% |

*MOFC= major obstetric-fetal complication= patient with any of the (*) complications*

**Table 3: Maternal Complications, Length of Stay and Disposition**

| Complication | % |
|---|---|
| **Cardiovascular** | |
| Death | 0 |
| Cardiac arrest | 1.1% |
| Cardiogenic shock | 1.1% |
| Acute congestive heart failure<br>*Systolic*<br>*Diastolic* | 0<br>0<br>0 |
| Cardiopulmonary resuscitation | 1.1% |
| Mechanical circulatory support (MCS)<br>*Intra-aortic balloon pump*<br>*Other MCS devices* | 1.1%<br>0<br>1.1% |
| Atrial arrhythmias | 0 |
| Ventricular tachycardia | 4.6% |
| Implantable cardioverter defibrillator | 1.1% |
| Pacemaker implantation<br>*Temporary*<br>*Permanent* | 1.1%<br>1.1%<br>0 |
| Acute stroke | 0 |
| **Pulmonary** | |
| Acute respiratory distress syndrome | 1.1% |
| Mechanical ventilation | 3.4% |
| **Discharge and Length of stay** | |
| Length of stay > 4 days | 21.8% |
| Discharge to facility other than home | 1.1% |
| Any major Adverse Event (AE) | 22.9% |

*MAE= death + long length of stay (> 4 days) + acute congestive heart failure + cardiogenic shock + acute stroke + discharge to facility other than home*

# POSTER PRESENTATION ABSTRACT

## Syncope Management and Cost Analysis

***Patrick Callaghan, DO; Matthew Carey, DO; Hesham Tayel, MD; Hussam Tayel, MD; Vikas Yellapu, MD; Nora Ko, MS3; Cara Ruggeri, DO; Justin Psaila, MD***

### Introduction/Background

Syncope comprises nearly 1-3% of ED visits and nearly 6% of all inpatient admissions. Lifetime prevalence of syncope in the general population is close to 20%. The presenting symptoms are frequently vague, leading to extensive testing with low diagnostic yield and significant costs. Costs incurred by syncope admission have been as high as $2.4 billion per year. This quality improvement project aimed to review the cost of evaluation for patients admitted to St. Luke's Bethlehem University Hospital with a diagnosis of syncope. Ultimately, these data will be used to improve resource utilization in diagnosing and treating syncope.

### Methodology and Statistical Approach

This was a retrospective cohort study of data from 2015 – 2017. Using electronic medical records from EPIC, we identified patients who were admitted to the observation department from the ED with syncope as the primary diagnosis. Using billing and procedures codes, we identified the diagnostic tests performed for each admission. Using the San Francisco Syncope Rule, patients were stratified into high and low risk categories. If patients had any of the following, they were considered high risk (score > 1): shortness of breath, congestive heart failure, EKG abnormalities at admission, or systolic blood pressure < 90 mmHg at admission. Otherwise, patients were considered low risk (score = 0), as this test has a negative predictive value (NPV) of 99%, meaning low-risk patients do not require further diagnostic assessment. We used chi-square analysis to identify associations between patient groups (low risk versus high risk) and diagnostic test results, and the Student's t-test for identifying differences in mean costs incurred during admission.

### Results

We reviewed 197 cases of syncope (98 low risk, 99 high risk). We compared the number of echocardiograms, head CT scans, telemetry monitoring, carotid ultrasounds, and MRIs received by patients in each group.

Chi square testing revealed no significant differences between low-risk and high-risk groups.

| **Diagnostic Test** | **Low Risk** | **High Risk** | **$\chi 2$ p-value** |
|---|---|---|---|
| CT Head | 63 | 52 | 0.063 |
| CT Head and Neck | 6 | 1 | 0.058 |
| CT Chest | 7 | 9 | 0.406 |
| Echocardiogram | 47 | 49 | 0.577 |
| MRI | 7 | 4 | 0.263 |
| Ultrasound | 10 | 15 | 0.204 |
| Telemetry | 86 | 91 | 0.233 |

Mean diagnostic costs were $2,588 per patient in the high-risk category and $2,160.14 in the low-risk group, and this difference was not statistically significant ($p = .30$).

## Discussion and Conclusion

Our study revealed substantial unnecessary costs incurred by low-risk syncope patients, despite the lack of a statistically significant difference compared to high-risk patients. Educational programs and implementation of appropriate diagnostic order sets will help curb these costs and streamline syncope management.

# POSTER PRESENTATION ABSTRACT

## Echocardiographic Findings in 102 Centenarians

***Bhavin Dumaswala, MD; Kunal Bhagatwala, MD; Komal Dumaswala, MD; Jamshid Shirani, MD***

### Introduction/Background

The number of centenarians in the United States is steadily increasing, with 72,000 centenarians reported in 2015. This number is expected to surpass 1 million by 2050. Cardiovascular disease (CVD) remains the most common cause of death in this population. However, studies of CVD in centenarians are relatively scarce, and there is evidence that CVD is underreported in the "oldest old". The goal of our study was to explore the morphologic and functional cardiac abnormalities in centenarians as evaluated by echocardiography.

### Methodology and Statistical Approach

We retrospectively reviewed the echocardiograms of 102 consecutive centenarians ages 100 to 105 years who were referred to our center for echocardiography between 2010 and 2017. Patient demographics were as follows: mean age $\pm$ standard deviation = 100.4 ± 1.4 years; 85% women; 87% hypertensive; 17% diabetic; 25% hyperlipidemic; body surface area range mean $\pm$ standard deviation = 1.6 ± 0.2 $m^2$ (range 1.2 – 2.1); body mass index (BMI) mean $\pm$ standard deviation = 24.9 ± 4.5 $kg/m^2$ (range 15.1 – 41.7); 33% overweight; and 12% obese. We analyzed our data descriptively.

### Results

The following occurrences of CVD were present based on patient history: heart failure = 56%; coronary artery disease = 23% (prior PCI = 7%, prior CABG = 2%); peripheral arterial disease = 7%; and cerebrovascular accident = 24%.

Electrocardiographic atrial fibrillation was present in 32% of patients. Echocardiographic abnormalities included left ventricular (LV) dilation (1%); concentric remodeling (47%); LV hypertrophy (46%), including 18% with severe LV hypertrophy; regional wall motion abnormality (21%); decreased LV ejection fraction (21%); abnormal (other than age-appropriate) indices of diastolic function (50%); left atrial (LA) dilation (60%); right ventricular dilation (17%); tricuspid regurgitation peak velocity $\geq$ 3 m/second (49%); and pericardial effusion (9%). Mild, moderate and severe aortic stenosis was present in 14%, 12%, and 16% of patients, respectively. Mild or moderate calcific mitral stenosis was noted in 9% of patients. Significant (> mild) regurgitation was noted in mitral (37%), aortic (13%), and tricuspid (40%) valves.

### Discussion and Conclusion

Structural and functional cardiac abnormalities are commonly noted among centenarians referred for echocardiography. Overall, at least one echocardiographic abnormality was noted in 99% of the centenarians we studied.

# POSTER PRESENTATION ABSTRACT

## The Effect of Oral Anticoagulation Agents on Hemoglobin Levels in Reproductive Age Women

*Aaron Herrera Gonzalez, MD; Alexandra Stough, MS; Danica Palacio, MS; Vijay Palvia, MD; James Anasti, MD*

### Introduction/Background

Oral anticoagulation in reproductive age women is not uncommon. Some studies have reported increased incidence of abnormal uterine bleeding and heavy menstrual bleeding in patients receiving anticoagulation. However, studies comparing the effect of different oral anticoagulants on hemoglobin (Hgb) levels on menstruating women are lacking. Our study sought to clarify this issue.

### Methodology and Statistical Approach

We retrospectively reviewed charts of reproductive age women taking oral direct-activated Factor X inhibitors (FXaI), vitamin K antagonist (vKa), or aspirin (ASA). We recorded patient demographics and indications for anticoagulation, as well as Hgb levels before and 6 to 12 months after initiation of oral anticoagulation. We compared pre- and post-treatment Hgb values using paired t-tests for each individual anticoagulant and repeated measures, and we conducted one-way analysis of variance (ANOVA) to compare initial Hgb levels and pre/post treatment Hgb differences.

### Results

There were 91 FXaI patients, 73 vKa patients, and 68 ASA patients. They did not differ in mean age (44.2 ± 6.2 years) or BMI (32.5 ± 8.1 $kg/m^2$). Indications for FXaI were deep vein thrombosis (DVT) or pulmonary embolism (PE) (64/91 patients), atrial fibrillation (Afib) (8/91 patients), or antiphospholipid syndrome (7/91 patients). vKa was used for DVT/PE (28/73 patients), stroke (12/73 patients), or Afib (10/73 patients). ASA indications included stroke (27/68 patients), DVT/PE (11/68 patients), or Factor V leiden (10/68 patients). In all three groups, post-treatment Hgb values were lower than pre-treatment Hgb levels by less than 2%, which was neither statistically nor clinically significant. Differences in Hgb levels were also similar between groups. Tables 1 and 2 present our findings.

**Table 1**

| **Demographics** | **FXaI**<br>**n = 91** | **VKa**<br>**n = 73** | **ASA**<br>**n = 68** | **p value** |
|---|---|---|---|---|
| Age (years) | 43.9 ± 8.5 | 45.5 ± 6.8 | 44 ± 7.1 | .18 |
| BMI (Kg/M2) | 33.7 ± 9.1 | 32.6 ± 10.1 | 32.4 ± 8.2 | .39 |

**Table 2**

| **Anticoagulant** | **Intial Hgb (gms)** | **Post-Treatment Hgb (gms)** | **p value** |
|---|---|---|---|
| FXaI | 12.5 ± 1.8 | 12.3 ± 1.7 | 0.40 |
| VKa | 12.5 ± 1.9 | 12.2 ± 1.8 | 0.15 |
| ASA | 12.7 ± 1.5 | 12.4 ± 1.6 | 0.09 |

***ANOVA results for intial Hgb: p = .78***

***ANOVA results for post-treatment Hgb: p = .97***

**Discussion and Conclusion**

There was no significant decrease in Hgb levels in menstruating women receiving oral anticoagulants at 6 to 12 months post-initiation of oral anticoagulation.

