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2019 Student Research Fellowship Program: SERF ABSTRACT Booklet

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SCHOOL OF MEDICINE
FORT WAYNE

Student Research Fellowship Program

Abstract Booklet

July 31, 2019

Are Trauma Centers in Northeast Indiana Prepared in Triage for Mass Casualty Events?

Andy Alvarez, BS; Deborah McMahan, MD; Lisa Hollister, MSN, RN; Thein Hlaing Zhu, MBBS, FACE, FRCP; Julie Hughbanks, MLS; Annette Chard, RN, CEN; Jana Sanders, M. En.

Objective: The purpose of this cross-sectional qualitative study is to assess key hospital staffs' gaps in knowledge in Mass Casualty Triage at trauma centers in Northeast Indiana. **Background:** Due to recent mass shootings, there has been a major emphasis on mass casualty preparedness across the nation. Mass casualty incidents (MCIs) are disasters that generate a number of casualties that disorganize the flow of the emergency department and overwhelm its resources. These disasters can be caused by natural events, like hurricanes, or be man-made events, such as mass shootings. Although, mass casualty plans have been implemented recent review suggest that we are not prepared and there is a need for improvement at trauma centers in Northeast Indiana. **Methods:** This study used a complete open-ended response questionnaire. Nine questions were developed based off the recommended actions for Triage from the World Health Organization's Hospital Emergency Response Checklist. The questionnaire was distributed electronically via SurveyMonkey®. A total of 17 participants were chosen based on their position from Parkview Hospital and Lutheran Hospital, respectively. Answers were graded based on best practices in the literature and hospital policy. **Results:** The results show that there were severe gaps in MCI triage knowledge: 76.5% of respondents were unable to describe the mechanism and steps whereby the hospital emergency response plan is activated; 64.7% were able to identify their designated triage officer; 70.6% were able to identify their MCI triage location; 47.1% were able to identify the location used for green triaged patients; Only 35.3% of respondents were able to explain alternative processes for admission and discharge during a MCI; and Less than 64% of respondents understood their hospitals MCI Triage Protocol. **Conclusion:** The results demonstrate that Trauma Centers in Northeast Indiana are not well prepared in Triage for Mass Casualty Events.

Severity of Obstructive Sleep Apnea: Patient Compliance and Treatment Response.

Grayson Bastin; Aaron Roberts, MD.

Objective: Based on the current literature, it is assumed patients diagnosed with severe obstructive sleep apnea (OSA) are more likely to use Continuous Positive Airway Pressure (CPAP) due to a greater improvement to quality of life. The goal of this study is to compare the compliance with CPAP for patients with mild, moderate, and severe OSA, as well as identify other potential predictors of CPAP compliance. **Background:** OSA is a prevalent disorder affecting 9-38% of the global population and is linked to multiple health complications and comorbidities. CPAP is accepted as the gold standard treatment for OSA, but its efficacy is limited by poor patient compliance. Studies have linked many clinical and lifestyle factors to CPAP adherence but have sometimes produced conflicting outcomes. **Methods & Design:** This study was a retrospective chart review of 100 patients seen by Dr. Aaron Roberts, MD, who were newly diagnosed with OSA and started on CPAP between 1/1/2017 – 1/1/2018. Baseline and demographic data, as well as past medical and medication history were recorded, along with OSA severity, daytime sleepiness, and compliance to CPAP therapy. Compliance was defined as CPAP device usage >4 hrs per night for ≥21/30 days. **Results:** Mean follow-up time after CPAP initiation was 3.19 months. 77% of subjects were compliant to CPAP therapy, of which 48% were males and 52% were females (P=0.48). CPAP compliance rates for mild OSA (79.3%), moderate OSA (73.7%), and severe OSA (78.8%) showed no significant difference (P=0.83) or correlation with compliance (P=0.99). Only seasonal allergies/allergic rhinitis showed a positive association with CPAP adherence (P = 0.031) and depression showed a negative association (P = 0.027). **Conclusion:** This study found level of OSA severity to not be a significant predictor of short-term CPAP compliance among newly diagnosed patients.

Interferon- β treatment to prolong t-PA treatment window in cerebral ischemia.

Kristopher D Bosi; Jui-Hung Yen, PhD.

