

# GHS Health Sciences Center Research Showcase

*April 13, 2018*  
*GHS Community Room*  
*12:00 – 2:00 PM*

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GHS Health Sciences Center Partners





## 2018 GHS HSC Research Showcase

12:00 PM – 1:30 PM *Poster Presentations*

1:30 PM – 2:00 PM *Showcase Awards Presentation*

**Outstanding Research Team Member**

**GHS Proceedings Manuscript Awards**

*Best Original Research Article*

**Poster Awards**

*Best Overall Research*

*Runner-Up Best Overall Research*

*Best Investigation in Population Health*

*Best Investigation in High Value Care*

*Best Investigation in Diabetes*

*Recognition for Patient Engagement in Research*

*Patient Engagement Champion*

**Student Posters**

*Outstanding Medical Student Research*

*Outstanding Nursing Student Research*

*Early Investigator's Award*

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## 1. Antibiotic Irrigation of the Surgical Site Decreases Incidence of Surgical Site Infection After Open Ventral Hernia Repair

**Authors:** *Fatula LB, Nelson A, Abbad H, Ewing JA, Hancock BH, Cobb WS, Carbonell AM, Warren JA H Abbad*

**Purpose:** Antibiotic lavage of the surgical field before abdominal wall closure has been shown to lower the incidence both intraabdominal and soft tissue SSI. We hypothesize this combination decreases incidence of SSI after OVHR.

**Methods:** Retrospective review of OVHR with mesh at a single high-volume center (Greenville Health System Hernia Center) between 2008 and 2017. All patients were repaired in an open fashion with mesh, primarily in the retromuscular space. Four groups were identified: Patients receiving no antibiotic irrigation (Group 1), Gentamicin (G) alone (Group 2) or G+Clindamycin (C) irrigation (Group 3). Analysis was completed using Chi-square or Fischer's Exact test (for  $n < 5$ ), ANOVA, or Kruskal-Wallis test, and finally logistic regression to determine the effects of irrigation on SSI.

**Results:** We identified 852 patients undergoing OVHR. No irrigation was used in 260 patients, Gentamicin alone was used in 266 patients, and G+C was used in 299 patients; 27 patients were excluded due to use of different antibiotic regimen. Incidence of SSI was also significantly lower after G+C irrigation, but not Gentamicin alone (Grp 1, 16.5%; Grp 2, 15.4%; Grp 3, 5.0%;  $p < 0.001$ ). Multivariate logistic regression demonstrated significantly increased SSI with contaminated wounds (OR 4; 95% CI 2.0-8.2), dirty wounds (OR 6.3; 95% CI 2.9-13.4), and COPD (OR 4.1; 95% CI 2.4-6.9), as expected. Use of G+C was an independent predictor of decreased SSI (OR 0.29; 95% CI 0.14-0.58).

**Conclusion:** Irrigation with a combined Gentamicin + Clindamycin antibiotic irrigation significantly reduces the incidence of surgical site infection following open ventral hernia repair with mesh.

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## 2. Fine Needle Aspiration Versus Gencut Core: Is One Biopsy Method Superior in Terms of Tissue Volume?

**Authors:** *Tiffanie Aiken, Allyson L. Hale, Joseph A. Ewing, William D. Bolton, James E. Stephenson, Sharon Ben-Or*

**Purpose:** Though multiple tools are used for biopsy via navigational bronchoscopy (ENB), the increase in genetic testing has created a need for biopsying additional tissue volume. Tissue volumes biopsied via fine needle aspiration and Gencut™ Core were compared.

**Method:** Between May 2016 and May 2017, we retrospectively reviewed 17 consecutive patients who underwent ENB and had biopsies via FNA and Gencut. Obtained specimens were prepared for cell block and/or slides. Data collection included lesion size, lobe location, tissue volume, and number of cell blocks and slides per biopsy. Primary endpoint was difference in total tissue volume biopsied. Impact on tissue volume according to number of cell blocks or slides per biopsy was also compared. Secondary endpoint was diagnostic accuracy.

**Results:** During the study period, a total of 20 lesions were biopsied. Lesion characteristics are described in Table 1. Overall, the Gencut Core biopsies were significantly larger in mean tissue volume than FNA (Gencut,  $0.47 \pm 0.34$  mL vs. FNA,  $0.19 \pm 0.12$  mL;  $p < 0.001$ ). A total of 7 biopsies in each group (FNAs vs. Gencut) underwent both 3 slides and 3 cell blocks. From these, the Gencut mean tissue volume ( $0.643$  mL, CI:  $0.338, 0.948$ ) was larger than the FNA ( $0.214$  mL, CI:  $0.115, 0.314$ ) with no overlap in confidence intervals. No differences in diagnostic accuracy were seen between biopsy methods, as both reported an accuracy rate of 90%.

**Conclusion:** Our findings suggest that Gencut Core may be a better biopsy tool than FNA in terms of providing increased tissue volume.

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### 3. Volumetric analysis of patients undergoing abdominal wall reconstruction after preoperative progressive pneumoperitoneum

*John M. Allen, Jeremy Warren, Joseph S. Bittle*

**Introduction:** Preoperative progressive pneumoperitoneum (PPP) is a method of increasing abdominal cavity volume prior to repair of massive incisional hernias with loss of abdominal domain (LOD). We hypothesize that the increase in abdominal cavity volume after PPP is adequate to accommodate the initial hernia contents.

**Methods:** Retrospective review of all PPP patients over a 10 year period. Volumetric analysis was performed prior to and after PPP as described previously. The accommodating volume (AV) was defined as the Abdominal cavity volume (ACV) – (pre PPP ACV + pre PPP hernia sac volume). Primary outcomes were AV, change in length abdominal wall musculature. Secondary outcomes were LOS, SSO, SSI, recurrence, and readmission.

**Results:** Twenty-nine patients underwent PPP. Mean hernia width was 18.6 cm, with an ACV:HSV ratio of 40%. Mean time of PPP was 7.7 days. The mean increase of ACV after PPP was 3.3L with mean AV of 0.37L. All repairs were open with the majority having mesh in retro- muscular position (75.9%). Average increase in oblique muscle complex length and rectus muscle width was 2.57 cm and 1.04 cm respectively. Fascial closure was achieved in 65.5%. The AV significantly impact fascial closure, with a mean AV of 1.1L when fascial closure was achieved and - 1.6L when closure was not achieved. Similarly, increasing hernia width impacted closure, with a mean width of 24.2 cm in those unable to be closed and 15.6 cm when closure was possible. Complications included SSO in 48%, SSI in 27.6%, and SSO requiring intervention in 71.4%. Recurrence was 24.1% with mean 26.7 month follow-up.

**Conclusion:** Patients with LOD benefit from PPP by increasing ACV and lengthening abdominal wall musculature to accommodate initial herniated contents. Greater hernia width, ACV:HSV and AV predict ability to close fascia.

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### 4. Model for Management of Medicare Patients with Congestive Heart Failure and Multiple Chronic Conditions

*Brent Egan, Joel Amidon, Bruce Hanlin, Irfan Asif*

**Introduction:** Patients with multiple chronic conditions (MCCs) research shows receive suboptimal care and utilize greater healthcare dollars. Medicare beneficiaries with MCCs have been shown to be as high as 68 %. Integrated multidisciplinary care guidelines have been recommended since the 2001 report "Crossing the Quality Chasm" by The Institute of Medicine.

**Methods:** A retrospective EMR review was performed on Medicare patients that clustered based on diagnosis.

**Results:** A 12 cluster model was selected. Two clusters with 21% of beneficiaries had an extreme burden of MCCs including chronic heart failure (percentage of Medicare beneficiaries /mean MCCs per patient [12.3%/9.8]) and chronic kidney disease (8.6%/7.5). Five clusters with 52% of beneficiaries had a high burden of chronic disease (diabetes mellitus [13.0%/5.9], cancer [10.6%/5.8], vascular disease [10.9%/5.4], chronic lung disease [10.3%/5.1], and behavioral and addictive disorders [7.0%/4.6]. Five clusters with 27% of beneficiaries had an intermediate to low burden of MCCs (obesity [8.3%/3.3], osteoarthritis [4.0%/3.0], hypertension [5.3%/2.5], hyperlipidemia [2.3%/1.7] and a 'healthy' group [7.4%/0.4].

**Discussion:** Congestive Heart Failure has been found to be the primary cost diagnosis for Medicare and these patients are admitted to the hospital frequently but only 10% of these admissions are for heart failure. We have created integrated Congestive Heart Failure treatment guidelines for patients with MCCs and we are piloting their use in clinical practice at Center for Family Medicine in an attempt to reduce hospital admission rates and provide quality care to complex patients which has demonstrated an initial decrease in ED and hospital utilization.

## 5. The Clinical and Economic Impact of a Physical Activity-Based Treatment Program for Severe Obesity: 2-Year Follow-up

*Irfan M. Asif, Joseph A. Ewing, Samantha H. Reid, Nathan Schewecke, Allyson Hale, Vicki Nelson, Michael Wiederman*

**Purpose:** To determine the clinical and economic impact of a physical activity-based program to treat severe obesity in patients at high-risk for cardiovascular disease.