# POSTER PRESENTATION ABSTRACT

## Face to Name

*Devyn Graham, DO; Heather Krasa, DO; Cara Ruggeri, DO; Ben Veres, DO*

### Introduction/Background:

With the growing size of healthcare provider teams in academic teaching hospitals, patients often report difficulties identifying what role different providers play in their care, leading to confusion and frustration, as well as possible decreased patient satisfaction. Studies using identification tools, such as labeled photo cards at the bedside, can assist patients in correctly identifying their physicians as well as lead to higher patient satisfaction in certain cases. The aim of our quality improvement project was to increase patients' ability to identify their primary physicians, enhance patient satisfaction, and strengthen overall physician and patient communication on the inpatient Internal Medicine teaching service.

### Methodology and Statistical Approach

We collected baseline data from July through November, 2017, via a survey (English and Spanish) asking patients to rank their regarding the quality of communication by the primary team of physicians during their stay. A team member administered the survey on the day of discharge for all patients who met inclusion criteria. Three of our survey questions were taken from the Hospital Consumer Assessment of Healthcare Provider and Systems (HCAHPS) survey.

We introduced our intervention from January through April, 2018. We gave laminated photo cards to enrolled patients at the beginning of their stay. Team members' photos and names as well as a daily message area were utilized each day by participating providers. Messages included the goals or upcoming diagnostic tests for that day, as well as a list of consulting specialist services. These messages were given in both English and Spanish, depending on the patient's native language. On daily rounds, the team leader circled the photo of each team member, which included the attending physician, resident, and intern who would be caring for them that day. The team leader also updated the daily goals. Identical discharge day surveys were given to patients, with the addition of one question.

### Results

Anecdotally, a number of patients, their families, and nursing staff gave enthusiastically positive feedback about the face cards. Tables 1 and 2 and Figures 1 and 2 present pre- and post-intervention survey results.

**Figure 1**

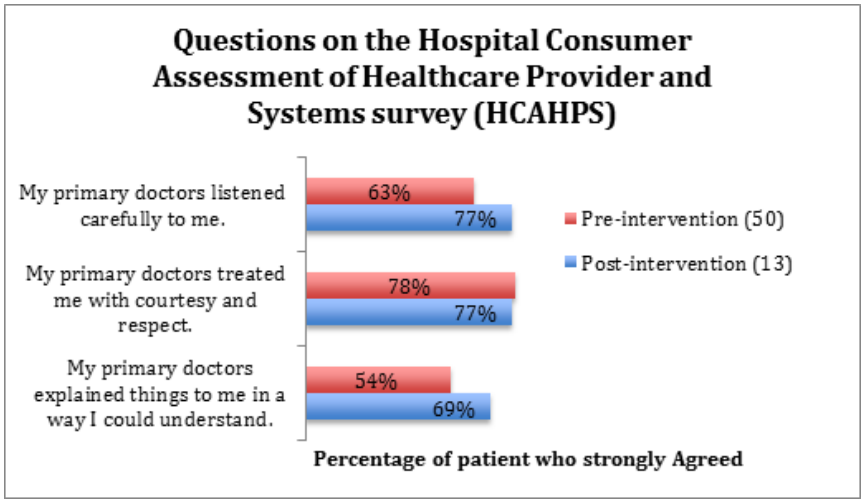



**Figure 2**

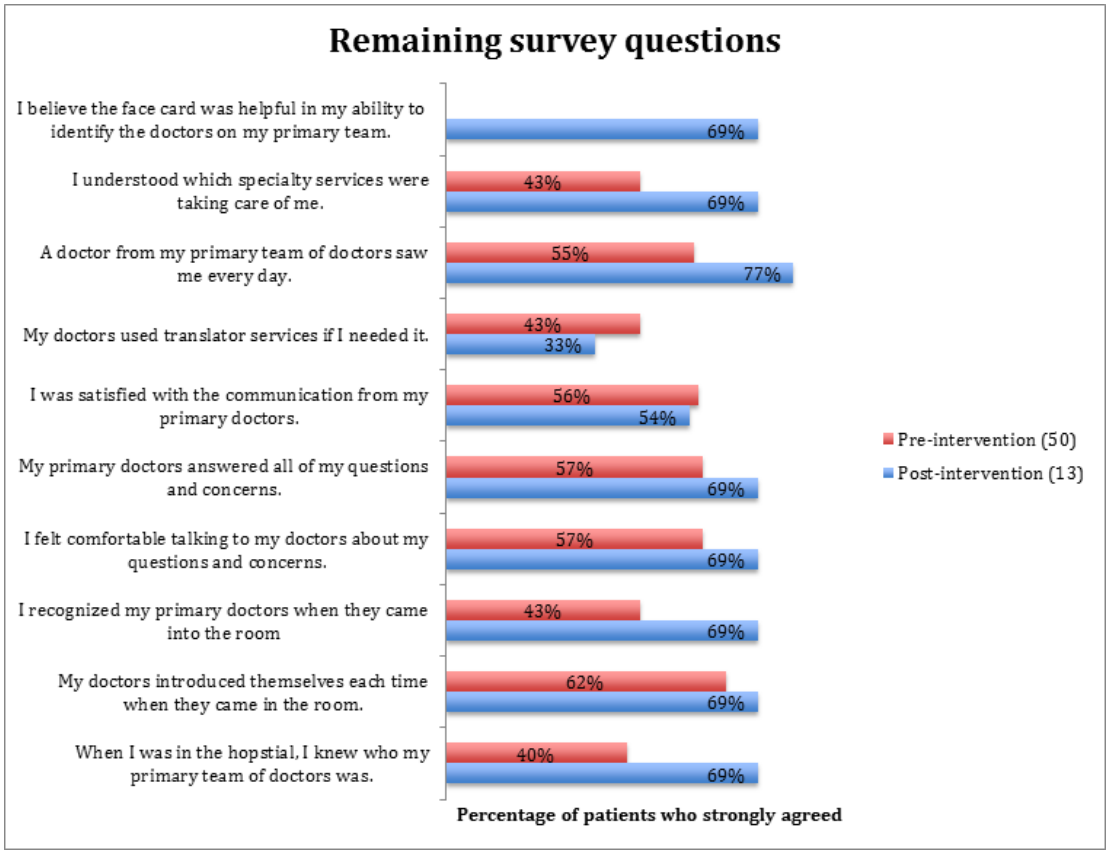


**Table 1: Survey Results**

| Survey Question | Before the Face Card* | With the Face Card** |
|---|---|---|
| 1. When I was in the hospital, I knew who my primary team of doctors was. | 40% strongly agreed | 69% strongly agreed |
| 2. My doctors introduced themselves each time they came into my room. | 62% strongly agreed | 69% strongly agreed |
| 3. I recognized my primary doctors when they came into my room. | 43% strongly agreed | 69% strongly agreed |
| 4. My primary doctors explained things to me in a way I could understand. | 54% strongly agreed | 69% strongly agreed |
| 5. My primary doctors treated me with courtesy and respect. | 78% strongly agreed | 77% strongly agreed |
| 6. My primary doctors listened carefully to me. | 63% strongly agreed | 77% strongly agreed |
| 7. I felt comfortable talking to my doctors about my questions and concerns. | 57% strongly agreed | 69% strongly agreed |
| 8. My primary doctors answer all of my questions and concerns. | 57% strongly agreed | 69% strongly agreed |
| 9. I was satisfied with the communication from my primary doctors. | 56% strongly agreed | 54% strongly agreed |
| 10. My doctors used translator services if I needed it | 42% strongly agreed | 33% strongly agreed |
| 11. A doctor from my primary team of doctors saw me every day. | 55% strongly agreed | 77% strongly agreed |
| 12. I understood which specialty services were taking care of me. | 43% strongly agreed | 69% strongly agreed |
| 13. I believe the face card was helpful in my ability to identify the doctors on my primary team. | NA | 69% |

**based on 50 surveys collected*
***based on 13 surveys collected*

**Discussion and Conclusion**

Overall the face cards improved patients' understanding of their care, improved their recognition of their primary team of physicians, and appeared to improve satisfaction in several areas. The face cards allowed patients to more easily put a face to the name of their physicians by giving them access to the cards throughout the day. Our intervention also allowed nursing staff to more rapidly identify the resident caring for the patient, enabling them to page that resident directly with questions or concerns.

Despite these positive findings, our study was limited by the fact that only 13 patients received post-intervention surveys. Challenges to obtaining a larger patient group included lost face cards, residents forgetting to update the cards on a daily basis, and post-intervention surveys not being completed before discharge. In addition, it was difficult to integrate face card implementation into residents' daily practice. However, if face cards become a regular part of the workflow, they may prove very useful in strengthening physician-patient communication and ultimately impacting patient satisfaction. Therefore, the use of face cards will be taught to incoming first years at the beginning of their residency in order to become seamlessly integrated into their daily responsibilities.

# POSTER PRESENTATION ABSTRACT

## Bone Markers in Charcot Neuroarthropathy

***Brandy Grahn, DPM; Brent Bernstein, DPM***

### Introduction/Background

Effective medical therapy for Charcot neuroarthropathy (CNA) has been based mostly on different biochemical markers that are used to gauge osteoclastic activity and thereby monitor the progression of CNA. Among these markers are deoxypyridinoline (DPD) crosslinks and bone-specific alkaline phosphatase (BSAP).

Bone turnover markers have also been used to monitor the effectiveness of bisphosphonate therapy in the treatment of CNA. Bisphosphonates have been shown to successfully reduce the levels of these markers, which has led to the investigation of bisphosphonates as a potential medical therapy for CNA. The assumption here is that levels of these bone markers correspond to the severity of a patient's disease. If this assumption holds true, it would suggest that by decreasing the levels the bone markers via bisphosphonate therapy, CNA may be taken out of the acute phase. Therefore, the purpose of our study was to compare levels of relevant bone markers in the acute and quiescent stages to determine if they accurately reflect the severity of CNA. We hypothesized that as CNA progresses into chronic or quiescent stages as measured by pedal temperature, the levels of bone markers would decrease accordingly.