Objective: Approximately ten percent of individuals with acute cerebral ischemia are eligible for thrombolytic treatment. The objective of this study is to establish whether matrix metalloproteinase (MMP) activity, implicated in exacerbating the cerebral infarct volume seen with delayed recombinant tissue plasminogen activator (tPA) treatment, can be suppressed with Interferon- β (IFN- β) and thus extend the therapeutic window of tPA. **Background:** Cerebral ischemia is a neurological deficit of cerebrovascular origin that can result in significant disability or death and is the 2nd leading cause of death worldwide. The pathological hallmarks of cerebral ischemia are excitotoxicity, oxidative damage, cell death, degradation of the blood brain barrier (BBB), and inflammation followed by resident microglia activation, peripheral immune cell infiltration and subsequent secondary neurodegeneration. The first line therapy for ischemic stroke is the powerful thrombolytic, tPA. However, only ten percent of patients are eligible for this treatment – primarily due to the risk of cerebral hemorrhage, secondary to BBB breakdown. **Methods and design:** We first investigated the therapeutic effect of IFN- β co-administered with tPA in the mouse model of transient middle cerebral artery occlusion/reperfusion. Second, using immunoblotting technique we investigated the expression levels of MMP-3 and MMP-9 in brain endothelial and microglial cell culture following treatments of TNF α , PGE2 and tPA in the presence or absence of IFN- β . **Results:** First, we demonstrated that IFN- β co-administered with tPA reduces the infarct size in ischemic brains receiving delayed treatment of tPA. Second, we demonstrated in microglial cell primary culture that MMP-9 expression induced by TNF α , PGE2, and tPA can be suppressed by IFN- β treatment. Our experiments to demonstrate the expression levels of MMP-3 and MMP-9 in brain endothelial cells following treatments of TNF α , PGE2 and tPA in the presence or absence of IFN- β still require optimization. **Conclusion:** Overall, these data indicate that IFN- β treatment is a viable therapeutic candidate to suppress the deleterious effects seen in delayed tPA treatment in the setting of acute cerebral ischemia. Furthermore, our preliminary data indicate that the molecular target of IFN- β , in this setting, belong to the MMP family of proteins.

Quantitative Effect of Emergency Department Case Management on Visits, Diagnostics, and Cost. Sergio Steven Cobos, BA; Nancy Connelly, RN, BSN; Jeffrey Nickel, MD; Cameron Duffner, BS. Objective: The objective of this study is to identify frequent emergency department (ED) users and review the intervention via case management that will decrease inappropriate ED use and reduce hospital costs. **Background:** EDs play an essential role within healthcare due to their ability to provide fast-paced care for patients suffering from acute illnesses and injuries. However, overcrowding within EDs is a major challenge faced by hospitals. Overcrowding leads to a decrease in the quality of care received by a patient, and a decrease in access to ED services. There are two main categories of users of the ED: chance users and frequent users. Frequent users correspond to 1-10% of total ED patients and 10-34% of total ED visits. In addition to this, the total cost of emergency care for frequent users was 5 times more than chance users. Multiple interventions have been studied, but case management is most prevalent and effective in decreasing ED visits and healthcare cost and increasing the quality of life for the patients. **Methods & Design:** This study examined records from 293 patients enrolled in the case management program between 2012 and 2018. The time of study ranged from 1 yr prior to the patient's enrollment in program through each patient's second year. A retrospective chart review was conducted and single-sided, paired t-tests and ANOVA was performed to test significance of results. **Results:** Outcomes of study indicated that Parkview Health ED Case Management Program is correlated to a reduction of more than 50% for ED visits, diagnostic tests, and cost of enrolled population. In addition, a mean cost reduction of \$1,489.37/patient was calculated over the course of study. **Conclusion:** Parkview Health ED's Case Management program demonstrated statistically significant reductions in ED visits, radiologic exposures, and affected costs over a 2-year duration.

Neonatal Follow Up Clinic: A Retrospective Chart Review of Developmental Outcomes.

Uchechukwu Emili, BS; Heather Wolfe, MD; Denise Gilham, NP; Susan Stace, RN, CPN.

Background: According to the CDC, preterm birth is defined as an infant born at or before 37 weeks of gestation. In 2016 preterm birth affected 1 in every 10 infants born in the United States. Preterm birth can cause birth defects along with developmental delays and has been attributed to 17% of infant deaths. Neonatal Follow Up clinics (NFC) have been instrumental in helping preterm infants catch up developmentally. **Objective:** To develop baseline measures of infant development for differently staged preterm infants in the hopes that these standards can be used assess preterm infant development in the NFC. **Method and Design:** A retrospective chart review was conducted to determine the developmental outcome of infants that were born at or prior to 37 weeks' gestation. Infants were divided into extreme, very, and moderate preterm cohorts based on gestational age at birth. Test of Infant Motor Performance (TIMP) and Ages and Stages Questionnaire (ASQ) scores were used to determine a standards for when preterm infant development. **Results:** Data showed that the developmental standard for each cohort varies. In the extreme preterm cohort, there was no point where they normalized to term infants at adjusted or chronological age. For the very preterm group and moderate preterm group, one sees a notable decrease in developmental delays by adjusted age 16 weeks (TIMP 2) and 6-8months (ASQ 6/8 months). **Conclusion:** Using the TIMP and ASQ to follow preterm infants in the NFC setting, one sees an improvement in development as early as 16 weeks with the administration of TIMP 2 in very preterm and moderate preterm infants but not extremely preterm infants. The standards developed in this study, should help NFCs better assess infant development in future.