**Methods:** 127 individuals were enrolled in a 12-week program focused on physical activity, healthy eating, stress reduction and behavior change. Clinical variables of body mass index (BMI), hemoglobin A1c (A1c), low-density lipoprotein (LDL) and systolic/diastolic blood pressure (SBP/DBP) were obtained at baseline, program completion, and one and two years after program completion.

To calculate economic impact, program participants were matched with non-participants by age, gender, BMI, occupation, and health-related risk adjustment. Economic data was determined utilizing total healthcare costs, including prescriptions, outpatient visits, emergency room visits, and inpatient visits for the year prior through two years after program completion.

**Results:** At baseline, program participants were on average obese (BMI=39.9 kg/m<sup>2</sup> ±6.2), pre-diabetic (A1c=5.86 ±0.9), pre-hypertensive (BP=126.8 mmHg ± 8.6/ 80.9 ± 8.9), and had an LDL of 109.5 ± 31.8. All clinical variables significantly improved after the 12-week program, except LDL (BMI=38.7 kg/m<sup>2</sup>± 6.1, p<0.001; A1c=5.72 ± 0.9, p<0.001; LDL=106.4 ± 32.0, p=0.07; SBP=123.1 mmHg ± 8.9, p<0.001; DBP=78.5 mmHg ± 6.7, p<0.01). After one and two years, there were no significant differences in clinical variables compared to baseline.

Healthcare expenditure decreased by \$73,288 (\$726/person) among program participants one year after program completion, with persistent but smaller, cost-savings at two years (\$57,922; \$574/person). Expenditure was lower compared to matched non-participants at one (\$55,313; \$547/person) and two years (\$29,936; \$299/person) following program completion.

**Conclusions:** Physical activity-based wellness programs have short-term clinical and economic benefits for patients at high-risk for cardiovascular disease, but these benefits appear to diminish over time.

**Significance:** Physical activity can play a prominent role in the prevention and treatment of chronic disease in value-based healthcare reimbursement models, but novel methods for continued patient engagement may be needed for long-term clinical and economic sustainability.

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## 6. Comparison of electrocardiographic interpretation criteria for use in athlete screening

*Elizabeth E. Barton, Vicki R. Nelson, Joseph A. Ewing, Brett G. Toresdahl, Jonathan A. Drezner, Irfan M. Asif*

**Purpose:** Modified electrocardiogram (ECG) interpretation criteria have been developed to reduce high false-positive (FP) rates seen in pre-participation screening for athletes. This study assessed the accuracy of several ECG interpretation criteria.

**Methods:** Between 2011-2017, Division I collegiate athletes within a single institution underwent pre-participation screening including a 12-lead ECG. The ECGs were retrospectively analyzed using the following guidelines: 2017 International, 2014 Refined, 2013 Seattle, 2011 Stanford, and 2010 European Society of Cardiology (ESC). Chi-squared and Fisher's exact test were used to compare criteria and determine differences by gender, sport, and race.

**Results:** 1118 athletes were included (53% male; 25% African-American). Two athletes were identified with Wolff-Parkinson-White (WPW), and all ECG criteria were 100% sensitive in identifying the confirmed pathology. The 2017 International Criteria reduced the FP rate to 3.4% versus 5.0% (Refined), 4.7% (Seattle), 7.3% (Stanford), and 22.8% (ESC;  $p < 0.001$ ). FP rates were not statistically different between genders using the Seattle, Refined, or International Criteria. African-American athletes had a higher rate of abnormal ECGs than Caucasian athletes ( $p < 0.05$ ) across all criteria. Similarly, basketball players had a higher rate of FP ECGs compared to other sports ( $p < 0.001$ ; International FP rate=14.3%).

**Conclusions:** The 2017 International Criteria for ECG interpretation outperformed other athlete-specific interpretation standards with the best specificity. African-American and basketball athletes demonstrated the highest rates of abnormal ECGs.

**Significance:** The evolution of ECG interpretation standards has lowered the false-positive rate in collegiate athletes. This has important economic implications, decreasing the number of unnecessary secondary investigations for institutions conducting or considering ECG screening.

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## 7. Understanding Pedal Usage and Foot Movement Characteristics of Older Drivers -

*Leah Belle, Yubin Xi, Johnell Brooks, Paul Venhovens, Shayne McConomy, John DesJardins, Patrick Rosopa, Kevin Kopera, Constance Truesdail, Nathalie Drouin, Sarah Hennessy, Stephanie Tanner, Jeremy McKee, & Kathy Lococo*

Previous research shows that older drivers are overrepresented in crashes caused by pedal application errors and that driving tasks prone to pedal errors include emergency braking, parking lot maneuvers and reaching out of the driver's window. The purpose of this research was to understand older drivers' foot movements during on-road driving tasks associated with higher risk of pedal error.

Twenty-six older participants (> 60 years) drove an instrumented vehicle along a standard route accompanied by a Certified Driving Rehabilitation Specialist (CDRS). Drivers completed 10 stopping tasks as baseline for stopping performance, and a startle-braking task, two forward parking tasks and two reaching out of the vehicle tasks. Significant correlation was found between driver stature and foot movement method, and between shoe length and foot movement method in baseline tasks. Lateral foot placement on the brake pedal during baseline driving tasks, however, was not significantly correlated with the foot movement method. In a startle-braking task, participants tended to use foot lifting, although the lateral foot placement was not significantly to the right compared with that in baseline tasks. In reaching-out tasks, participants' foot placement on the brake was more rightward, compared with the placement in other tasks.

This research provides information that may assist CDRSs with an increased awareness of older drivers' pedal operation behaviors during on-road driving tasks associated with pedal misapplication. This knowledge may benefit CDRS practices not only during in-clinic screenings but also during behind-the-wheel evaluations of older drivers.

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**8. ENS Alexa Bianchi, MS, M2 at USC School of Medicine Greenville  
Brittany Crum, Meenu Jindal**

Shared decision making (SDM) is a highly valued method of patient centered care, but extensive studies show a surprisingly lower rate of implementation than expected with such an effective model. We are curious what is preventing physicians from interacting with their patients using a SDM approach specifically at our internal medicine clinic at GMH.

Internal medicine residents at GMH were invited to fill out a pre-survey that subtly assessed their knowledge of SDM. The residents then listened to a lecture on SDM and took a posttest to reassess their actual implementation of SDM and perceived barriers to implementing this type of patient-physician interaction.

Residents were found to highly value SDM but did not implement it as much as expected. They reported time, patient education, and lack of efficient decision making aids as the biggest barriers to implementing SDM.

With these barriers defined, our next step is to create a shared decision making aid for one of the more difficult and time consuming physician-patient discussions we see in our clinic; colonoscopies. The interactive in-office decision aid will easily outline the disease, risks, benefits, procedure, and other pertinent aspects of colonoscopies so the patient can read and formulate questions before seeing the physician. Our intention is to save time and increase patient understanding and investment in their health.

The global impact on health will benefit patients in low health literacy populations who can begin to understand more about their health, leading to increased patient adherence, patient-physician rapport, and decreased medical costs.

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**9. Individual Human Galectin-9 Domains Display Distinct Antimicrobial Properties**

***Anna Blenda, Nourine Kamili, Christian Gerner-Smidt, Anita Venkatesh, Connie Arthur, Sean Stowell***

*Escherichia coli* (strain O86:B7), *Klebsiella pneumoniae* (strain KPO1), and *Providencia alcalifaciens* (strain PAO5) are pathogenic gram-negative bacteria known to express membrane lipopolysaccharides (LPS) that resemble mammalian cell membrane carbohydrates, such as blood group antigens. Several members of the human galectin family, a family of  $\beta$ -galactoside sugar-binding proteins, were previously found to play a key role in the innate immune response against these microbes that express self-like antigens. Each galectin displays unique binding and killing activity. Human Galectin-9 (Gal-9) consists of distinct N- and C-terminal carbohydrate-binding domains, each of which possess variable binding affinity for different microbes. Binding analysis by flow cytometry demonstrated that Gal-9N- and -C-domains both bind to KPO1, PAO5, and O86:B7, but fail to bind to the corresponding negative controls that lack self-like LPS, including KPO4, PAO19, and the mutant O86:B7Waal-. Although both Gal-9 domains bind to O86:B7, dose response curves demonstrated that dose-dependent antimicrobial killing of O86:B7 occurs only through the N-terminal domain. Gal-9C failed to kill O86:B7 at any concentration tested, indicating that variation in binding affinity may be responsible for the different killing activity of each domain. Thus, while binding is required for galectin killing of bacterial targets, the binding affinity of galectin for target bacteria determines subsequent bacterial killing. These findings may have potential therapeutic implications in the treatment of autoimmune disorders and bacterial infections that employ the tactic of molecular mimicry to survive in the host. Furthermore, these findings present a novel treatment approach to the problem of growing antimicrobial resistance to antibiotics.