### Methodology and Statistical Approach

We retrospectively reviewed 41 patients diagnosed with Charcot neuroarthropathy in our clinic. Disease severity was determined via temperature differences between affected and unaffected limbs, which was then compared to the levels of bone turnover markers BSAP and DPD:CRT using Pearson product-moment correlation coefficients.

### Results

The correlation between temperature and DPD:CRT was positive ($r = .16$, $p = .30$), while the temperature-BSAP correlation was negative ($r = -.17$, $p = .30$). However, neither association was statistically significant.

### Discussion and Conclusion

The lack of statistical significance in the relationship of bone turnover marker levels to pedal temperature and disease severity calls into question their reliability in the diagnosis of CNA, as well as their feasibility in monitoring the treatment effectiveness of medications such as bisphosphonates.

# POSTER PRESENTATION ABSTRACT

## Sonographic Assessment of Optic Nerve for Evaluation of Sports Associated Concussion

*Adam Kobialka, DO; Peter Murphy, DO; Maheep Vikram, MD; Celestine Nnaeto, MD*

### Introduction/Background

It is believed that concussion leads to increased intracranial pressure. Measurement of ocular ultrasound parameters that respond to changes in the intracranial pressure (including the optic disc and optic nerve sheath diameter) may provide a safe, inexpensive, and noninvasive means to help diagnose concussion, as well as help monitor for resolution of symptoms.

At present, there is no objective, noninvasive, point-of-care assessment measure that is both reliable and inexpensive for diagnosing sports-associated concussion/mild traumatic brain injury. Our study sought to determine if there is a relationship between ultrasound measurements of the optic disc/optic nerve sheath and clinically diagnosed sports-related concussion. We also investigated the association between ultrasound measurements of the optic disc/optic nerve sheath and clinically diagnosed resolution of sports-related concussion.

The purpose of this study is to assess for sonographic evidence of increased intracranial pressure in sports-related mild traumatic brain injury (a.k.a. concussion) and whether this could play a diagnostic and/or management role of sports-related concussion. We will measure the optic nerve sheath diameter and the optic disc to indirectly assess for increased intracranial pressure within the first week of clinically diagnosed sports-related concussion as well as repeat measurement of these parameters following clinically diagnosed resolution of the concussion. The primary objective is to investigate for a relationship between ultrasound measurements of the optic disc/optic nerve sheath and clinically diagnosed sports-related concussion. The secondary objective is to investigate for a relationship between ultrasound measurements of the optic disc/optic nerve sheath and clinically diagnosed resolution of sports-related concussion.

### Methodology and Statistical Approach

This was a prospective cohort study of patients between 17 – 50 years of age with a clinically diagnosed sports-related concussion/mild traumatic brain injury. Prior to performing ocular ultrasound on study patients, all research staff had to complete at least 10 ultrasounds to demonstrate competency as assessed by an active American Institute of Ultrasound in Medicine (AIUM) member.

During the study, we measured both the optic disc and optic nerve sheath diameter to indirectly assess for increased intracranial pressure, and we repeated these measurements following clinically diagnosed resolution of the concussion. We compared our results to the age-accepted normative values for unaffected individuals. Patients continued to receive standard of care for concussion treatment throughout the study. We reported descriptive outcomes and Spearman's rank correlation coefficients.

## Results

At the beginning of our study, there were 9 patients, with 6 included at study cessation. The initial ultrasound of the optic nerve was performed at a mean of 3 days post-injury. Of the 9 participants who had ultrasound performed post-injury, mean optic nerve sheath diameter for both the left and right eye was 6.30 mm, compared to the accepted mean diameter of 5.00 mm. Mean time for patients to have a clinically diagnosed resolution of concussion symptoms such that they were able to return to sports activity was 26.5 days. At this time, repeat ultrasound was performed on 6 remaining patients. Mean optic nerve sheath diameter decreased to 5.70 mm for both the right and left eyes, thereby demonstrating an overall decrease in the optic nerve sheath diameter with resolution of concussion symptoms.

| | **CORRELATION BETWEEN CONCUSSION AND CLINICAL RESOLUTION MEASUREMENTS** |
|---|---|
| ***Number of Days Post-Injury*** | rho = .39 (p = .44) |
| ***Left Optic Nerve Sheath Diameter*** | rho = .96 (p = .003) |
| ***Right Optic Nerve Sheath Diameter*** | rho = .99 (p < .0001) |
| ***Average Bilateral Optic Nerve Sheath Diameter*** | rho = .99 (p < .0001) |

## Discussion and Conclusion

This study revealed that optic nerve sheath diameter increases with concussion injury and subsequently decreases back to a normal range following concussion resolution. This study further suggests that sonographic evaluation of optic nerve sheath diameter may be utilized by clinicians to aid in the diagnosis of concussion, as well as help guide return-to-play decisions.

Our study was limited by the small number of participants. In particular, the majority of sports-related concussions diagnosed in the primary care sports medicine setting at St Luke's University Health Network are in high school athletes under the age of 18; therefore, future studies should include this population. It would also be beneficial to obtain comparison measurements from healthy individuals. Furthermore, although we used the accepted mean of 5.00 mm for normal optic nerve sheath diameter, it would be beneficial to include an accurate mean for our study population as well as for the ultrasound operator.

We hope our study can help guide future research that includes larger sample sizes and both adult and pediatric patients, along with comparison groups. This information would enable more accurate assessment of the effectiveness of sonographic evaluation of optic nerve sheath diameter in accurately diagnosing and determine appropriate return to play times for concussed athletes.

# POSTER PRESENTATION ABSTRACT

## Readmission rates in anemic patients undergoing knee and hip surgeries.

*Andrew Konopitski, MD; Vikas Yellapu, MD; Nora KO, MS3; Anshul Agarwala, MD*

### Introduction/Background

Readmission rates for total joint arthroplasty range from 1% to 8.5%, with the average cost of readmission ranging from $13,000 to $17,000 for primary arthroplasty and nearly $30,000 in revisions. Identifying the underlying risk factors for readmission after elective arthroplasty is an imperative step toward implementing preventative measures. In particular, patients with preoperative anemia have a significantly higher risk for postoperative complications as well as higher morbidity and mortality rates. The goal of our study was to establish a risk stratification system for patients with perioperative anemia and create an evidence-based transfusion protocol to decrease complication and readmission rates.

### Methodology and Statistical Approach

We conducted a retrospective analysis over a two-year period of patients who underwent elective primary or revision hip or knee arthroplasty with subsequent readmission (N = 224). Primary outcome measures were readmissions at 30 days, 90 days, or both. We used chi square tests to compare readmission status (no readmission versus readmission within 30, 60, and 90-days postoperatively) in patients with hemoglobin (Hgb) levels < 8.5 versus > 8.5.

### Results

Of the 224 patients in our study, 60 had Hgb levels < 8.5, and 164 patients had Hgb levels > 8.5. A total of 10/60 patients (16.7%) with Hgb < 8.5 were readmitted within 90 days, and 14/164 patients (8.5%) with Hgb > 8.5 were readmitted ($\chi 2 = 4.25$, $p = .04$).

### Discussion and Conclusion

Our results revealed that patients with Hgb levels < 8.5 prior to surgery are at higher risk for developing complications and being readmitted. While this finding provides clear insight for managing preoperative patients, the fact that patients with low Hgb levels might have other comorbid conditions that contributed to readmissions should also be taken into account. As we continue this study and look at additional anemic patients receiving arthroplasty, we will consider the etiology of anemia with readmission rates.

Our results also demonstrated a relationship between readmission rates and intraoperative blood loss, which should be the focus of future studies. Identifying patients with anemia and those at high risk of bleeding should be identified earlier and managed appropriately prior to surgery.

# POSTER PRESENTATION ABSTRACT

## Comparing Shoulder and Cervical Spine Surgical Intervention in Shoulder Pain

*Ajith Malige, MD; Paul Morton, MD; Gbolabo Sokunbi, MD*

### Introduction/Background

Etiology of neck and shoulder pain may be multifactorial. When surgical intervention is indicated, determining whether to start with spine or shoulder surgery is an important clinical decision that is based on severity of pathologies, comorbidities, and patient preference. The literature includes very few studies exploring the incidence or outcomes of different surgical treatment paths. Therefore, we sought to examine this issue more closely.

### Methodology and Statistical Approach

We retrospectively reviewed 154 charts at a single institution between 2009 – 2017 from patients who had both cervical spine and shoulder pathology and underwent operative intervention of one or both pathologies. We recorded demographic information, diagnoses, operative details, and subjective reports of operative success in relieving shoulder symptoms. We analyzed our data with independent samples t-tests or Mann Whitney rank sums tests, as appropriate.

### Results

Of the 154 patient charts reviewed, most patients were male (n = 90, 58.4%) and between ages 40 – 59 years (n = 95, 61.7%). Ninety-one patients (59.1%) underwent shoulder surgery, 15 (9.7%) underwent cervical spine surgery, and 48 (31.2%) underwent both operations. Overall, 71 patients (46.1%) noted complete cessation of original shoulder symptoms postoperatively. The following outcomes were similar when comparing only cervical spine to shoulder intervention: patient-reported success ($p = .85$), NRS pain score decreases ($p = .45$), all functional outcomes except for final external rotation range of motion ($p = .02$), and post-operative opioid use ($p = .30$). When comparing patients who underwent cervical followed by shoulder intervention to shoulder followed by cervical intervention, the following outcomes were similar: patient-reported success ($p = 1.00$), NRS pain score decreases ($p = .37$), all 6 functional outcomes, and post-operative opioid use ($p = .08$). In contrast, for patients who underwent both operations versus only one type, patient-reported success was significantly different ($p = .0004$), but not NRS decreases ($p = .18$), functional outcomes, or post-operative opioid use ($p = .43$).