Comparison of Technical Outcomes in Instrumented Posterolateral Fusion (PLF) with and without Transforaminal Lumbar Interbody Fusion (TLIF) performed using Silicon Nitride cages.

Mitchell Gray BA; Kyle Davis, BS; Lauren Jagger; Micah Smith MD.

Hypothesis: The objective of this study is to compare fusion rates, spinal parameters and complications for both PLF and TLIF using the silicon nitride cage (Si_3N_4). Our hypothesis is TLIF with a Si_3N_4 cage will have higher fusion rates, improved technical outcomes and fewer complications when compared to PLF alone. **Background:** Posterior lumbar fusion is performed for lumbar degeneration that leads to spinal stenosis and spondylolisthesis. Two common approaches include PLF and TLIF, with a current lack of consensus as to the superior approach. The Si_3N_4 cage has advantageous surface properties compared to other interbody cages, promoting theoretically higher fusion rates for TLIF procedures. **Methods:** A retrospective chart review of 102 spinal fusion patients (PLF=17, TLIF=85) was performed. One spine surgeon performed the fusions and reviewed pre-operative and post-operative radiographs. Measurable outcomes included fusion rates, surgical complications and pelvic/spinal radiographic parameters. Radiographic parameters included restoration of lumbar lordosis (LL), segmental lordosis (SL), pelvic incidence (PI), pelvic tilt (PT), disc height (DH) and foraminal height (FH). Patients who had ≥ 1 year follow up radiographs were included in analysis (PLF=16, TLIF=48). **Results:** TLIF patients with a Si_3N_4 cage had improved fusion rates (PLF=81.8%, TLIF=100% $p=0.003$), lumbar lordosis (PLF=-4.38° TLIF=3.15° $p=0.001$), disc height (PLF=0.55mm, TLIF=4.61mm $p<0.001$), foraminal height (PLF=-0.05mm, TLIF=2.41mm $p=0.036$) and a lower incidence of PI-LL mismatch (PLF=46.15%, TLIF=7.5% $p=0.004$). No statistically significant difference was found for surgical complications (PLF=11.1%, TLIF=17.6%) or segmental lordosis (PLF=-1.00mm, TLIF=1.17mm). An age difference of statistical significance was also found between the two patient populations (PLF=61.9, TLIF=54.1 $p=0.018$). **Conclusion:** Despite the difference in age between the procedure groups, TLIF with a Si_3N_4 cage proved to be superior in fusion rates, lumbar lordosis, PI-LL match, disc height and foraminal height restoration.

Long Term Outcomes of Iliac Artery Aneurysm (IAA) and Abdominal Aortic Aneurysm (AAA) Repair with Endovascular Procedures at the Parkview Heart Institute.

Christopher Herrera, BS; Douglas Gray, MD; Kim Recht, NP.

Background: Favorable characteristics of the minimally invasive endovascular aneurysm repair (EVAR), such as a reduced recovery time, have led physicians and patients alike to elect for this procedure over open repair. Longitudinal study on endovascular repair has raised concerns regarding an increased rate of late failure leading to rupture and overall higher rates of re-intervention for patients.

Objective: This project compares the outcomes of endovascular stent graft repairs of AAA and IAA at Parkview Heart Institute over a certain time span. **Methods & Design:** This study is a retrospective review of patients (N=89) with AAA/IAA repair since 2014. The EPIC online medical record is the main tool in data extraction while statistical analysis was conducted via Microsoft Excel ($p = 0.05$).

Results: Males, ages 51-75 y.o., White population, non-Hispanics, and BMI rating of 1-30 were observed to have more AAAs. A significant decrease in length of stay over historical averages was observed with at most 1-3 days and minimal complications. Most causes for re-interventions were due to endo-leaks. More than 60% of patients with AAA and EVAR have a significant past medical history of smoking, hypertension, and chronic obstructive pulmonary disease. Finally, most pre- and post-operative aneurysms sizes are within 41-60 mm in diameter. **Conclusion and Potential Impact:** This study analyzed 89 patients that experienced AAA instead of IAA. Certain populations, such as being male, ages 51-75 y.o., White population, non-Hispanics, and BMI rating of 1-30 with past medical history characteristics are frequent in patients with EVAR. The procedure has minimal complications in comparison to open abdominal surgery, and this study will add to the literature by aiding physicians' determination of the best course of action for treating patients with AAA/IAA.