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**10. An Integrated Passive Strain Sensor for Dynamic Hip Screws to Monitor Intertrochanteric Fracture Stability with Radiography**  
**Nathan Carrington, Bryce Kunkle, Caleb Behrend, Tom Pace, Paul Millhouse, Jeffrey Anker, John DesJardins**

**Purpose:** The dynamic hip screw system has been the standard implant for treating intertrochanteric fractures since its adoption, but complications such as poor fixation or infection can lead to implant loosening, failure and revision surgery. The intent of this project is to design a strain-sensing device that can be interpreted using standard radiography for use in conventional sliding DHS systems.

**Methods:** A strain-detecting device has been developed using a rigid .889-mm diameter tungsten rod that fits inside of the cannulated lag screw used in DHS systems. A Mark-10 Force Gauge and Test Stand was used to perform mechanical testing on DHS implants fitted with this system in both fractured and unfractured Sawbones.

**Results:** In the fractured femur, the rod showed clear displacement with each change in load, roughly correlating to 0.974 um of rod movement per N. In the unfractured model, the rod exhibited no discernable movement throughout the entire load cycle.

**Significance:** Improper loading of the DHS system is a clear sign of imminent implant failure. By augmenting an existing DHS system with an internal tungsten rod which can be clearly read on a standard x-ray, crucial information on the status of fracture healing can be ascertained noninvasively.

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**11. Early Treatment Innovation for Opioid-Dependent Newborns: A Retrospective Comparison of Outcomes, Utilization, Quality and Safety, 2006-2014**

**Julie Summey, Liwei Chen, Rachel Mayo, Elizabeth Charron, Jennifer Hudson, Windsor Westbrook Sherrill, Lori Dickes**

**Background:** Few coordinated treatment programs address the needs of infants and families struggling with the effects of substance use. In 2003, Greenville Memorial Hospital launched the Managing Abstinence in Newborns (MAiN) program, providing multidisciplinary, coordinated, community-based care for neonatal abstinence syndrome (NAS). The aim of this study was to compare the outcomes of MAiN infants to comparable NAS infants receiving traditional care between 2006-2014 in South Carolina (SC).

**Methods:** De-identified sociodemographic and clinical data on MAiN infants, as well as NAS infants not treated with MAiN, were obtained from SC statewide databases. Study measures included medical and safety outcomes, health services utilization, child protective services involvement, emergency services utilization, and inpatient readmissions.

**Results:** We identified 110 infants who received the MAiN intervention and 356 SC NAS infants who were potentially MAiN-eligible. Overall, there were no significant differences in the two groups regarding medical or safety outcomes or child protective services involvement.

Traditional care NAS infants were more likely to be treated in a higher level nursery (69% vs. 0%). MAiN infants had approximately \$20,000 less per birth in average charges ( $P < 0.001$ ) and an almost five days shorter length of stay ( $P < 0.001$ ) than the traditional care NAS infants. MAiN infants also had a lower percentage of ED visits ( $P = 0.01$ ) assessed as possibly or likely NAS-related, as compared to traditional care NAS infants.

**Conclusion:** This study demonstrates the potential value of implementing the MAiN model in eligible NAS infants. Benefits of implementation may include significant cost reduction without sacrificing quality and safety.

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## 12. Construction of Chimeric Histone Methyltransferase Complexes in *Saccharomyces cerevisiae* Generate Unique Phenotypes and Clarify the Roles of MLL1 and Set1 Complex Accessory Proteins

**Renee J. Chosed, Arnav Lal, David Klein, Emery Longan, Marian Baker, Sasha Gogoli, Jingtian Wang, Sami Alkoutami**

**Goal:** Define the regulatory mechanisms within the human mixed-lineage leukemia (MLL1) multi-protein complex by modeling the complex in the budding yeast.

Genomic rearrangements involving the MLL1 gene are prevalent in human cancers, especially mixed lineage leukemia. This gene encodes an enzyme that methylates histone H3 on lysine 4 as a part of the MLL1 multi-protein complex. The MLL1 complex regulates the expression of many genes via this epigenetic mark, including homeobox genes. Problematically, higher eukaryotes contain many functionally redundant complexes that complicate the study of MLL1 and associated cancers in a living system. Furthermore, due to the nature of the disease-causing mutations, namely chromosomal rearrangements, MLL1 is not a promising drug target. However, several accessory proteins within the complex are required for catalytic activity, presenting possible drug targets themselves. Herein we present an *in vivo* system for the study of the MLL1 complex in *Saccharomyces cerevisiae*, making use of the homologous Set1/COMPASS complex. We genetically replaced COMPASS members from *Saccharomyces cerevisiae* with their human homologs using antibiotic resistance cassettes. We then performed phenotypic characterization of chimeric COMPASS/MLL1 complexes assessing global H3K4 methylation status. Selected chimeric yeast-human methyltransferase complexes conferred catalytic activity at varying degrees, while others did not confer methyltransferase activity. Our study represents a proof of concept for simplifying the study of the MLL1 complex in an *in vivo* system, and offers mechanistic insight into the functional role of a catalytically essential accessory protein within the MLL1 complex that may serve as new drug targets for specific leukemias.

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## 13. Integrating Personalized Patient Goals and Priorities Into Clinical Care: Understanding The Best Way for Patients to Provide the Information

**Melanie Cozad, Gulzar Merchant, Rasmine Baker, Kait Crosby**

**Abstract:** Delivering patient-centered care (PCC) needs to incorporate the lifestyle goals and priorities that are important to the patient. Currently, no tool exists to help patients express these goals and priorities during the course of clinical care to aid in treatment decisions. In developing such a tool, this study's purpose was to determine the best way to measure priority information from the patient perspective. A survey tool was developed comparing two commonly used methods for measuring patient priorities: direct weighting (DW) and best worst scaling (BWS). DW requires the patient to make implicit trade-offs across priorities, while BWS allows the patient to make explicit choices which are thought to be cognitively easier. Once patients completed the initial survey by providing answers to both types of questions, those answers were summarized and returned to them in a follow up survey. The follow up survey asked patients which method most accurately measured their priorities. Patient experts acting as part of two different patient engagement studios designed the language and visual display of information contained in the initial and follow up surveys. Of the 55 patients who completed both surveys, 30 patients (54%) selected the DW method as the one most accurately measuring their priorities. In those instances, the individual's most important and least important priority was accurate 90% of the time. These findings show that patients prefer the DW method and that implicit choices can accurately capture personalized priorities that can be integrated into care.

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#### 14. Exercise Programing Correlates with Patient Success in a Comprehensive Pediatric Weight Loss Program *Jenna L. Crowder, Irfan M. Asif, Cara B. Reeves, Kerstin K. Blomquist, Erin Brackbill, Sarah Griffin, Dorothy Schmalz, Kerry Sease, Laure Utecht, Vicki R. Nelson*

**Purpose:** Evaluate whether guided exercise visits lead to successful weight loss in a comprehensive pediatric obesity program (New Impact).

**Methods:** Pediatric patients were enrolled from October 2012 – July 2015. New Impact is a 1- year pediatric obesity program consisting of a pre-treatment physician visit, 8 treatment phase visits including psychologist, dietician and exercise specialist visits, and 3 maintenance physician follow up appointments. BMI measurements were obtained at the initial visit and at program completion. BMI was analyzed as a percent change in BMI.

**Results:** 332 participants (mean age  $11.98 \pm 6.5$  years, 56% female, 44.9% Caucasian, 30.7% African American) completed an average of  $8.6 \pm 2.6$  total visits and  $3.3 \pm 2.0$  exercise visits. 19.9% of participants did not participate in the exercise component of the program.

Pre-treatment BMI was  $32.95 \pm 9.0$  with a post-treatment change in BMI of  $-1.17 \pm 4.46\%$ . The total number of exercise visits completed correlates with a reduction in BMI (Spearman's rank correlation ( $p$ ) = -0.17,  $p$ = 0.001; Pearson's linear correlation ( $r$ ) = -0.094,  $p$ = 0.045). For example, participants completing no exercise visits had an average BMI decrease of  $0.85 \pm 4.94\%$ . Those completing 6 exercise visits had a decrease of  $2.67 \pm 2.64\%$ . The total number of visits completed is not significantly correlated with BMI change ( $p$ = -0.062,  $p$ = 0.13;  $r$ = -0.032,  $p$ = 0.28).

**Conclusions:** Structured exercise program participation during comprehensive pediatric obesity treatment correlates with treatment success measured as % BMI change.

**Significance:** Structured exercise visits should be included in pediatric obesity treatment programs to increase success.

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#### 15. BEYOND BATES: ADVANCED PHYSICAL EXAM SERIES FOR MEDICAL STUDENTS *Ryan Dean, Steven Connolly*

**Purpose:** To develop a curriculum for medical students designed to teach proper technique and choice of both routine and advanced physical exam maneuvers as they relate to medical decision making in clinical practice.

**Methods:** Created a two week pilot course in partnership with the University of South Carolina School of Medicine – Greenville. The JAMA: The Rational Clinical Exam and the Evidence-Based Physical Diagnoses were used to develop the curriculum focusing on various topics relevant to Internal Medicine. Both faculty and residents assisted in leading the course.