### Discussion and Conclusion

We observed similar success rates when comparing patients who underwent only shoulder surgeries versus only cervical spine surgeries, as well as patients receiving shoulder followed by cervical spine surgery versus cervical spine followed by shoulder surgery. Performing both types of surgeries also yielded higher success rates compared to only one type of surgery.

# POSTER PRESENTATION ABSTRACT

## A Double Blind Randomized Controlled Equivalence Study Comparing Intra-Articular Corticosteroid to Intra-Articular Ketorolac Injections for Osteoarthritis of the Knee

*Shane McGowan, MD; Paul Morton, MD; William Rodriguez, MS3; Vikas Yellapu, MD; Tim Visser, MS4; Gregory Carolan, MD*

### Introduction/Background

The United States Bone and Joint Initiative asserts that 26 million individuals in U.S. are affected by osteoarthritis (OA). The prevalence of osteoarthritis has doubled in the last 20 years, and its financial burden on hospitals exceeds $16 billion per year and is responsible for $160 billion in lost wages, making OA the second most expensive medical condition. OA is a significant problem for patients and hospitals; therefore, identifying effective and efficient treatments is paramount. Our study evaluated two treatment options for OA in a segment of our patient population.

### Methodology and Statistical Approach

This was a randomized controlled trial comparing the efficacy of intra-articular ketorolac (Toradol) with intra-articular betamethasone injections in reducing self-reported pain. We randomly stratified patients into two arms: the comparison group received 6 mg of betamethasone, and the treatment group received 60 mg of ketorolac. The patient, injector, and researchers were blinded to treatment assignment. Prior to injection, enrolled patients completed the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC), with follow-up WOMAC responses obtained post-injection at one month, three months, and six months. We also recorded age, gender, body mass index (BMI), laterality, severity, and fluid aspirations. Our primary endpoint was changes in WOMAC scores for pain at each time point after the initial injection. We analyzed our data using paired t-tests and chi square tests.

### Results

Over a three-year period, 409/543 patients (75.3%) met inclusion criteria. A total of 111 knees were injected. There were statistically significant differences in mean WOMAC scores for both the ketorolac and betamethasone groups at one month [54.0 to 38.9 ($p = .001$) versus 53.0 to 37.8 ($p = .004$), respectively] and at three months [54.4 to 37.8 ($p = .001$) versus 50.9 to 29.3 ($p = .001$), respectively]. At six months, the ketorolac group had significantly decreased mean WOMAC scores [48.5 to 16.0 ($p = .004$)], but the betamethasone did not [54.4–32.9 ($p=0.11$)]. When comparing the changes of WOMAC scores between groups across all time periods, there was no statistically significant difference.

### Discussion and Conclusion

Our study demonstrated a significant decrease in WOMAC scores among patients who received ketorolac intra-articular injections, which was comparable to the decrease among patients in the intra-articular betamethasone group. Since ketorolac is a more accessible and cost-effective drug, it is worth considering its use in managing osteoarthritis of the knee.

## Effect of Treatment Groups on WOMAC Scores

### Betamethasone

| | After 1 Month | After 3 Months | After 6 Months |
|---|---|---|---|
| average change | -14.6 | -16.7 | -20.6 |
| p-value | 0.001 | 0.001 | 0.11 |

### Ketorolac

| | After 1 Month | After 3 Months | After 6 Months |
|---|---|---|---|
| average change | -13.8 | -22.8 | -33.9 |
| p-value | 0.004 | 0.001 | 0.004 |

## Comparison Between Betamethasone and Ketorolac Treatments on WOMAC Scores

| | **1 Month** | | **3 Months** | | **6 Months** | |
|---|---|---|---|---|---|---|
| | Betamethasone | Ketorolac | Betamethasone | Ketorolac | Betamethasone | Ketorolac |
| average score | 38.9 | 37.8 | 37.8 | 29.3 | 32.9 | 16.0 |
| p-value | 0.83 | | 0.16 | | 0.18 | |

| | **Initial to 1 Month** | | **Initial to 3 Months** | | **Initial to 6 Months** | |
|---|---|---|---|---|---|---|
| | Betamethasone | Ketorolac | Betamethasone | Ketorolac | Betamethasone | Ketorolac |
| average change | -14.6 | -13.8 | -16.7 | -22.8 | -20.6 | -33.9 |
| p-value | 0.86 | | 0.28 | | 0.35 | |

| | **1 Month to 3 Months** | | **1 Month to 6 Months** | | **3 Months to 6 Months** | |
|---|---|---|---|---|---|---|
| | Betamethasone | Ketorolac | Betamethasone | Ketorolac | Betamethasone | Ketorolac |
| average change | -1.8 | -1.1 | -8.4 | -6.6 | 6.8 | -2.1 |
| p-value | 0.89 | | 0.88 | | 0.19 | |

## Treatment Group Demographics

| | Initial | | | 1 Month | | | 3 Months | | | 6 Months | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Betamethasone | Ketorolac | p-value | Betamethasone | Ketorolac | p-value | Betamethasone | Ketorolac | p-value | Betamethasone | Ketorolac | p-value |
| N | 56 | 55 | | 43 | 41 | | 31 | 24 | | 9 | 8 | |
| Body Mass Index | 33.9 | 33.7 | 0.87 | 34.1 | 33.4 | 0.62 | 34.6 | 33.0 | 0.50 | 32.6 | 32.0 | 0.98 |
| Age | 68.0 | 66.2 | 0.82 | 68.4 | 66.9 | 0.75 | 68.6 | 66.7 | 0.57 | 66.4 | 72.0 | 0.38 |
| Gender | | | | | | | | | | | | |
| Male | 26 | 28 | 0.95 | 20 | 22 | 0.90 | 15 | 13 | 0.94 | 7 | 5 | 0.85 |
| Female | 30 | 27 | 0.95 | 25 | 22 | 0.89 | 16 | 11 | 0.93 | 2 | 3 | 0.80 |
| Laterality | | | | | | | | | | | | |
| Left | 27 | 24 | 0.94 | 21 | 22 | 0.97 | 15 | 11 | 0.97 | 3 | 3 | 0.95 |
| Right | 29 | 31 | 0.95 | 24 | 22 | 0.97 | 16 | 13 | 0.97 | 6 | 5 | 0.96 |
| Diabetes | 11 | 9 | 0.96 | 8 | 8 | 0.97 | 4 | 4 | 0.93 | 1 | 3 | 0.67 |
| KL Grade | 3.1 | 3.1 | 0.43 | 3.1 | 3.0 | 0.43 | 2.5 | 3.0 | 0.76 | 3.1 | 3.3 | 0.66 |
| Aspirations | 9 | 8 | 0.97 | 7 | 5 | 0.91 | 6 | 3 | 0.85 | 1 | 2 | 0.78 |
| Initial WOMAC | 53.90 | 54.50 | 0.88 | 54.00 | 53.00 | 0.81 | 54.40 | 50.90 | 0.47 | 54.40 | 48.50 | 0.39 |

# POSTER PRESENTATION ABSTRACT

## Quality Improvement of Asthma Symptom Control Documentation

***Margaret Mintus, DO; Eginia Franco, MD; Satinderpal Kaur, MD; Piotr Zembzruski, MD; Abby Rhoads, DO; Elspeth Black, MD***

### Introduction/Background

Asthma affects 25.7 million people in the United States. Recent studies have revealed poor control of asthma in the larger population, resulting in 1.8 million emergency room visits, 439,000 hospitalizations, and 3,615 deaths, leading to greater than $60 billion in health care costs each year. In order to help address this burden, it is essential to improve documentation of patient symptoms.

Our quality improvement project sought to improve asthma symptom control documentation by at least 20% in order to exceed American Academy of Family Physicians (AAFP) benchmarks, which include nighttime symptoms (42%), limitation of activity (31%), and asthma control (27%).

### Methodology and Statistical Approach

Utilizing the AAFP Asthma Metric Module, we collected baseline data on 211 asthma patients. We observed that our documentation of nighttime symptoms, limitation of activity due to symptoms, and overall control were in need of improvement (28%, 18.5%, and 35.5%, respectively). During the three month implementation period (August to November, 2017), patients were identified on their billing sheet as having asthma at the time of their appointment check-in. These patients were given an Asthma Control Test (ACT), which was used by our clinic physicians to document specific symptoms and overall control of patients' condition. At the end of our implementation time period, we repeated our evaluation of documentation to monitor progress.

### Results

Based on ACT results, we detected improvement in documentation in all three areas of interest, as follows:

- Nighttime symptoms: 28% to > 53%
- Limitation of activity due to symptoms: 18.5% to >39.5%
- Overall asthma control: 35.5% to >73%

### Discussion and Conclusion

By identifying patients with asthma at the beginning of their appointments, having them complete a self-evaluation of their symptom control, and working collaboratively with ancillary clinic staff, we were able to improve our patient care across all three areas of interest. We hope to continue identifying patients with poor asthma control who are at risk for exacerbation and hospitalization, thereby lowering the morbidity of this disease within our clinic population.

# POSTER PRESENTATION ABSTRACT

## Provider Prescription Patterns for Acute Sinusitis: a Call for Antibiotic Stewardship in the Outpatient Setting

*Priya Patel, MD; Thomas Wojda, MD; Pradeep Patel, MD; Derek Tang, MS3; Eugene Decker, DO*

### Introduction/Background

Excessive antibiotic prescription in ambulatory practice contributes to the growth of antibiotic-resistant bacteria. Acute sinusitis, the fifth most common diagnosis for which an antibiotic is prescribed, is frequently viral in origin and will resolve without antibiotics. The objective of our study was to provide a descriptive analysis of our clinic's antibiotic (ABX) prescribing patterns for acute sinusitis.