Malpractice in Shoulder Surgeries

Connor T. Holcomb, BS; Adam D. Hall, MD.

Objective: The objective of this study was to determine the influencing variables in malpractice cases following shoulder surgery in order to extrapolate correlations and trends. **Background:** It is estimated that 4.5 million Americans visit their physician each year for shoulder pain. Many patients require surgical intervention, and the total number of shoulder surgeries performed each year continues to rise. Any practicing physician is prone to litigation, but orthopedic surgeons have been shown to be at an increased risk. To date, there is one published study that has reviewed medical malpractice following shoulder surgery. This study will investigate postoperative complications following shoulder surgery that resulted in litigation. **Methods & Design:** A retrospective cohort study was performed utilizing closed legal claims provided by a medical liability insurance company. A total of 68 cases closed between January 1, 2017 and December 31, 2018 were provided. Two cases were excluded; one was due to the patient being under eighteen years of age and the other lacked sufficient information. Each case was coded by a legal team and included patient demographics, allegation codes, contributing/risk factors, and clinical narratives. **Results:** Improper performance of the surgery (37 cases; 56.1%) and improper management of the surgical patient (13 cases; 19.7%) were the most documented allegations. Postoperative complications were recorded in 87.9% of the cases. A total of 16 of the 66 included cases settled with financial compensation, and the mean indemnity payment paid was \$124,641.31 SD \pm \$98,090.90. **Conclusion:** In cases where there was a settlement, litigation following shoulder replacement led to the highest mean indemnity payment. Postoperative complaints of shoulder dysfunction were correlated with a verdict in favor of the plaintiff. Because of the high number of postoperative complications, it is important that physicians discuss the risks of surgery and success rates thoroughly with each patient before performing the procedure.

Impact of IVC Filter Guidelines, Registry, and Clinic on Filter Retrieval.

Brandon Kiley, BS; Lisa Hollister, MSN, RN; Eric White, MD; Emily Keltner, BS, MA; Thein Zhu, MBBS, FACE, FRCP; Dazar Opoku, MPH. **Objective:** Retrievable inferior vena cava filters (IVCFs) are associated with serious complications if not promptly removed and have subsequently become the subject of litigation. The objective of the present study is to compare IVCF retrieval rate and dwell time before and after implementation of IVCF guidelines, registry and clinic at single tertiary care center.

Background: Deep vein thrombosis (DVT) and pulmonary embolism (PE), collectively referred to as venous thromboembolism (VTE), are serious medical conditions that affect up to 900,000 Americans yearly, accounting for up to 100,000 deaths. The first line treatment for VTE is anticoagulation; however, in patients who experience a contraindication to, or failure of anticoagulation, an IVCF may be used. Retrievable filters are indicated when the contraindication to anticoagulation is transient, and they may be removed once the contraindication has passed. Retrievable filters have become associated with serious complications such as filter fracture, migration, and IVC perforation. **Methods & Design:** This study was a mixed retrospective and prospective chart review of patients who received an IVCF before and after implementation of IVCF guidelines, registry, and clinic. The guidelines, registry, and clinic were established in 2017. Cases were analyzed based on filter insertion during the years 2014-2015 (n=191) and 2017-2018 (n=103). Data was obtained on filter retrieval rate, dwell time, filter-associated complications, and indication for placement. **Results:** There was a significant decrease in dwell time (310 ± 38 days vs 130 ± 14 days, $p < 0.001$) and a significant increase in retrieval rate following clinic implementation (46.86% vs 71.58%, $p < 0.001$). There was a reduction in patients lost to follow-up (27.90% vs 2.90%, $p < 0.001$). There was no change in complication rate. **Conclusion:** Implementation of guidelines, registry, and clinic were effective in improving patient follow-up and filter retrieval. Although there was no significant difference in complication rate, these efforts may be protective against litigation by patients who experience a filter-associated complication.