**Results:** Five 4th year medical students enrolled in the pilot course. A 21 question pre-course assessment and a 20 question post-course assessment were administered.

Pre-course average: 12.4/21 points ( $59.1 \pm 12.9\%$ )

Post-course average: 16.8/20 points ( $84.0 \pm 11.4\%$ )

All students demonstrated an improvement in their percent score by  $25 \pm 10.6\%$ . An oral final assessment was developed with four clinical scenarios using the Greenville Health System Simulation Center. Grading was based on five different clinical categories.

Average oral score: 34.8 out of 40 points ( $87 \pm 8.9\%$ ).

The students provided feedback explaining the afternoon physical exam rounds were most helpful for learning.

Students requested more structured teaching on maneuver technique.

Conclusion: After participating in the pilot course, students demonstrated improved knowledge and implementation of the physical exam for clinical decision making and cost effective care. Results from the pilot will be used to improve a follow-up course that has already been expanded to include 8 students.

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**16. Analysis of positive responses to two different heart health questionnaires in NCAA Division 1 Athletes**  
**Joseph DeStefano, Hampton Williams, Douglas Reeves, Joseph A. Ewing, Irfan M. Asif**

**Purpose:** To determine the rates of positive responses to heart health medical history questions within collegiate athletes before and after a change in our cardiovascular screening questionnaire.

**Methods and Study Design:** In 2011, a set of heart health history questions (questionnaire 1) was implemented within our NCAA Division I institution and was used for 4 seasons (2011- 2014). In 2015, these questions were revised (questionnaire 2) and used during the recent 3 seasons (2015-2017). Comparisons between each questionnaire were examined using Chi- Square and Fisher's Exact tests.

**Results:** 1118 athletes (52.3% male, 70.3% Caucasian) from 10 different sports were included. 556 (49.7%) athletes received questionnaire 1, while 562 (50.3%) received questionnaire 2. The rate of abnormal responses was higher in questionnaire 1 vs. 2 (73% vs. 57%,  $p < 0.001$ ). Highest abnormal rates were seen in mascots, golf and basketball athletes. Abnormal response rates in football players (82% v. 55%,  $p < 0.001$ ), whites (70% v. 57%,  $p < 0.001$ ), and males (74% v. 54%,  $p < 0.001$ ) improved from questionnaire 1 to 2. In both evaluations, questions with the most abnormal responses included those for family history (63% vs 57%). Abnormal response rates for family history questions related to sudden death improved from questionnaire 1 to 2 (86.88% vs. 12.15%), while questions related to overall family history related to cardiovascular disease appeared to worsen in specificity (0% vs. 69.16%).

**Conclusions:** Heart health questions used during the pre-participation exam have a high rate of abnormal responses, especially questions related to family history that may be perceived as vague.

**Significance of Findings:** Refinements in the medical history of the pre-participation exam are needed to improve the statistical measures of performance for detecting underlying cardiovascular pathology in young athletes.

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**17. Evaluation of CarFit® Criteria Compliance and Knowledge of Seat Adjustment**

**Nathalie Drouin, Shayne McConomy, Johnell Brooks, Paul Venhovens, Yubin Xi, Patrick J. Rosopa, John D. DesJardins, Kevin Kopera, Leah Belle, Connie Truesdail, Stephanie Tanner, Kathy Lococo, Loren Staplin, & Elin Schold Davis**

Improper driver fit in a vehicle may affect the ability to reach the steering wheel and pedals, view the roadway and instrument gauges, and allow safety features to properly work during a crash. CarFit® is a community outreach program to educate older drivers on proper "fit" within personal vehicles. This study evaluated compliance with CarFit® criteria prior to/ after CarFit® education and across different ages and stature.

A subset of measurements from CarFit® were used to quantify the "fit" of 97 older drivers (> 60) and 20 younger drivers (30-39), in their personal vehicles. Binary, logistic regression was used to assess the likelihood of drivers meeting the CarFit® measurement criteria prior to/ after CarFit® education. Older drivers were five times more likely to meet the CarFit® criteria for line of sight above the steering wheel, suggesting that younger drivers would also benefit from CarFit® education. Binary, logistic regression was used to determine whether a subset of 33 older drivers selected a seating position that allowed them to operate the brake without fully extending their leg or reaching with their toes. 45% positioned themselves too far from the brake, and therefore might benefit from additional education and/or adaptive devices to better accommodate their "fit".

Findings of this study show that both age and stature were significant predictors of the likelihood of compliance with the CarFit® criteria.

This study provides support for the restructuring the CarFit® checklist to assist CarFit® technicians with optimizing a driver's "fit" in his/her own vehicle.

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**18. Geographic Variation in the Treatment of Proximal Humerus Fracture in the Medicare Population**  
***Sarah B Floyd, Joel Campell, Charles Thigpen, Mike Kissenberth, John Brooks***

**Purpose:** Conservative management has become the preferred initial course of treatment for patients with proximal humerus fracture (PHF); however surgical management rates vary widely across the country. The objective of our study was to evaluate local area treatment variation in management of acute PHF.

**Methods:** This was a retrospective cohort study of Medicare patients who were diagnosed with PHF in 2011. Patients receiving reverse shoulder arthroplasty, hemiarthroplasty, or open reduction internal fixation within 60 days of their PHF diagnosis were classified as surgical management patients. Area Treatment Ratios (ATRs) at the Hospital Referral Region (HRR) level were calculated as the ratio of the number of patients in the HRR who received surgical treatment over the sum across these patients of their predicted probabilities of receiving surgical treatment.

**Results and Summary:** Among patients with PHF (N= 77,053) 15.0% received surgery and 85.0% received conservative management. Patients that were older, had more medical comorbidities, were male, of non-white race, or dual-eligible for Medicaid were less likely to receive surgery (P<.0001). Surgery rates varied from 6.3% to 25.6% across all HRRs, with variation in South Carolina ranging from 11.5% to 21.2%.

**Applicability to Healthcare:** Given heterogeneity of treatment effects, it is possible that variation in surgery rates may represent appropriate care in local areas. Alternatively, higher surgery rates may reflect an overuse of surgical treatment that does not result in improved outcomes for patients. Future analysis will assess the association between higher surgical rates and patient outcomes such as mortality and Medicare spending.

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**19. Persistent Functional Neurological Symptom Disorder Spontaneously Remits with ECT Treatment**  
**Raphaella S. Fontana, Frank A. Clark, Benjamin Griffeth**

A 49-year old Caucasian female has had three psychiatric hospitalizations over a two year time period since a complicated cardiac ablation that resulted in the patient needing defibrillation for non-sustained ventricular tachycardia. Family and patient both endorse alterations in her mood and emergence of a new debilitating tremor after being told about the cardiac arrest requiring lifesaving measures. Initially, this patient was treated with psychotropic medications during her first hospitalization, which improved her depression, but not her functional tremor. Approximately one year later, she had two recurrent hospitalizations for acute decompensation with catatonia and significant tremor within a two month time span. At that time, the patient's medical work up and imaging were largely within normal limits or found to be unremarkable.

The patient's catatonic presentation and functional motor tremor resolved with concurrent psychotropic medications (Remeron 30 mg QD, Propanolol 10 mg TID, Zoloft 200 mg QD, Risperdal 1 mg QHS, Ativan 0.5 mg TID) and electroconvulsive therapy (ECT) during both hospitalizations. There is a paucity of evidence demonstrating the remission of conversion disorder with a multimodal therapeutic approach of ECT and psychotropic medications. This case presentation will investigate the potential use of ECT in the treatment of functional tremor/conversion disorder in a patient with underlying refractory depression.

Objectives:

Present a case to which there is a proposed relationship between a traumatic event and new onset conversion disorder

Propose and explore a new treatment modality with ECT for a patient with refractory or treatment-resistant depression and concurrent conversion disorder

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## 20. Early Warning Response System in GHS School-Based Health Centers: Connecting Students to Mental Health Care and Social Supports

*Bryan H., Rolke L., Griffin S., Forrester J., Johnson L., Sease K.*

Greenville Health System (GHS) has partnered with the United Way to establish four School-based Health Centers (SBHCs) in high poverty neighborhoods. School-based health centers (SBHCs) provide a unique opportunity to reach adolescents in an accessible setting.

High-risk students are identified through the Early Warning Response System (EWRS). EWRS is a real-time data dashboard that monitors attendance, behavior and grades. Each EWRS student is recommended to be referred for a SBHC appointment. A comprehensive assessment (e.g. HEADSS, PHQ2) is completed to determine well-being and screen for risks associated with social determinants of health. While the SBHCs do treat acute illness and manage chronic conditions, the service is designed to target students at highest risk for dropout, in order to better understand what is happening in their lives socially and emotionally. The purpose of this study was to identify how many SBHC visits were completed by EWRS students, the number and result of these screenings.

Chart abstraction and analysis revealed 784 SBHC visits during the 2016/17 school year, 20% of which were EWRS referrals. 94% were provided a screening and 88% revealed complicated physical, emotional, behavioral, or social health concerns. Students were connected to services (i.e. insurance) and outside care (i.e. medical homes and specialists). 94% of all students seen by the SBHC were able to return to class.