### Methodology and Statistical Approach

This was a retrospective analysis of patients > 18 years of age who were diagnosed with acute sinusitis between January 1, 2016 and August 31, 2017. We obtained our data from Allscripts electronic medical records system and used the REDCap Electronic Data Capture system to centralize data collection. We documented patient age; gender; COPD/asthma history; smoking status; month of diagnosis; ABX prescribed; visit type (attending or preceptor); symptoms (facial pressure/pain/fullness, fever > 100.5, maxillary toothache pain, purulent rhinorrhea, symptoms > 10 days); follow-up; and clinical outcome (worsening symptoms, not improving, or new symptoms versus improved symptoms). We analyzed our data descriptively.

### Results

Patient outcomes included the following: median age = 44 years; 101 males, 295 females; 67 patients with COPD/Asthma 67; 6 immunocompromised patients; 371 attending visits, 25 preceptor visits; 190 ABX initially prescribed (Figure 1); 34 patients with follow-up visits (22 before 4 weeks, 12 after 4 weeks); 126 patients diagnosed in winter, 116 in spring, 82 in summer, and 72 in fall (Figure 2).

A total of 20 patients had second visits with attendings, and 14 had second visits with preceptors. A total of 27 patients had worsening symptoms and 7 improved, with ABX prescriptions as follows: amoxicillin (AMX) = 3; sulfamethoxazole/trimethoprim (TMP-SMX) = 3; azithromycin (AZM) = 3; cephalexin (CFX) = 1; amoxicillin-clavulinic acid (AMC) = 3; and doxycycline (DX) = 1. Table 1 presents characteristics of patients who were prescribed an ABX on a second visit. Only one patient reported gastrointestinal side effects after azithromycin was initially prescribed.

### Discussion and Conclusion

Although our data on acute sinusitis cannot determine causality based on factors such as season, smoking status, and worsening or no improvement of symptoms, it appears that facial pressure or fullness may be associated with ABX prescription. We hope to use this information as baseline/historical control data in implementing an antibiotic stewardship program at our outpatient

clinic to better determine if improved provider education enhances judicious prescription of antibiotics for this common illness.

**Figure 1**

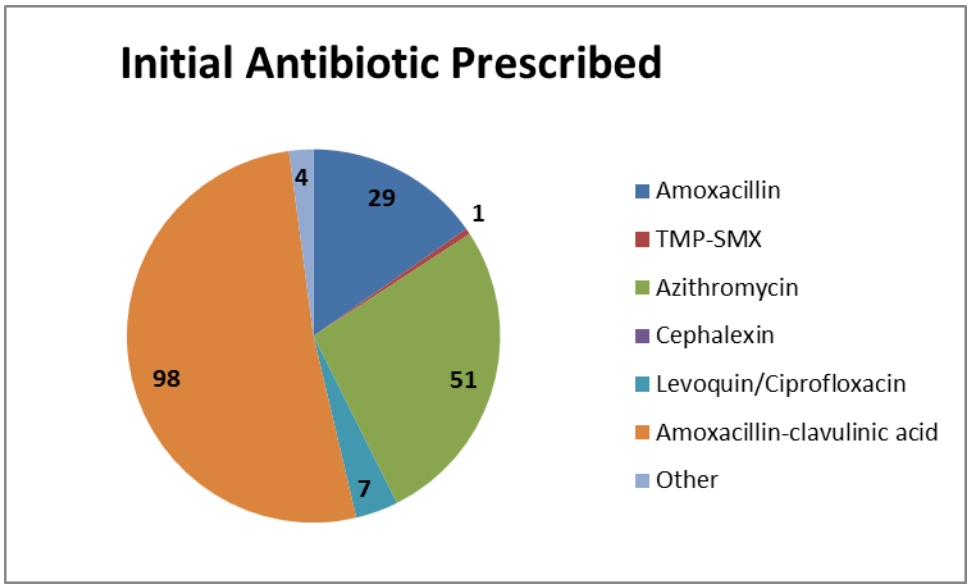



**Figure 2**

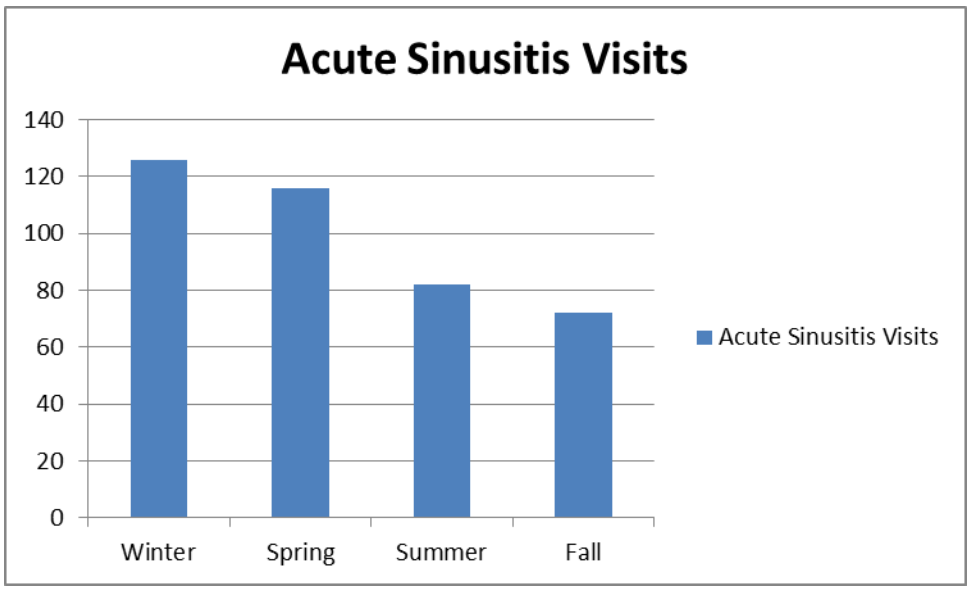


**Table 1: Characteristics of Patients Who Failed to Improve**

| Age | Gender | Smoker | Face Pressure | Fever | Maxillary Pain | Rhinorrhea | Symptoms > 10 Days | Month | ABX |
|---|---|---|---|---|---|---|---|---|---|
| 25 | F | N | Y | N | N | Y | Y | May | AMC |
| 31 | F | Y | Y | N | N | N | N | Sept | AZM |
| 35 | F | Y | Y | N | N | N | N | Feb | DX |
| 37 | F | Y | Y | N | N | Y | N | Nov | AZM |
| 40 | F | N | Y | N | Y | N | Y | Jan | AMX |
| 42 | F | Y | N | N | N | N | N | Nov | AMX |
| 43 | F | N | N | N | N | N | N | May | AMC |
| 56 | F | Y | Y | N | N | N | N | March | AMC |
| 60 | M | N | Y | N | N | N | N | March | AZM |
| 60 | F | Y | N | N | N | N | N | Feb | CFX |
| 91 | F | Y | Y | N | N | Y | N | Nov | AMX |

# POSTER PRESENTATION ABSTRACT

## Acute Bronchitis: Prescription Patterns of Healthcare Providers in an Outpatient Clinic

***Sidra Sindhu, DO; Thomas Wojda, MD; Naffie Ceesay, MD;***
***Chris Michel, MS4; Jessica Smith, MS; Eugene Decker, DO***

### Introduction/Background

Although acute bronchitis (AB) is a predominantly viral illness, antibiotics continue to be prescribed frequently in outpatient settings, despite having limited to no benefit. The objective of our study was to describe our clinic's antibiotic (ABX) prescription patterns for AB, with the overall aim of enhancing provider awareness of the role of antibiotics for this disease.

### Methodology and Statistical Approach

This was a retrospective analysis of adult patients > 18 years who were diagnosed with AB between January and August of 2017. We obtained our data from the Allscripts electronic medical records system and used the REDCap Electronic Data Capture system to collect data. We obtained data on patient age; gender; preexisting COPD or asthma; smoking status, month of diagnosis; ABX given; type of visit (attending or resident/preceptor); symptoms (acute illness of < 21 days, cough, respiratory tract symptoms, no other explanation, no documentation); follow-up; and clinical outcome (worsening symptoms, not improving, or new symptoms versus improved symptoms). Due to lack of a viable comparison group, we only reported descriptive outcomes.

### Results

We analyzed 319 cases (mean age $\pm$ standard deviation = 52 $\pm$ 16 years, 230 females and 89 males, 136 patients with COPD/asthma, 254 attending visits and 65 preceptor visits, and ABX given 126 times versus 193 not given (Figure 1). The prescribed ABX included azithromycin (AZM) = 89/126 (70%); amoxicillin (AMX) = 14/126 (12%); fluoroquinolones (LVF) = 11/126 (9%); amoxicillin-clavulanic (AMC) = 5/126 (4%); doxycycline (DX) = 6/126 (5%); and sulfamethoxazole/trimethoprim (TMP-SMX) = 1/126 (0.8%).

Follow up outcomes included 97 patients (47 not improving, worsening, or new symptoms; 50 improved); 35 preceptor visits; and 91 attending visits. The following ABX were prescribed: 14/18 AZM (77%); 2/18 AMC (11%); 1/18 AMX (6%); and 1/18 LVF (6%), and the mean age $\pm$ standard deviation of this population was 57.5 ± 20 years. Table 1 presents characteristics of patients given ABX.

### Discussion and Conclusion

In our study population, ABX were prescribed on 40% of the initial visits, with AZM being most frequently prescribed on both initial and follow-up visits (70% and 77%, respectively). Multiple factors may influence the decision to prescribe antibiotics, such as preexisting lung diseases, smoking status, symptomology variation, and other factors. Understanding these factors may assist in development an antibiotic stewardship program aimed at enhancing provider awareness of optimal treatment guidelines for acute bronchitis in outpatient settings.