A Comparison of the Accuracy of WATCHMAN Device Sizing between CT, TEE, and Patient Specific 3D Models. **Luke Landrigan, BS; John Lozo, BS; T Eric White, MD; Emily Keltner, BS, MA.** **Objective:** The objective of this study is to evaluate the accuracy of computerized tomography (CT) and CT-based 3-dimensional (3D) models for preprocedural device sizing for the WATCHMAN procedure in comparison to the use of transesophageal echocardiography (TEE). **Background:** Patients with atrial fibrillation (AF) are five times more likely to have a stroke than the general population. First line therapy for stroke risk reduction in these patients is anticoagulation therapy. For individuals contraindicated for anticoagulation therapy, an available alternative is the occlusion of the left atrial appendage (LAA) with a WATCHMAN device. TEE is the current standard for preprocedural planning and device sizing, but the unique anatomy of each LAA presents many challenges and limitations when imaging with TEE. **Methods and Design:** All 32 patients underwent the WATCHMAN procedure prior to the study. TEE measurements for maximum LAA orifice diameter were collected retrospectively. Patient specific 3D models and CT scans were evaluated retrospectively to measure maximum LAA orifice diameter. Measurements as well as predicted device sizes were compared among the three modalities. **Results:** The maximum LAA orifice diameter measurements from 3D models and CT images were 3.4 ± 3.1 mm ($p < 0.00001$) and 4.2 ± 3.5 mm ($p < 0.00001$) larger than measurements from TEE, respectively (mean \pm SD). The maximum LAA orifice diameter measurements from CT scans were 1.0 ± 2.3 mm ($p = 0.03$) larger than measurements from 3D models. Device sizing with 3D models was 18.7% and 9.3% more accurate than TEE and CT, respectively, while CT was 9.4% more accurate than TEE. **Conclusion and Potential Impact:** CT imaging and CT-based 3D models for preprocedural planning of the WATCHMAN procedure appear not only to be accurate methods for correct device sizing, but more accurate than the traditionally used TEE. More accurate device sizing and LAA assessment will potentially minimize radiation exposure to patients and reduce procedure time and cost.

Magnesium Effects on Target Specificity for Trm4 and NSUN2. Randall McComb MS; Kent

Redman PhD; Haley Moon, MS. Objective: Oxidative stress causes a cascade of protective processes within cells. One response involves increased translation of stress proteins through codon biased translation, resulting from stress-induced changes in transfer RNA (tRNA) methylation. The goal of this project is to understand the mechanism by which tRNA methyltransferase activity is altered in response to oxidative stress. This research is testing the hypothesis that stress induced elevation of free magnesium plays a key role in this cellular pathway. **Background:** Alterations in protein synthesis is a direct result of methylation patterns performed by Trm4 in yeast. The tRNA^{Leu(CAA)} during oxidative stress is methylated by Trm4 (Chan et al, 2012), and results in increased translational efficiency of UGG codon. Interestingly, many stress proteins have rich UUG codon sequences residing in them. Specifically, the methylation occurs at position 34 which results in increased binding to the A site of the ribosome. A similar mechanism may occur in humans with NSUN2 and tRNA^{Leu(CAA)} methylation at position 34. However, the switch to signal oxidative stress is occurring can be convoluted and difficult to pin down one culprit. Research into the cascade following oxidative stress has shown that as adenosine triphosphate (ATP) levels drop, [Mg²⁺] concomitantly increases. Mg²⁺ therefore is free to influence other biochemical processes such as complex formation with tRNA methyltransferases. **Methods & Design:** Using a bacterial system, Trm4 and Nsun2 will be expressed as his6 tagged proteins. The ability of Trm4 and NSUN2 to form complexes with mature and immature tRNA will be observed with altering [Mg²⁺]. Following this notion, methylation patterns and specificity on RNA substrates of Trm4 and NSUN2 will be observed. To form a complete model of the mechanism, we will test the ability of Trm4 and NSUN2 to form complexes with previously methylated RNA with altering [Mg²⁺]. **Results:** The results of these experiments demonstrated that Mg²⁺ inhibited complex formation of invitro transcribed tRNA^{Leu} but not invitro transcribed pre-tRNA^{Leu}. Mg²⁺ inhibition of complex formation was reversed upon application of a metal chelator (ATP or citrate). The results show Mg²⁺ depletion does inhibit growth upon application of a oxidative stressor (H₂O₂). The results of the methylation assays are still pending. **Conclusion:** In yeast, Trm4 knockouts were sensitized to oxidative stress. Increasing the [Mg²⁺] inhibited Trm4 from methylating mature tRNA^{Leu(CAA)}, and blocked complex formation with previously methylated mature tRNA^{Leu(CAA)}. However, increasing the [Mg²⁺] did not inhibit Trm4 methylation of pre-tRNA^{Leu(CAA)} nor complex formation. This suggests that the Mg²⁺ effect may be specific to mature tRNA^{Leu} and demonstrates the influential role Mg²⁺ has during times of stress. NSUN2 demonstrated a similar pattern of methylation specificity in regards to altering [Mg²⁺]. These results support a model where oxidative stress lowers ATP levels with a concomitant increase in [Mg²⁺]. This increased magnesium concentration has a direct and purposeful impact upon methylation target specificity for Trm4 and NSUN2. The end result being increased translational efficiency of stress proteins containing the UUG codon sequence.