SBHCs are able to help those students most at risk of dropping out and intervene to more effectively address the underlying issues contributing to presenting physical ailments, poor school performance and behavior.

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## 21. Prophylactic Placement of Permanent Synthetic Mesh at the Time of Ostomy Closure Prevents Incisional Hernia Formation

*Jeremy A. Warrena, Lucas R. Beffaa, Alfredo M. Carbonella, Jennifer Cullb, Brent Sinopolia, Joseph A. Ewingc, Cedrek McFaddend, Jay Crockettd, William S. Cobba*

**Purpose:** Enterostomy reversal results in a high rate of incisional hernia at the ostomy site. Prophylactic mesh reinforcement of the fascial defect is typically not considered due to the contaminated nature of the case. We present a series of prophylactic mesh reinforcement with retromuscular, large-pore polypropylene at the time of enterostomy reversal.

**Methods:** Retrospective review of all ostomy reversals was performed. All cases with placement of synthetic mesh reinforcement were identified from a prospectively maintained hernia database. Primary endpoints were surgical site occurrence (SSO), surgical site infection (SSI), and hernia occurrence.

**Results:** Ostomy reversal was performed in 359 patients; 91 were reinforced with mesh and 268 without mesh. Colostomy reversal was performed in 56.5% and ileostomy in 43.5%. The mesh group had higher BMI and greater incidence of COPD, but groups were otherwise similar. Midline incisional hernia was present in 45% of the mesh group vs 4.5% in the controls. Incidence of SSO and SSI were similar for mesh and control groups (20.9 vs 22.8%;  $p=0.82$ ; 19.8 v 19.8%;  $p=1.000$ ; respectively). Superficial SSI was lower with mesh (7.7 vs 16.4%;  $p=0.039$ ). Incidence of hernia at the stoma site was significantly decreased with mesh (1.1% vs 17.2%;  $p<0.001$ ), as was midline hernia occurrence (5.5% v 19%;  $p=0.004$ ). Mesh was placed across the midline prophylactically in 29.7% of cases, which reduced midline hernia formation from 24.1% to 3.8% ( $p=0.019$ ).

**Conclusions:** Retromuscular placement of permanent synthetic mesh at the time of enterostomy reversal is effective in preventing development of incisional hernia without increased risk of SSO or SSI.

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## 22. Optimization of Automated Guided Vehicle System in Health Care Facility *Kade Gilstrap, Amogh Bhosekar, Tugce Isik, Sandra D. Eksioglu, Robert Allen*

Automation in material handling systems have been a key to promoting cost-effective material flow within healthcare facilities. This research analyzes Automated Guided Vehicles (AGV) use in a hospital. AGVs perform tasks, such as moving surgical instruments, drugs, linen, food, trash, etc. The use of AGVs has improved staff utilization, however, it has also increased traffic and congestion. The goal of this study is to evaluate the impact of AGV use in the hospital. Historical data about travel time for all AGV trips in different times of the day and different days of the week has been analyzed. A Pareto analysis indicated that the majority of AGV travel time is spent in 3 trips. A statistical analysis of these trips indicates that the distribution of travel time during pick and off-pick hours is statistically different. The same holds true for travel times during different days of the week. This difference in travel time is due to congestion. Based on these results, we believe that reducing the number of AGVs used and implementing a Kanban system which maintains only a fixed number of AGVs active and moving during pick hours will reduce congestion. This numerical analysis provides the data necessary for developing a simulation model which will identify the right number of AGVs to use in this system in different hours of day and different days of the week.

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## 23. Understanding how clinicians use EPIC in clinical practice: A time and motion study *Benjamin Martin, Mark Wess, Nicholas Perkins, Renee Tollison, Ronald Gimbel*

**Purpose:** To explore how clinicians use EPIC within the context of outpatient clinical encounters. Specifically, to understand the association of the electronic health record to patient interaction, order entry, and clinical documentation.

**Methods:** The cross-sectional observation of twelve clinicians; two clinicians representing six different clinics. Clinician activity during outpatient visits was observed (and timed) using a modified NIH time-motion data collection instrument. Each provider was observed for two half-days of clinic visits.

**Results:** Clinician activity, in order of most-to-least time consuming were: speaking with patients (470 total recordings averaging 3:09 each), writing EPIC clinical notes (313 recordings averaging 1:44), physical examination (106 recordings averaging 3:20), computerized order entry (158 recordings averaging 1:27), talking to colleagues/staff (152 recordings averaging 1:20), and EPIC chart review (129 recordings averaging 1:05). The most common activity transitions were between speaking with patients and EPIC note writing, computerized order entry, and EPIC documentation of the care plan. These time allocations were not consistent across specialties. In comparing the time spent “speaking with patients” to “interacting with EPIC”, higher proportions of “speaking with patients” were observed in surgical specialties (e.g. urology, bariatric surgery) compared to medicine specialties (e.g. internal medicine, cardiology, endocrinology).

**Explanation of the findings’ applicability to healthcare:** The transitions between computer-related activities that were most frequently recorded indicate opportunities for revisions to EPIC. This information also provides guidance on specialty specific areas most likely to benefit from efforts to reduce electronic health record utilization time.

#### 24. Improving Quality to Facilitate Research *Amanda Goode, Katie Daniels, Matthew F. Hudson*

**Purpose:** Federal regulations require that an Institutional Review Board (IRB) review and approve all human subjects research prior to research initiation. To optimize review efficiency, GHS's Office of Human Research Protection (OHRP) revised its policy on adverse event reporting in June 2017. Investigators may now report in aggregate at continuing review all non-serious adverse events that are not unanticipated problems. OHRP examined whether this change reduced the duration from submission to IRB approval.

**Methods:** There were 1318 IRB submissions from January through March 2017, prior to the policy revision, and 582 submissions from October through December 2017, following policy revision. OHRP compared summary statistics and performed analyses by review type (full board or expedited) and time period.

**Results:** The mean and median full-board review durations decreased from 41.08 and 30 days, respectively, to 24.43 and 22 days, respectively, subsequent to policy change ( $U=6067.5$ ;  $p<.0001$ ). The mean expedited review duration decreased from 20.75 to 13.37 days, while the median was 12 days for both time periods ( $U=234106.5$ ;  $p<.0002$ ).

**Discussion:** The results suggest that OHRP improved IRB efficiency by changing the adverse event reporting process. This change could afford our patients more immediate access to clinical trials and provide system leadership with quicker access to care improvement data. Finally, this improvement may also relieve administrative burden for investigators, study coordinators, IRB chairs, and IRB coordinators. Collectively, these benefits may facilitate sustained research engagement and enhance IRB resource utilization.

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#### 25. Self-perceptions on Fitness to Drive in Collegiate Athletes Following a Sport-related Concussion *Steven Greene, Yathavan Rajakulasingam, Vicki Nelson, Alex Ewing, Andrew Albano*

**Purpose Statement:** Limited data exists to guide clinical decisions pertaining to concussed athletes' operation of a motor vehicle following a sport-related concussion. This study assessed collegiate athletes' perceptions of the effects, if any, that a sport-related concussion has on their ability to operate a motor vehicle. Additionally, behavior modification pertaining to driving, either recommended or self-imposed, following a sport-related concussion was assessed.

**Experimental methods & results:** A multi-item survey was administered electronically to collegiate athletes at colleges and universities within the upstate of South Carolina. For athletes who had not suffered a sport-related concussion, survey questions evaluated perceptions of the impact a concussion may have on one's ability to drive. For concussed athletes, the perceived influence of health professionals and their guidance on driving behaviors were also assessed. Sixty-seven of 173 respondents (39%) reported having suffered a sport-related concussion with 25% completing a formal physician evaluation following injury. Fifty-eight subjects (86.5%) acknowledged removal from athletics with 67% of individuals reporting clearance to return to driving before returning to sport. Only 38.8% were advised to alter their driving habits, although 65% of the concussed athletes and 63% of the other respondents felt changes to driving behaviors following a sport-related concussion were warranted.

**Summary of conclusions:** While a majority of the collegiate athletes surveyed supported the need to alter driving habits following a sport-related concussion, only a small percentage actually received a formal recommendation to do so.

**Explanation of findings' applicability to healthcare or population health:** The development of a consensus statement providing guidance on returning this cohort of patients to driving is recommended.

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## 26. The Correlation Between Residency Applications and Standardized Behavioral Assessments for Gaining Entry into a Graduate Medical Education Program

*Vincent E. Green, Ardalan Ahmadi*

**Purpose:** To develop a standardized assessment tool for the selection of residents into a graduate medical education (GME) program.

**Methods:** A standardized assessment tool for selection of residents into a GME program was developed by faculty within the Greenville Health System (GHS) Family Medicine Residency. The assessment tool consisted of two parts: 1) A pre-interview instrument (maximum total score = 28) assessing board scores, grades during undergraduate medical education, extra-curricular activities, letters of recommendation, interest in family medicine, and scholarly activity; 2) A rubric of behavioral questions (maximum total score = 16) with standardized anchors for objective assessment within the domains of problem solving, resilience, interpersonal communication and professionalism, and emotional intelligence. The tool was used to assess all applicants who interviewed within the GHS Family Medicine Residency during recruitment for the class beginning in July 2018.