**Figure 1: Preceptor and Attending Visits with Frequencies of Antibiotic Prescriptions for Acute Bronchitis**

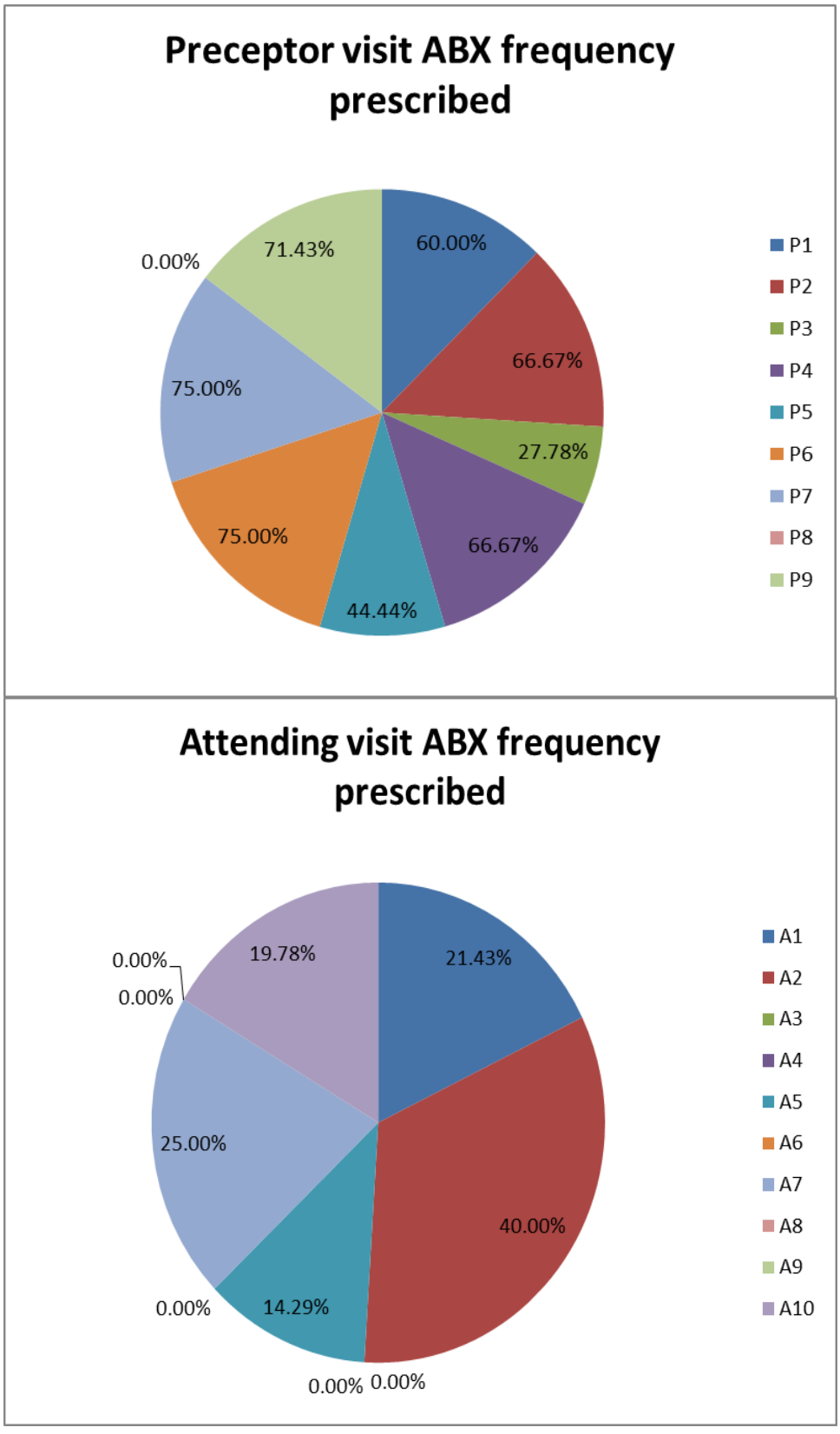


**Table 1: Characteristics of Follow-up Patients Given Antibiotics**

| Age | 1,2,3* | 2,3* | 1,2* | 3* | COPD/ Asthma | Smoker | Abx_1st prescribed | Symptom worsening | Month | F/U ABX |
|---|---|---|---|---|---|---|---|---|---|---|
| 46 | | X | | | Y | Y | N | Y | Feb | AZM |
| 73 | X | | | | N | Y | N | Y | Feb | AZM |
| 57 | X | | | | Y | Y | N | Y | Nov | AZM |
| 60 | X | | | | N | Y | Y | Y | Nov | AZM |
| 52 | X | | | | Y | N | X | Y | Feb | AZM |
| 85 | X | | | | Y | Y | Y | Y | Jan | AZM |
| 47 | | | X | | Y | Y | N | Y | Sept | AZM |
| 85 | X | | | | Y | Y | Y | X | Sept | AZM |
| 74 | X | | | | Y | Y | N | Y | June | AZM |
| 77 | X | | | | Y | Y | N | Y | April | AMX |
| 53 | X | | | | N | N | N | Y | Feb | AZM |
| 22 | X | | | | Y | N | N | Y | Feb | AMX |
| 85 | | | X | | N | N | N | Y | Feb | AZM |
| 26 | X | | | | Y | Y | N | Y | Sept | AZM |
| 93 | | | | X | N | N | N | Y | June | AZM |
| 55 | | | X | | Y | Y | N | Y | Jan | AZM |
| 35 | | | X | | N | N | Y | Y | July | AMC |
| 58 | X | | | | Y | Y | Y | Y | Jan | LVF |

**Symptoms present: 1 = illness< 21 days; 2 = cough as predominant symptom; 3 = other lower respiratory tract symptom (sputum production, wheezing, chest pain).*

# POSTER PRESENTATION ABSTRACT

## Impact of Having a Multidisciplinary Team in Nursing Homes to Improve Psychotropic Medication Prescribing Practices

***Hemlata Singh, MD; Emelia Perez, MD; Alaa-Eldin Mira, MD; William Kuehner, MD; Lou Czechowski, RPh***

### Introduction/Background

Nationally, there is a well-recognized need for improving medication prescription for elderly patients in order to minimize adverse effects and prevent negative outcomes associated with the use of certain medication classes. At the forefront of these medications is the use of psychotropic medications, which can lead to increased morbidity and mortality in the elderly population. Examples include antipsychotic and hypnotic medications, antidepressants, and anxiolytics.

Based on previous studies in nursing homes, multidisciplinary team involvement has improved prescribing practices and resulted in a decreased number of patients on psychotropic medications. One known strategy is for a multidisciplinary team to review patients' charts on a monthly basis. These teams are typically comprised of a physician, facility psychiatrist, pharmacist, nursing supervisor, floor nurse, and nursing aides. Teams should then follow Omnibus Budget Reconciliation Act (OBRA) guidelines to gradually reduce the doses of potentially inappropriate medications Created in 1987, OBRA implemented federal standards of care for nursing homes.

Our quality improvement project highlighted data obtained from Cedarbrook Nursing Home following implementation of a multidisciplinary team during a one-year period. We looked to the Centers for Medicare and Medicaid Services (CMS) goal of reducing psychotropic medication usage by 15% among long-term nursing home residents by the end of 2019.

### Methodology and Statistical Approach

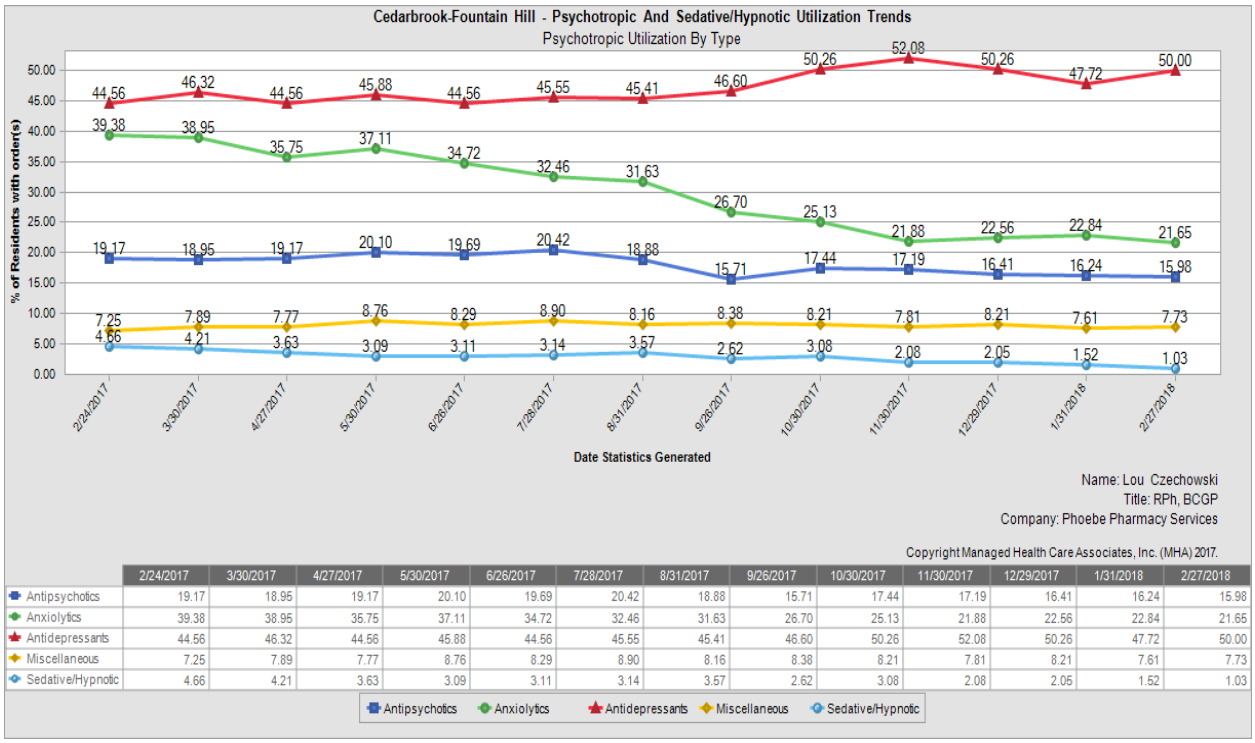
We conducted monthly chart reviews of nursing home patients > 65 years of age beginning in January of 2017. The multidisciplinary team began looking at prescribing practices and reviewed medication lists to identify residents currently taking psychotropic medications. After the team pharmacist tracked changes using pharmacy data, the team recommended gradual dose reductions, with actual implementation based on patient tolerance. During monthly meetings, the team discussed the appropriateness of medications as well as monitoring of patient behaviors.