An Analysis of Percutaneous Transluminal Angioplasty Treatment Outcomes on Critical Limb Ischemia Patients. Alexia Parra BS; Dr. Hollace Chastain MD; Emily Keltner BS, MA.

Background and Hypothesis: Peripheral arterial disease (PAD) is estimated to affect as many as 8.5 million U.S. citizens. Critical limb ischemia (CLI) presents as the end stage of peripheral arterial disease. Around 11% of PAD patients will progress to the development of CLI. Percutaneous transluminal angioplasty (PTA) is one of the standard treatment options for CLI patients. The objective of this study was to determine outcomes for CLI patients that underwent PTA procedures at Parkview Hospital. The primary outcomes evaluated include limb salvage and mortality at one-year post treatment. **Project Methods:** This study was conducted using a National Cardiovascular Data Registry (NCDR®)-Peripheral Vascular Intervention Registry (PVI™) at Parkview Health. A retrospective chart review was completed on the included patients using Parkview Health databases and their electronic medical record system EPIC. A total of 316 individual patients that underwent PTA procedures between the years of 2015 and 2018 were evaluated for primary outcomes. **Results:** Limb salvage was defined as the absence of history of major amputation at one-year post treatment. 85.6% of patients were shown to have limb salvage. One-year mortality was present in 14.3% of patients evaluated in the PVI™ Registry. Chi-square analysis yielded no significant difference between gender, diabetic history, or history of smoking on primary outcomes. **Conclusion and Potential Impact:** Peripheral arterial disease and critical limb ischemia have a sizeable impact on the United States population. Percutaneous transluminal angioplasty is a treatment that is able to re-establish blood flow for CLI patients and provide them with a sustained quality of life in many cases.

Epidemiological Assessment of GI BioFire Negative Tests at Parkview Health.

Brycen Ratcliffe BS; Candace Rodgers RN; R. Scott Stienecker MD.

Background and Hypothesis: With advances in multiplex PCR testing (i.e. GI BioFire), many gastrointestinal pathogens can be identified in about an hour and provide increased specificity comparative to traditional detection methods. At Parkview Health, 60.4% of samples return with no microorganisms found; this suggests tests are often ordered needlessly, creating misused time and costs. This study evaluated the negative GI BioFire results and ordering patterns of providers at Parkview Health to determine adherence to diagnostic stewardship principles.

Design: This retrospective chart review investigated 300 negative GI BioFire results from in 2018. Patient records were retrieved from Parkview LIS and EPIC software. Inclusion Criteria: negative gastrointestinal BioFire results. Exclusion Criteria: positive results, negative results outside the study period, any data from patients not admitted at Parkview Health.

Results: This study found that 73.4% of tests did not follow ACG guidelines stating diarrhea must have persisted longer than seven days; 51.0% were administered laxative; 57.0% of patients had diarrhea-associated co-morbidities; 14.3% had redundant tests; 79.3% had laxatives concurrently administered or did not follow ACG guidelines; 19.7% had endoscopic procedures within eight weeks of assay testing; 18.9% had non-reported diarrhea consistency; 79.3% had at least one C-Diff diarrhea risk factor. Of providers ordering the assay, 45.9% were hospitalists, 5.5% were surgeons, and 17.9% were infectious disease or gastroenterologists. **Conclusion and Potential Impact:** This data suggests that utilizing C-Diff antigen testing is more cost effective and should be used before GI BioFire for those with C-Diff risk factors. Following ACG guidelines, and deferring those administered laxatives would eliminate over three-quarters of negative panels. Documentation of stool consistency, volume and suspicious etiologies are essential to furthering diagnostic stewardship. These recommendations will save approximately \$1,036,399 after consideration for C-Diff antigen testing replacement per year for Parkview Health.

Orthostatic Hypotension Diagnosis and Management in the Context of a Multi-disciplinary Fall Prevention Care Model. Taylor Schaetzle, BS; Fen Lei Chang, MD, PhD.