**Results:** Overall, 71 applicants (mean age = 27.1 years, 49.3% male, 50.7% female, 80% Caucasian, 7% African American, 3% Hispanic, 10% Other) were selected to interview between October 2017-January 2018. The mean pre-interview assessment score = 22.73 (range 17-27), behavioral rubric score = 11.46 (range 8-16), and total composite score = 35.4 (range 27-42). The correlation between the application pre-interview assessment and the behavioral rubric measuring interview performance was 37.3%. Low correlations were also found within each individual domain of the pre-interview assessment and the behavioral health questions.

**Conclusions:** Objective tools for selection into graduate medical education (GME) programs are lacking. The ideal selection criteria include a combination of the candidate's application and performance during an interview. Data from this investigation suggest that there is little correlation between strength of application and interview performance, which highlights the need for measuring both components during the selection of candidates into GME programs.

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## 27. Micromotion and strength of the glenoid component in reverse total shoulder arthroplasty: the effect of malpositioning versus optimum VIP positioning in the simulated B2 glenoid

*Hall, Shannon, Baxley, David, Kissenberth, Michael, Karnes, Josh, Metcalfe, Nick, DesJardins, John D*

Glenoid deformity remains one of the most difficult challenges facing reverse total shoulder arthroplasty surgeons today. While RTSA aids in reducing pain and improving function in patients suffering from shoulder pathologic processes, high complication rates, ranging from 15-50%, and revision rates, ranging from 4-40%, have been reported; glenoid baseplate loosening remains the main cause for revision.<sup>1,2</sup> In an attempt to enhance clinical outcomes, the purpose of this study was to compare micromotion in a validated model, using Arthrex's Virtual Implant Positioning™ (VIP) System, between RTSA glenoid components placed in malpositioning versus optimum VIP™ positioning in the simulated B2 glenoid.

Twenty Arthrex Unvers Revers™ implants were implanted into B2 scapula sawbones, with ten implants comprising the malpositioning and optimum positioning groups. Cyclic and failure testing were conducted using the Instron and Linear Variable Differential Transformer (LVDT). After 150 µm of motion was reached during cyclic testing, each specimen was tested to failure by causing a displacement of 1 cm. Although this study is still underway and results are not complete, it is hypothesized that the VIP™ system will produce a more stable glenoid baseplate and stronger fixation strength in RTSA procedures. Currently, few studies have determined the amount of shear load necessary to cause glenoid component loosening or failure, and none of these studies have done so in the simulated B2 glenoid. Therefore, this study is clinically significant because it will address novel implantation techniques that will help prevent glenoid baseplate loosening and implant failure, thus improving RTSA clinical outcomes. Problems, complications, reoperations ..., 2011, 20(1), 146-157.

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## 28. JUMPING INTO DIABETES CONTROL

*Lauren Hassan, Sheena Henry, Gail Chastain, Meenu Jindal*

**Background:** A study analyzing the results of the Boston Area Community Health Survey confirmed that socioeconomic status has a stronger association with diabetes prevalence than race. If systems were in place to address socioeconomic barriers, the inequality in diabetes prevalence and complication rates may improve.

**Purpose:** The construct of this study is to provide diabetic patients with a group setting that focuses on self-empowerment.

**Methods:** Groups included 1-2 resident facilitators, a diabetic educator, and 5-10 IMC patients. The program included three weekly sessions, comprised mostly of patient-led discussion. JUMP has graduated 24 participants. As a comparison group, 24 patients were pooled from the list of clinic patients who expressed interest in the program but did not enroll. Patients' pre- and post- JUMP HgbA1c were measured.

**Results:** JUMP participants showed a statistically significant decrease in HgbA1c. The average pre-JUMP HgbA1c was  $9.3 \pm 2.5$  and post was  $8.0 \pm 1.9$ . This yielded a mean drop in HgbA1c of 1.3 ( $p$ -value  $< 0.001$ ). The control group yielded pre-JUMP HgbA1c of  $9.0 \pm 2.2$  and post  $9.2 \pm 2.3$ , a variation with no significant change ( $p$ -value 0.418).

**Discussion:** The United Kingdom Prospective Diabetes Study found that the rate of microvascular complications from diabetes fell by 25% when comparing patients with a mean HgbA1c of 7.9% to those at 7.0%. The incidence of diabetes-related deaths, myocardial infarctions, and all-cause mortality was significantly lower for each one percent improvement in HgbA1c. This is promising given that the mean decline in A1c for JUMP participants was 1.3%.

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## 29. Identifying the Profile of Youth who Present to the Emergency Department for Psychiatric Reasons

*Sharon M. Holder, Dawn Blackhurst, Eunice Peterson*

**Objectives:** This study examines utilization of Greenville Memorial Hospital's (GMH) ED for mental health visits by the pediatric population over a 5-year period.

**Methods:** A retrospective study of all psychiatric visits of children aged 5-18 visiting the GMH ED between 01/01/2010 and 12/31/2014 was conducted. Psychiatric visits were identified using the primary ICD-9\* diagnosis codes of 290.0 to 319.0. The population was categorized into three age groups based on school-age grades: ages 5-10 elementary; 11-13 middle school; and 14-18 high school. Demographic characteristics and ED utilization were compared among the age groups;  $p$ -values  $< 0.05$  were considered statistically significant. The Hospital Institutional Review Board (IRB) approval was obtained prior to the study.

**Results:** There were 2,700 visits of the study population. This comprised ~11% of the total psychiatric ED visits in the study timeframe ( $N=25,411$ ). The total number of visits increased from 380 in 2010 to 698 in 2014 (84% increase). The greatest increase was in the 11–13 age groups (137%). The majority of visits occurred on weekdays (79%); however, the older age groups had a higher percentage of weekend visits (21% vs. 15%). Elementary and middle school groups were predominantly male (60% vs. 40%) and the high-school group was predominantly female (52% vs. 48%).

**Conclusion:** Statistically significant differences were found in ED utilization characteristics among the three age groups. Females were more likely to visit the ED than males and among the older age groups those diagnosed with anxiety were more likely to visit the ED. Understanding the profile of Youth who utilize the ED has clinical implications for developing treatment protocols in the ED, community partnerships and mental illness preventive practices.

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### 30. Are We Asking the Right Questions? Screening and Counseling for Environmental Tobacco Smoke Exposure at a Federally Qualified Health Center

*Elizabeth W. Holt, Jackson Pearce, McKenna Luzynski, Matthew Delfino, Lochrane Grant*

**Background:** Interventions which combine provider training with “practice transformation” techniques can greatly increase screening and counseling for ETS during pediatric visits (1,2). A clinic-based family smoking cessation intervention is planned at a multi-site FQHC serving rural/suburban patients in Upstate, SC. Rates of smoking at the FQHC are >2 times the national average.

**Purpose:** In order to inform intervention design, we assessed 1) provider practices around screening and education for ETS exposure at the pediatric encounter, and 2) provider-stated barriers to counseling and referral to cessation resources.

**Methods:** Medical record data for all 2017 pediatric visits (n=7,997) were analyzed to determine rates of screening and education around ETS. Provider surveys were administered (n=11) to identify specific education techniques used and key barriers to counseling and referral.

**Results:** Preliminary analyses revealed that provider-documented screening and/or education for pediatric ETS exposure occurred in 55% of pediatric encounters. Rates varied by provider/clinic site and visit type. Analyses are underway to assess variation by documented respiratory disease. Initial results from provider surveys revealed that 1) the specific education/counseling techniques used vary widely, 2) smoking cessation resources (quitline referrals, NRT) are underused, and 3) practice-wide changes in EMR prompts could increase counseling and referral to cessation resources.

**Conclusion:** Implementation of a clinic-based family smoking intervention could increase the quality of patient counseling and frequency of referral to smoking cessation services, reducing morbidity and mortality among a patient population where smoking rates are high. Data from this pilot study will inform future intervention dissemination across the region.

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### 31. Biomechanical effects of therapeutic horseback riding on balance and gait confidence in elderly

*Anne Marie Holter, Julia Gates, John DesJardins, Kristine Vernon, Marieke Van Puymbroeck*

Therapeutic horseback riding utilizes a horse as a moving platform for rehabilitation treatments, however, the biomechanical relationship between horse and rider is largely unknown. The purpose of this study is to assess the biomechanical relationship between horse and rider and analyze the effects of therapeutic horseback riding on balance confidence of the elderly. It is hypothesized that horseback riding will provide participants with gains in balance confidence. This study, which is currently underway, involves 10 volunteers, ranging from 55 to 85 years old, and two horses of different confirmation over an 8 week timeframe. An initial balance assessment was given to all participants, with a final assessment being given after completion of the final riding lesson. Both rider and equine movements were tracked during initial lessons. The rider was suited with dual-axis goniometers at the hips and thoracic spine to record angular deflections. Horses were tracked with a video motion capture system and analyzed in MATLAB. A previous study suggested that there was a repetitive, rhythmic stimulation to the rider, which was tracked with goniometer sensors. Data collected from initial lessons showed similar rhythmic movement that can be corresponded to a specific point in the horse's gait. These findings will pilot future studies involving understanding the relationship between horse and rider, thus optimizing and validating therapeutic horseback riding practices. Clinical interest is evident through collaborations with the Clemson University Equine Center, the Department of Parks, Recreation, and Tourism, and the Roger C. Peace Hospital.