We collected data for 12 months and compared these findings to both state and national reports of psychotropic use. We presented our data descriptively.

### Results

We reviewed 193 nursing home residents in 2017 and 194 in 2018. There were 39 residents who were prescribed psychotropic medications as of July of 2017, and 31 residents were prescribed these medications as of February of 2018. Over the course of one year, 19 residents discontinued their psychotropic medications, with 4 requiring re-initiation, 1 resident discharge, and 1 resident who died.

## Percentage of Residents Taking Psychotropic Medications




| | 2/24/2017 | 3/30/2017 | 4/27/2017 | 5/30/2017 | 6/26/2017 | 7/28/2017 | 8/31/2017 | 9/26/2017 | 10/30/2017 | 11/30/2017 | 12/29/2017 | 1/31/2018 | 2/27/2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antipsychotics | 19.17 | 18.95 | 19.17 | 20.10 | 19.69 | 20.42 | 18.88 | 15.71 | 17.44 | 17.19 | 16.41 | 16.24 | 15.98 |
| Anxiolytics | 39.38 | 38.95 | 35.75 | 37.11 | 34.72 | 32.46 | 31.63 | 26.70 | 25.13 | 21.88 | 22.56 | 22.84 | 21.65 |
| Antidepressants | 44.56 | 46.32 | 44.56 | 45.88 | 44.56 | 45.55 | 45.41 | 46.60 | 50.26 | 52.08 | 50.26 | 47.72 | 50.00 |
| Miscellaneous | 7.25 | 7.89 | 7.77 | 8.76 | 8.29 | 8.90 | 8.16 | 8.38 | 8.21 | 7.81 | 8.21 | 7.61 | 7.73 |
| Sedative/Hypnotic | 4.66 | 4.21 | 3.63 | 3.09 | 3.11 | 3.14 | 3.57 | 2.62 | 3.08 | 2.08 | 2.05 | 1.52 | 1.03 |

| Type of Medication | Percentage of Usage as of 2/24/2017 | Percentage of Usage as of 1/13/2018 | Difference |
|---|---|---|---|
| **Antipsychotic** | **19.17** | **15.98** | **-3.19** |
| **Anxiolytics** | **39.38** | **21.65** | **-17.73** |
| **Antidepressants** | **44.56** | **50.00** | **+5.44** |
| **Sedative/Hypnotics** | **4.56** | **1.03** | **-3.53** |
| **Miscellaneous** | **7.25** | **7.73** | **+0.48** |

### Discussion and Conclusion

Our findings suggest that consistent collaboration among caregivers, prescribers and pharmacists can improve prescribing practices of psychotropic medications as defined by clinical guidelines. Specifically, implementing a multidisciplinary team helped reduce use of psychotropics as well as the risk of polypharmacy and other adverse outcomes associated with these medications. Our data are consistent with previous studies of this topic.

# POSTER PRESENTATION ABSTRACT

## Body Mass Index in Trauma Patients: Relationships between Obesity and Injury Patterns

***WT Hillman Terzian, MD; Alyssa Green, MD; Franz Yanagawa, MD; Ashley Jordan, MD; Thomas Wojda, MD; Elizabeth McCarthy; Jacqueline Seoane, MS4; Colleen Taylor, MS4; Brian Hoey, MD; William Hoff, MD; Stanislaw Stawicki, MD, MBA***

### Introduction/Background

The obesity epidemic poses a threat to public health. This trend affects all aspects of the U.S. healthcare system, including trauma centers. At present, the relationship between body mass index (BMI) and injury patterns is poorly understood. Our study sought to determine whether significant associations exist between BMI and injury patterns using a large administrative trauma patient database.

### Methodology and Statistical Approach

We conducted a retrospective review of our Level I trauma center database for the time periods between June of 2015 and December of 2017. We collected patient information on demographics, Injury Severity Score (ISS), and injury patterns (proximal/distal extremities, torso, spine, head, and neck). We evaluated vital signs, mortality, and lengths of stay (hospital and ICU). BMI ranges were divided into terciles: low (LO < 20.1); intermediate (INT 20.1 – 26.3); high (HI 26.4 – 35.8); and morbid (MOR > 35.8). Statistical comparisons were performed using analysis of co-variance (ANCOVA) with adjustments for patient age, gender, and ISS. Statistical significance was set at $\alpha = .05$.

### Results

Out of 7,950 patients, 7,579 (95.3%) had both height and weight recorded. Mean patient age was 56.8 years, with 56.1% male, ISS of 8.64, and BMI of 27.7. There was no significant association between BMI and mortality. Patients with higher BMIs had elevated systolic blood pressures (LO 143 versus MOR 151). Increasing BMI was associated with more torso injuries, both qualitatively and quantitatively (AIS chest LO 1.48 versus MOR 1.97; proximal LO 12% versus MOR 16%; and distal LO 10% versus MOR 21%). Leg and spine injuries increased with BMI. There were no significant differences between groups in terms of head and neck trauma, with corresponding AIS reductions as BMI increased (LO 2.13 versus MOR 1.96). Patients with higher BMIs had longer hospital stays (LO 4.1 versus MOR 5.1 days) and ICU stays (LO 0.9 versus MOR 1.5 days).

| Variable | BMI < 20.1 (10th pct)† | 20.1 – 26.3 (10-50th)† | 26.4 – 35.8 (50-90th)† | BMI > 35.8 (>90th)† | P-value |
|---|---|---|---|---|---|
| **Mortality** | **2.5%** | **2.1%** | **2.6%** | **2.2%** | **n/s** |
| **Systolic Blood Pressure** | **143** | **147** | **151** | **151** | **< .01** |
| **Torso Injury** | **30.7%** | **37.1%** | **40.2%** | **35.0%** | **< .01** |
| **Proximal Leg** | **14.2%** | **12.3%** | **16.2%** | **16.6%** | **< .01** |
| **Distal Leg** | **18.7%** | **21.9%** | **25.6%** | **35.8%** | **< .01** |
| **Proximal Arm** | **15.5%** | **13.6%** | **12.6%** | **15.4%** | **n/s** |
| **Distal Arm** | **22.9%** | **22.3%** | **24.8%** | **24.7%** | **n/s** |
| **Spine** | **16.8%** | **20.4%** | **22.5%** | **23.7%** | **<.01** |
| **Head & Neck** | **57.3%** | **56.5%** | **55.6%** | **53.6%** | **n/s** |

**All data adjusted for age, ISS, and gender;*
*†Percentile*

**Discussion and Conclusion**

We found that torso, lower extremity, and spine injuries were significantly more common with increasing BMI; however, this was not the case with upper extremity and head/neck trauma. Although there was no significant increase in mortality with higher BMIs, these patients had longer hospital and ICU stays.

# POSTER PRESENTATION ABSTRACT

## A Comparison between Laparoscopic and Robotic Hysterectomy in Obese Patients: Effect on Cost, Operating Time, and Estimated Blood Loss

***Jessica Ton, MD***

### Introduction/Background

Obesity is a prevalent public health issue and poses unique challenges in gynecologic surgery. Obese patients are at increased risk for surgical complications, including venous thromboembolism, surgical site infection, and complications of anesthesia. Minimally invasive techniques confer a significant benefit when compared to open approaches, especially in obese patients. Traditional laparoscopic versus robotic approaches have comparable surgical outcome and complication rates. When comparing laparoscopic techniques, robotic surgery by a skilled surgeon may offer additional benefits over traditional laparoscopic surgery, specifically for the obese population.

### Methodology and Statistical Approach

We conducted a retrospective chart review of robotic and laparoscopic hysterectomies completed over a 12 – 24 month period. Patients were first grouped by surgical approach (robotic or laparoscopic hysterectomy), then further subdivided into two categories: body mass index (BMI) $< 30$ (non-obese) and BMI $\geq 30$ (obese). We obtained data regarding direct cost of the procedure (which includes instruments, physician labor, and additional hospital charges); estimated blood loss (EBL); and operating room (OR) time. We compared groups using Student's t-tests.

### Results

For the cost analysis, 222 patients were included (120 robotic, 101 laparoscopic). For EBL and OR time, there were 396 patients (248 robotic, 148 laparoscopic). In the non-obese BMI group, there was no significant difference in cost between the two approaches ($p = .09$), However, in the obese BMI group, there was a significant decrease in cost with robotic compared to laparoscopic hysterectomy ($5,701 versus $6,490, $p = .004$). There was also a significant decrease in EBL (122 ml versus 211 ml, $p = .002$) and OR time (116 minutes versus 166 minutes, $p < .001$) using the robotic approach.

| | Robotic Hysterectomy | Laparoscopic Hysterectomy | p-value |
|---|---|---|---|
| **Non-Obese BMI (<30)** | Mean age = 45years<br>Mean uterine weight = 471gm | Mean age = 41years<br>Mean uterine weight = 440 gm | .004<br>.32 |
| ***EBL (ml)*** | 90 (n = 90) | 120 (n = 71) | .02<br>.03 |
| ***OR time (min)*** | 120 (n = 90) | 139 (n = 71) | .09 |
| ***Cost ($)*** | 5,940 (n = 45) | 7,089 (n = 52) | |
| **Obese BMI (≥ 30)** | Mean age = 45yo<br>Mean uterine weight= 526 gm | Mean age = 43yo<br>Mean uterine weight = 639 gm | .03<br>.07 |
| ***EBL (ml)*** | 122 (n=159) | 211 (n = 76) | .002 |
| ***OR time (min)*** | 116 (n=159) | 166 (n = 76) | < .001 |
| ***Cost ($)*** | 5,071 (n=75) | 6,490 (n = 49) | .04 |

**Discussion and Conclusion**

In patients with a BMI of 30 or greater, we observed a significant decrease in cost, surgical time, and estimated blood loss with robotic hysterectomy compared to laparoscopic hysterectomy. This finding could be due to surgeon expertise, the efficiency of the surgical team, or the ergonomic advantage of robotic surgery in obese patients. More research is needed to further clarify the factors contributing to this significant advantage.