Objective: The objective of the present study was to evaluate the effect of blood pressure (BP) status and management on fall prevention in a multidisciplinary team clinic. **Background:** Falls are the leading cause of fatal and nonfatal injuries among adults 65 years and older. BP management and neurological assessment have not been a common element in fall prevention programs. Hypertension is one of the most pressing concerns in the elderly population. In addition, age-related changes in baroreceptor sensitivity lead to increased risk for orthostatic hypotension (OH) and falls. Reduced baroreceptor function modifies the response of geriatric patients to antihypertensive drugs, resulting in more marked drops in BP. Although hypertension remains a common problem among geriatric patients, antihypertensive medications may induce OH and increase fall risk. **Methods & Design:** This is a retrospective study of 82 patients with initial referrals to the Parkview Fall Prevention Clinic after January 2016. Of the original 225 patients, 143 were excluded due to incomplete follow-up data. **Results:** 17 (20.7%) of 82 had documented evidence for OH. For all patients, significant fall reduction was noted 6 months after the clinical visit ($p < 0.01$), including in our OH subgroup ($p < 0.04$). The number of BP or total medications was not significantly reduced between initial visit and follow-up in patients with OH. In all patients, lower overall medication load (< 10 vs. > 10) was associated with fewer falls and OH was associated with severe neuropathy. **Conclusion:** Patients with or without OH all benefited from recommendations made by a multi-disciplinary team. Failure to reduce the medication load in OH patients suggests a missed opportunity to further decrease fall risk, as we showed fewer medications is associated with fewer falls. Our study suggests that when evaluating neuropathy's role in fall risk one should consider OH in addition to gait ataxia, impaired proprioception and lower extremity weakness. Findings are supportive of a multi-disciplinary care model for fall prevention in the elderly regardless of OH status.

Complications of DBS replacement surgeries: optimizing individualized treatment options for patients. Samuel Stegelmann BS; Fen-Lei Chang MD, PhD; William Young MD.

Objective: Our objective was to identify post-operative complications of IG replacement surgeries and identify patient characteristics that were associated with a higher risk of complications. **Background:** Deep brain stimulation (DBS) is an FDA-approved treatment for numerous neurological conditions. The device is powered by an impulse generator (IG) with a fixed-live or rechargeable battery. IG replacement is a surgical procedure associated with complication risks, the most common being surgical site infection (SSI). Data suggests patients with certain risk factors are at higher risks for surgical complications, but limited studies have sought to characterize these. **Methods & Design:** This retrospective chart review included patients who underwent IG replacement surgery at Parkview Health between 2006-2019. **Results:** 50 patients received 71 IG replacement surgeries, with SSIs occurring in 3 surgeries (4.23%). Patients with SSIs had an average BMI of 27.7 ± 4.65 , non-significantly lower than those without SSIs (30.08 ± 5.78). 66% of patients with SSIs had diabetes ($n=2$) and 100% had hypertension ($n=3$), in contrast to the non-SSI group, where 23.5% had diabetes ($n=16$, $\chi^2=0.09$) and 51.5% had hypertension ($n=35$, $\chi^2=0.10$). SSIs occurred significantly more in patients with both diabetes and hypertension ($\chi^2=0.03$). **Conclusion:** SSI rates were within the range of those found in literature. Besides diabetes and hypertension combined, our small sample size was under-powered to identify statistically significant risk factors for SSIs, although diabetes and hypertension individually were suggestive. Effort to expand our study to more neurosurgeons in the same network is underway. By expanding this project, we aim to improve healthcare quality and cost-effectiveness. Newer rechargeable batteries can eliminate repeated IG replacement surgeries, thus eliminating surgery-related SSIs, but insurance was often reluctant to cover this option due to higher initial costs. Our ability to identify patients with higher risk of SSIs may provide a better balance between patient morbidity, patient preference, and cost containment.

Rapid Identification of Large Vessel Occlusion Stroke Subtype in the Pre-hospital Setting.

Daniel Torolira, BS; Sara Brown, MD; Fen-Lei Chang, MD, PhD.