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### **32. The Effect of Fad Diets on Patient's Perceptions of Health and Disease** *Cassidy Hood, Robert Masocol, Alex Ewing, Vicki Nelson, Irfan Asif*

**Purpose:** To identify common nutritional perceptions among adult patients in a high-risk family medicine clinic.

**Methods and Study Design:** Cross-sectional survey. A paper survey was distributed to adult patients within a high-risk family medicine residency clinic from September to October 2017.

**Results:** 220 adult patients were surveyed (69% female, 50% African American, 38% Caucasian) with majority of patients between 25-65 years old (75%) with a BMI >25 (80%). 45% of patients identified as being overweight/obese, 55% identified having diabetes, 42% identified having hypertension, and 29.5% identified having hyperlipidemia.

Approximately 63% of participants described a healthy diet to include fruits and vegetables, with only 23.6% of those patients eating 5 or more servings of fruits or vegetables per day. 28.6% of participants could not describe what constituted a healthy diet. 31.3% of patients have used fad diets in the past with only 15.4% of patients considering fad diets healthy. 30.4% of patients identify the media as a major influence on their dietary choices (18.2% TV and social media).

**Conclusions:** Participants identified a healthy diet as plant based, though few follow this recommendation. Nearly 33% of patients report trying a fad diet.

**Significance:** This study identifies the significant overall lack of knowledge and understanding of appropriate nutrition, including the common belief in and usage of fad diets, and the poor insight of chronic disease amongst adult patients in a high-risk family medicine clinic. It is imperative that sufficient patient counseling and education on healthy diets are completed on a regular basis.

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### **33. White coat syndrome in the obese pediatric population: the case for ambulatory blood pressure monitoring** *Walters S, Eke R, Kline H, Sundlie S, Sease K.K., Markowitz J*

Pediatric nephrologists and cardiologists have seen an increase in referrals related to hypertension among their patients. Many referrals are made following single or repeated blood pressure (BP) measurements in primary care; however, these measurements are not always predictive of true hypertension (HTN). Misclassification can be associated with stress-induced elevation of clinic BPs seen in white coat hypertension (WCH). Ambulatory blood pressure monitoring (ABPM) has been shown to be an accurate method to quantify BP and discriminate between true HTN and WCH. The purpose of this study was to determine whether obesity, as measured by BMI, influences risk for WCH based on ABPM.

ABPM was used for the evaluation and management of elevated BPs in pediatric patients referred to nephrology. An ABPM database was established in January 2010 and maintained for six years. 426 patients who had ABPM were reviewed. We compared the ABPM diagnoses of WCH vs. true HTN between non-obese (54%, n=232) and obese (46%, n=194) pediatric patients. Obese patients were more likely to be diagnosed with WCH (54% vs. 46%), and less likely to be diagnosed with true HTN (39% vs. 61%) compared to non-obese patients. The OR for having HTN in obese vs. non-obese patients was 0.52, (95% CI 0.35-0.76),  $P < 0.001$ .

This study suggests that obesity influences referral patterns for elevated blood pressure and hypertension based on ABPM. Pediatric practitioners who treat hypertension should be wary of empirically treating elevated BP in obese patients. ABPM is an essential tool for determining who warrants treatment.

**34. Potential Benefits of a Separate Instrument Setup Room or Induction Room Adjacent to the Operating Room**  
**Brandon Lee, Dee San, Kevin Taaffe, Lawrence Fredendall, Yann Ferrand, Amin Khoshkenar, Alexis Fiore, Anjali Joseph, Scott Reeves,**

This research sought to examine how hospitals can benefit from adding a separate instrument setup room and a separate induction room adjacent to the operating room. All activities in the operating room were video recorded during 26 surgical procedures, including the room turnaround. Four of these procedures were selected for intensive analysis of the room turnaround times. All activities by all staff in the room were coded and placed into a Gantt chart format timeline chart. The timeline was used to identify potential bottleneck resources and how slack resources could begin activities in parallel with the bottleneck resources to reduce the overall length of the turnaround time. We developed and compared multiple hypothetical scenarios of adding those separate support rooms. Such comparison analyses allowed us to quantify the potential turnover time reduction for each of the scenarios. We conclude that identifying the bottleneck resource, and adding additional resources to the bottleneck or improving the efficiency of the process pertaining to the bottleneck is critical for overall turnover and patient preparation time reduction, and separate support rooms can help achieve such process improvements.

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**35. Leader Mindfulness, Unit Well-being, and Patient Care**  
**Chelsea A. LeNoble, Michelle Flynn, Marissa Shuffle, Nastassia Savage, Sharon Wilson, Tod Tappert**

Healthcare leaders must provide positive environments for their employees and their patients despite staffing shortages, policy changes, and shifting economic demands. Ensuring leaders possess the right skills is critical for everyone from nurses, doctors, and staff, to patients and their families. This study considers the impact of the leader attributes of mindfulness and emotion regulation on their staff and patients.

To examine the impact of leader mindfulness and emotion regulation on unit and patient outcomes, multisource longitudinal data from 698 healthcare leaders and 12,300 healthcare employees were analyzed. Mediated regression analyses indicate that (1) leader mindfulness improves emotion regulation strategies and leader-unit relationship quality, and (2) a high-quality leader-unit relationship improves the unit's ability to recover from work stress and provide high-quality patient care. These results suggest that mindful leaders are more likely to use appropriate emotion regulation strategies at work, foster quality relationships and well-being norms with their staff, and facilitate top-notch patient care.

The ability of leaders to manage themselves and their employees is crucial for healthcare. When leaders are ineffective, their employees are more likely to burn out, and their patients are less likely to receive effective care. This not only costs hospitals millions, but also reduces the overall health of patient populations served. These findings highlight the importance of leadership development programs that improve leaders' mindfulness and emotion regulation skills and foster a healthier organizational culture.

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### **36. Implementation of the Survey of Well-being of Young Children (SWYC)<sup>TM</sup> Form in a Primary Care Office to Improve Screening of Children 2 Months to 5 Years of Age.**

***Eric Lessard, Sara Ryder Emerson***

**Introduction:** The AAP and Bright Futures recommend monitoring all children for developmental progression and social determinants of health at well child check evaluations.<sup>1</sup> While there are a variety of tools available to meet screening requirements, this

often means patients receive multiple screening forms per visit, which is laborious for families and clinical staff. Tufts University developed a comprehensive screening tool, SWYC, which includes developmental, interpersonal/behavioral, and social determinants of health screening for children 2 months through 5 years-old. Our aim was to utilize this tool to improve pediatric screening in our clinic by approximately 20%.

**Material and methods:** Baseline data for correct distribution of screening tools was obtained from retrospective chart audits of children 0 - 5 years-old seen at the Greenville Health System (GHS) Center for Family Medicine during a two month period. The SWYC form was then introduced via small group educational sessions involving physicians and clinic staff. One month after implementation, chart audits were repeated measuring percentage of forms completed by caregivers.

**Results:** Prior to SWYC implementation, patients received the age appropriate screening tool(s) 62% of the time. After SWYC introduction, age appropriate screening tool completion improved to 94%.

**Conclusion:** This study demonstrates that implementation of the SWYC form at GHS Center for Family Medicine provided more consistent comprehensive developmental and social screening of children 0-5 years-old.

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### **37. Influence of Opioid Referrals on Physical Therapy Outcomes For Patients with Neck and Back Pain**

***Markut K, Dunn D, Lutz A, Denninger T, Shanley E, Kissenberth MJ, Thigpen CA***

**Purpose:** The purpose of this study was to determine if differences in self-report of outcomes exist in patients with low back or neck pain who were seen in the same facility and were either seen direct access or were referred by a physician.

**Subjects:** The study involved 230 patients with low back and/or neck pain with or without extremity pain, who received standard care by physical therapists over a 1 year period.

**Methods:** The non-randomized comparative study involved a cohort of patients with low back and/or neck pain who were treated by physical therapists (PTs). Patients were either self-referral (direct-access) or physician-referral to physical therapy. Baseline measures of pain and disability, depression and quality of life were captured for each subject. Separate ANCOVAs were used to compare opioid referral and referral source to physical therapy for all baseline measures ( $\alpha \leq 0.05$ ).

**Results:** Patients were more likely to have an opioid referral if they began their care with a MD referral to PT who were MD-Referred and an opioid referral compared to who were direct access PT-First ( $\chi^2 = 18.3, P < 0.001$ ). Patients who were MD-Referred for back/neck pain displayed a near 5-fold increase in opioid referrals. Patients with opioids presented with average disability scores 35% less compared to non-opioid referrals. Patients with opioids did not show significant difference in visits or length of stay.