# POSTER PRESENTATION ABSTRACT

## Clinical Significance of Paradoxical Hypotension during Dobutamine Stress Testing

*Srilakshmi Vallabhaneni, MD; Matthew Carey, MD;*
*Rasha Aurshiya, MD; Jamshid Shirani, MD*

### Introduction/Background

Dobutamine stress echocardiography (DSE) is a safe and effective alternative to exercise stress testing in patients with suspected coronary artery disease (CAD). Hypotensive response to exercise stress has been associated with severe obstructive CAD and poor prognosis. The aim of this systematic review and meta analysis was to explore the occurrence, risk factors, pathogenesis, and clinical significance of paradoxical hypotension (PH) during DSE.

### Methodology and Statistical Approach

We conducted a systematic search of English literature using PubMed, Ovid Medline, and Cochrane library from inception through January 30, 2018. Our key words were dobutamine stress and hypotension, vasodepression, and paradoxical vasodepression (PVD). All English-language case reports, case series, retrospective studies, case-control, and cohort studies were included if they reported outcomes of PVD and/or hypotension during dobutamine stress testing. We examined all full text articles to ensure that they met our study criteria. Studies in languages other than English were excluded. Our final database included 10 retrospective, 3 prospective, and 2 case reports describing paradoxical hypotension during DSE (N = 6,134).

We used a fixed-effects model to conduct our meta analysis and reported $I^2$ statistics as a measure of study heterogeneity.

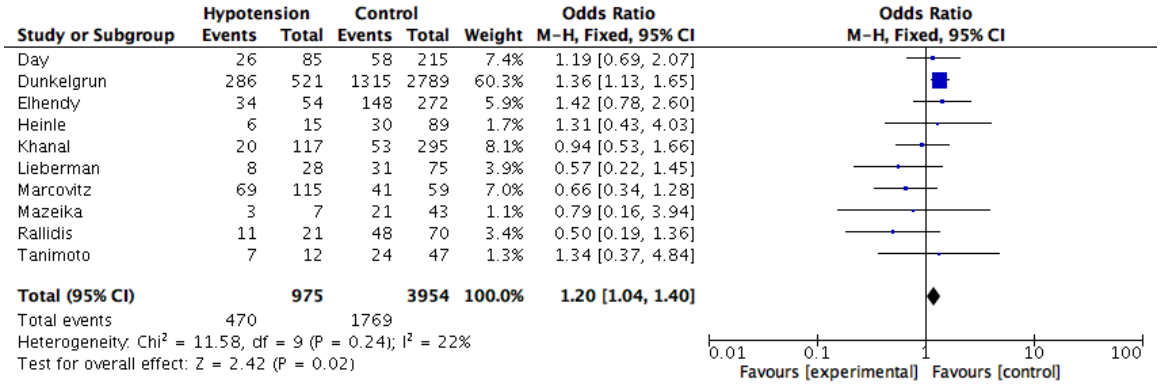
### Results

PH was defined in the different studies as a drop in systolic blood pressure (SBP) ≥ 10-20 mmHg; a decrease in SBP at peak to less than baseline; or a >15% drop in SBP from baseline. Incidence of PH was 18% (n = 1,100, mean age = 64 years, 63% men). PH was associated with older age [64 versus 60 years, odds ratio (OR) = 3.45, 95% confidence interval (CI) 2.73 – 4.34, p < .0001) and history of hypertension (38% versus 29%, OR = 1.66, 95% CI 1.39 – 1.97, p < .0001). Gender, prior CAD, left ventricular ejection fraction < 40%, or prior beta blocker use was not associated significantly with PH. Inducible myocardial ischemia was present in 48% of patients with PH compared to 45% in the control arm; however, coronary angiography was completed in only 11% of patients with PH and 8% of patients with normal BP response. Of the patients who underwent coronary angiography, PH did not predict angiographic evidence of obstructive CAD.

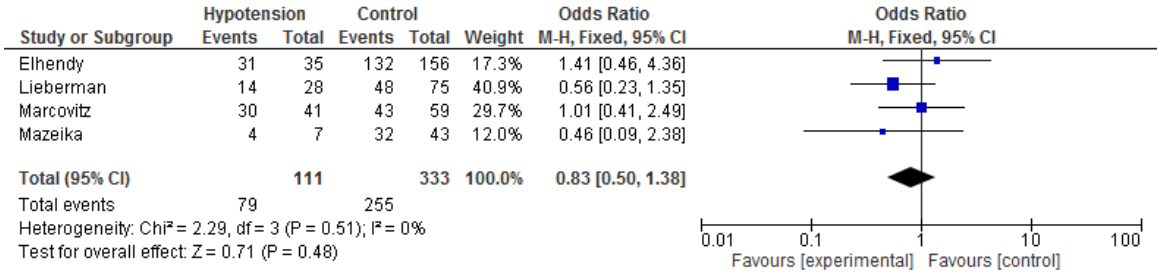
## Discussion and Conclusion

PH during DSE is seen in older patients with a history of hypertension and is highly associated with the presence of inducible ischemia. Additional studies are needed to further clarify the association of PH with CAD.

### Ischemia on Imaging




### Angiographic CAD



# POSTER PRESENTATION ABSTRACT

## Radiographic Parameters Associated with Acromial Stress Fractures after Reverse Total Shoulder Arthroplasty

*Shawn Yeazell, MD; Ajith Malige, MD; Hannah Milthorpe, MS3; Gregoray Carolan, MD*

### Introduction/Background

Acromial stress fractures are a potential complication of reverse total shoulder arthroplasty (rTSA). The purpose of this study was to examine the association between radiographic parameters of implant position and acromial stress fractures following rTSA.

### Methodology and Statistical Approach

We conducted a retrospective review of patients who underwent primary rTSA between January of 2013 and April of 2017. We included patients with a minimum of six months follow-up and appropriate postoperative x-rays. For each patient, eight measurements were obtained at the first postoperative visit on a true anteroposterier (AP) view of the shoulder. These measurements were then compared between patients who developed acromial stress fracture and those who did not. Patients were grouped on the basis of the presence of acromial stress fracture or no fracture. We calculated the mean, standard deviation, median, and range were calculated for all eight measurements and analyzed our data using the Mann-Whitney U test. For all analyses, $p < .05$ denotes statistical significance, with no adjustment for multiple comparisons.

### Results

Of the 105 rTSAs evaluated, eight shoulders were diagnosed with an acromial stress fracture. Three measurements [glenoid humerus distance (GH), acromial index (AI), and lateral humeral offset (LHO)] differed significantly between the fracture and non-fracture groups, with the fracture group demonstrating a more medial position of the humerus. The median non-fracture group's GH, AI, and LHO were 47.3 mm, 0.66 mm, and 16.5 mm, respectively, while the median fracture group's GH, AI, and LHO were 43.8 mm, 0.74 mm, and 10.9 mm, respectively. These between-group differences were statistically significant as follows: GH ($p = .014$), AI ($p = .007$), and LHO ($p = .003$). Fractures that were confirmed on CT scan were analyzed as a separate subgroup and maintained statistical significance for the same three measurements.

### Discussion and Conclusion

Our study found that a more medialized humeral component, as measured by GH, AI and LHO, is associated with the development of an acromial stress fracture following reverse total shoulder arthroplasty.

# MEDICAL STUDENT POSTER PRESENTATION ABSTRACT

## Epidural Ketamine Infusion for Pain Management in Trauma Patients with Rib Fracture

*Emily Du, MS4; Heather Alban, MSN; Alyssa Green, MD*

### Introduction/Background

Pain control is critical in the clinical management of patients with rib fracture in order to promote adequate ventilation and decrease complications such as pneumonia and atelectasis. While opioid analgesics have been the mainstay of pain management in traumatic injury, effective multimodal analgesia must be explored in the wake of the nation's current opioid epidemic. Our study sought to characterize the use of adjunctive analgesics and determine associations between adjunctive analgesics (particularly epidural ketamine infusion) and opioid medications for pain management in patients with rib fracture.

### Methodology and Statistical Approach

We conducted a retrospective cohort study to compare total opioid use in trauma patients who received a combination of opioid plus ketamine infusion therapy versus those who received stand-alone opioid therapy. We selected a non-probability convenience sample of trauma patients admitted from our hospital in 2017. Inclusion criteria were patients with any number of rib fractures, initial Glasgow Coma Score (GCS) $\geq 8$, Injury Severity Score (ISS) $\leq 25$, and age $\geq 18$ years old (N = 380). The hospital rib fracture protocol and clinical decision-making guided the pain management regimen patients received. Opioid consumption was standardized by converting all dosing into equianalgesic oral morphine equivalents (OME). We used descriptive statistics to analyze the data.

### Results

Our preliminary results came from a subset of study patients (n = 128). Epidural ketamine infusion was used sparingly as adjunctive pain management (n = 3), likely reflecting either patient ineligibility to receive it or physician preference. The mean number of rib fractures across all patients was 3.62 [standard error (SE) = .21, 95% confidence interval (CI) ± .41]. The mean quantity of opioids consumed by both groups combined was 45.39 OME per day (SE = 4.31, 95% CI ± 8.53).

### Discussion and Conclusion

Epidural ketamine infusion may present an opportunity for decreasing opioid use in patients with rib fractures. Future directions for this study include comparing the combination of opioid plus ketamine infusion therapy to stand-alone opioid therapy in patients with rib fractures. There is potential to incorporate ketamine more readily into pain management of rib fracture by addressing the barriers preventing its use.

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