Objective: This study aims to develop a large vessel occlusion stroke (LVO) predictor model with high sensitivity and specificity for use by EMS in the pre-hospital setting to better identify LVO from other stroke subtypes in suspected acute stroke patients. **Background:** Stroke treatment is highly time-sensitive, with an estimated 1.9 million neurons dying per minute during an untreated ischemic stroke. The recent advent of mechanical thrombectomy (MT) in treating LVO strokes has generated a need to rapidly identify LVO patients in the pre-hospital setting for immediate transport by EMS to an MT-capable Comprehensive Stroke Center, as opposed to the patient's nearest hospital, thus reducing time-to-treatment and improving patient outcome. While various grading scales, such as the C-STAT, have been developed for this purpose, all have shown to lack sensitivity and specificity for accurate LVO determination. We hypothesize that a new scale combining common LVO presentations as positive values and those of other stroke subtypes, such as small vessel occlusion (SVO), cardioembolic (CE), embolic, and hemorrhagic (ICH/SAH) stroke as negative values will increase the accuracy of LVO determination. **Methods:** This is a retrospective chart review analysis of 148 patients evaluated for stroke between January 2017-May 2018 at the Parkview Regional Medical Center with imaging confirmed LVO, SVO, CE, embolic, ICH, or SAH diagnoses. **Results:** C-STAT stroke scale had a sensitivity of 66.7% and a specificity of 73.0% in differentiating LVO from other stroke subtypes. Compared to C-STAT, our new model showed a significantly higher sensitivity of 93.8% ($p=0.0004$) and a non-significantly increased specificity of 81.0% ($p=0.084$). **Conclusion:** Our findings suggest that our new scale may allow for a more accurate determination of LVO stroke in the pre-hospital setting without significant delay. A prospective, larger patient cohort in a pre-hospital setting is needed to validate these findings.

Evaluation of Lung Nodules with Positron Emission Tomography in Region Endemic to Fungal Infections. William Voors, BS; Abhishek Biswas, MD, FACP.

Background and Hypothesis: 18 F-fluorodeoxyglucose-positron emission tomography (FDG-PET) will have a lower specificity in a region endemic to fungal infections when trying to predict lung cancer. Pulmonary nodule (PN) is < 3 cm diameter mass within the lung parenchyma [1]. ~94.5% of all PN discovered on CT are noncancerous [2]. Positron emission tomography (PET) is used to evaluate the risk for malignancy, however it is not specific to tumor [3]. Granulomatous diseases can resemble cancer on PET, lowering specificity to 40% without change in sensitivity [4, 5]. False positives make it likelier for a patient to undergo unnecessary biopsies and/or surgical interventions. **Experimental Design or Project Methods:** This retrospective study gathered information on patients who underwent both a CT and FDG-PET due to a pulmonary nodule between January 2017 and January 2019. Any nodule with a SUV greater than 2.5 was considered as a positive indication for a malignant tumor. Follow-up biopsy, resection and/or CT determined the pathology of the nodule. **Results:** Of the 463 patients included, 324 had benign growths and 159 had malignant. 51% of both malignant and benign nodules was between 1 and 2 cm in size. Malignant nodules had a mean SUV of 9.35 while the benign was 1.35. The PET sensitivity was 94%, specificity 74%, PPV 60% and NPV 98%. The Positive Likelihood Ratio was 3.551 and Negative .0783. **Conclusion and Potential Impact:** The results of this study yielded a similar sensitivity to other studies but lower accuracy and PPV. PET specificity was lower than the average of similar studies but still within one standard deviation of the mean. The study concludes that in regions endemic to fungal infections, PET remains an effective tool for ruling out lung cancer, but further diagnostic testing must discern false positives. Further studies should be performed to characterize cancer vs benign growth indications.

Brain Metastasis as Exclusion Criteria in Clinical Trials Involving Extensive-Stage Small Cell Lung Cancer. Andy Wang, Takefumi Komiya MD.

Background: The American Society of Clinical Oncology (ASCO) and Friends of Cancer Research (FOCR) submitted recommendations to the FDA to reduce barriers in clinical trial participation. They proposed the removal of several specific exclusion criteria, including brain metastasis. Clinical trials involving small cell lung cancer (SCLC) have varying exclusion criteria regarding brain metastasis.

Methods: We completed an online search of clinicaltrials.gov for the query “small cell lung cancer, extensive stage.” The trials were classified into a group of strict exclusion, allowed only if treated, allowed without treatment, or undefined. Relationships between status of brain metastasis in exclusion criteria and study characteristics (trial status, trial design, sponsor, location, and treatment groups) were investigated by chi-squared test. The trends of exclusion status were investigated by a comparison against the variable time. **Results:** Of the 204 eligible trials, 32 strictly excluded any form or history of CNS metastases, 129 allowed patients that are undergoing or have undergone CNS-specific therapy, 9 allowed patients without any CNS-specific therapy, and 34 did not mention any criteria involving CNS metastases. Studies conducted outside the United States and with single systemic therapy were associated with strict exclusion of brain metastasis. ($p=0.026$ and 0.039 , respectively). The proportion of clinical trials with strict exclusion has remained around 15% for the past few decades. **Conclusion:** Non-US and single systemic therapy studies are more commonly associated with strict exclusion of brain metastasis in ES-SCLC trials. The strict exclusion of brain metastases in clinical trials has remained relatively constant for the past few decades.