**Conclusions:** In patients with low back/neck pain who were treated by physical therapists via a direct access were less likely to have an opioid referral. Additionally, even with an opioid referral, patients who saw PT as first provider had better outcome scores compared to those who had opioid referrals, but were MD-Referred

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**38. Stability of Parkinson's disease (PD) subtypes based on a cluster analysis in a large cohort.**

**Artur F. Schumacher-Schuh, Oswaldo Lorenzo-Betancor, James B. Leverenz, Liana S. Rosenthal, Ted M. Dawson, Marilyn S. Albert, Zbigniew K. Wszolek, Owen A. Ross, Dennis W. Dickson, Joseph F. Quinn, Kathryn A. Chung, Amie L. Peterson-Hiller, Alberto J. Espay, Johnna Devoto, Fredy J. Revilla, Jennifer G. Goldman, Glenn T. Stebbins, Bryan Bernard, Tom J. Montine, Cyrus P Zabetian, Ignacio F. Mata**

**Background:** PD is a heterogeneous disorder, with variability in motor and non- motor symptoms and treatment response. No definition exist about how classify patients into subtypes. This is essential to better delineate clinical trials and assist in the development of personalized treatment in PD.

**Methods:** 1180 PD patients from the PD Cognitive Genetics Consortium, a longitudinal multicenter cohort, was used. Cluster tendency, the best cluster algorithm and the optimal number of clusters was determined based on statistical methods. A clinical prediction rule was constructed using principal component analysis, followed by multinomial logistic regression. This tool was applied to a follow-up visit after 2 years.

**Results:** Three subtypes were observed. The "benign tremor-dominant" group (N=425; 36%) had more tremor compared to other motor symptoms, had the lowest functional and motor impairment and the best scores in a comprehensive cognitive evaluation. A "malignant" subtype was seen (N=101; 9 %), patients exhibited the worst functional, motor and cognitive impairment. The third subtype (N=654; 55%) exhibited intermediate functional and motor scores. After two years, 64% (99/154) of the benign, 67% (103/153) of the intermediate and 19% (6/32) of the malignant subtypes were stable.

**Conclusions:**

A tremor-dominant phenotype had less severe motor and cognitive impairment, especially in the executive domain. The malignant subtype was the smallest and least stable. Further research will be necessary to confirm these findings.

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**39. Wearable Motion Quantification and Electronic Diaries for Long-term Monitoring of Parkinson's Disease (PD).**

**Aaron Hadley, Enrique Urrea Mendoza, Nicola Mennucci, Carol Zimmerman, Joseph Giuffrida, Zoltan Mari, Michelle A. Burack, Iliia Itin, Fredy J. Revilla, and Dustin Heldman**

**Objective:** To clinically assess wearable motion sensors for measuring tremor, dyskinesia, slowness, mobility and an electronic diary for (PD). Wearable sensors can record body motion throughout the day and could potentially provide a less burdensome means to detect and quantify PD symptoms.

**Methods:** Days of data with more than four hours of motion sensor data were collected and analyzed by finding the percent of day that symptoms were present and the average symptom score during those time periods in twelve PD patients. This study utilized two wireless sensors (Kinésia 360 system, Great Lakes NeuroTechnologies), one placed on the wrist and one on the ankle. Data was transmitted to a smartphone and it was used to record an electronic diary of their symptomatic state and timing of medication. Additionally, the subjects were instructed to complete a paper diary in 30 minute increments according to a schedule. Previously validated algorithms processed the motion data to detect and quantify tremor, dyskinesia, slowness, and mobility, which were compared to diary entries.

**Results:** Tremor, dyskinesia, slowness, and mobility were successfully recorded throughout the 5-month study.

**Conclusions:** The wearable system captures clinically relevant data throughout the day with increased temporal resolution. Differences in symptom categorical output of motion sensors and diary recordings may be explained as a combination of patient sensation subjectivity, overestimation of brief symptom states into 30- minute blocks of time.

#### 40. Evaluation of Chronic Lung Disease and Surgical Retinopathy of Prematurity Outcomes After a Change to Bubble Continuous Airway Pressure

*Ara Messamer, Reese Clark, Felecia Wood*

**Background:** In response to worsening outcomes for their premature infants, Neonatal Intensive Care Unit (NICU) leaders studied and implemented policy and equipment changes, based on published evidence.

**Purpose:** The purpose of the project was to evaluate the incidence of Chronic Lung Disease (CLD) and surgical Retinopathy of Prematurity (ROP) outcomes after the adoption of an evidence-based protocol using bubble Continuous Airway Pressure (bCPAP).

**Methods:** This evaluation consisted of a retrospective review of CLD and ROP in infants less than 28 weeks gestation. Chart data compared demographics, use of antenatal and postnatal steroids and maternal infection. Lengths of stay and number of days an infant spent on the ventilator were compared pre- and post the intervention period.

**Results:** There was a statistically significant decrease in the number of infants who required a ventilator greater than 24 hours. If required greater than 24 hours, the number of ventilator days was similar pre- and post-intervention. Surgical ROP and postnatal steroid use were clinically decreased but not statistically significant. There were no significant decreases in CLD, or any other variable measured. There were no deleterious effects.

**Implications for Practice:** While there was a decrease in the number of infants placed on a ventilator for greater than 24 hours, in this age group, it did not statistically affect the outcome variables of CLD, surgical ROP, or length of stay post-intervention.

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#### 41. Cervical Interbody Spacer with Passive Radiographic Fusion Status Indicator

*Paul W Millhouse, Arifuzzaman, Apeksha C Rajamanthrilage, Nathan T Carrington, Caleb Behrend, John D DesJardins, Jeffrey N Anker*

**Introduction:** Nonunion is the result of failed attempted spinal fusion and is a leading cause of postoperative axial pain or radiculopathy. Rates of failed cervical fusion range from 4.4 to 50% and pseudarthrosis accounts for 45 – 56% of revision. Nonunion is difficult to detect and diagnosis is based solely on symptomatology and imaging. Using interspinous motion analysis, fusion occurs when the distance between the tips of adjacent cervical spinous processes differs by less than 1-2mm on dynamic films.

**Hypothesis:** Intervertebral motion can be more accurately detected using a simple passive implantable device that responds to the pressure differential or vertebral body endplate motion between cervical spine flexion and extension.

**Methods:** A cervical interbody spacer with integrated fluidic pressure sensor was developed and prototyped. The working principal involves a fluid reservoir and indicator channel. The spacer was placed between Sawbones® and loads applied to simulate dynamic spinal positions. Radiographs were taken of a device loaded with cesium acetate and channel diameter of 0.5mm.

**Results:** Simulations demonstrated the device would fit well *in vivo*. Prototypes in cervical bone analogs under load suggest the indication would be apparent clinically. Previous work showed that fluid displacement into the indicator was in the appropriate scale (0 – 6.9 mm) under applied loads in the clinical range (0 – 110 N); this relationship was linear and repeatable. The resolution of the device loaded with a radiocontrast agent was also sufficient.

**Conclusion:** An implantable fluidic sensor is potentially a viable option for assessing fusion status in the cervical spine.

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#### **42. Interdisciplinary care huddles and rounding**

***Christy Morris, Terri LaRusso, Annette Dunphy, Paari Gopalakrishnan***

Research supports the fact that interdisciplinary communication and collaboration improves patient outcomes as well as the patient experience (Gonzalo et al., 2016). One method of increasing the collaboration amongst providers is interdisciplinary care huddles and rounding. The implementation of such processes has been connected to improved patient outcomes, decreased length of stay, improved patient satisfaction, and improved nursing satisfaction (Pritts & Hiller, 2014). In an effort to incorporate these practices in an acute care environment, a medical telemetry unit at a teaching hospital began a morning huddle with the Hospitalist admitting service. The huddle is a physician led process in which nursing, case management, and pharmacy collaborates on the care that is offered to patients on the unit. Following the huddle the physician and nurse participate in bedside rounding. After 9 months of implementation the results of the process have included a decreased length of stay, improved patient satisfaction scores, improved quality of care scores, and improved nursing and physician satisfaction.

Specifically, the adjusted length of stay has decreased by 0.2 days, HCAHPS scores around communication with nursing staff have increased 3.3 points from FY 16 to FY 17, HCAHPS around communication with physicians has increased 4 points from FY 16 to FY 17, and discharge throughput has decreased by 48 minutes.

The data supports the fact that collaborative communication improves not only the care that is delivered to patients but also the hospital experience for the patient. The data all supports the fact that communication improves the efficiency and effectiveness of the discharge plan and process. Additionally, the data supports that the fact that improved communication improves the work environment for nursing staff as well as physicians.

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#### **43. Increasing compliance with consistent sterile procedure during central line fluid changes in the Small Baby Unit of the Neonatal ICU to decrease the central line-associated bloodstream infection (CLABSI) rate**

***Melissa Motes, Michael Stewart***

The purpose of this project was to increase compliance with consistent sterile procedure during central line fluid changes in the Small Baby Unit of the Neonatal ICU to decrease the central line-associated bloodstream infection (CLABSI) rate and maintain the lower rate.

The framework for this quality improvement was the Iowa Model of Evidence Based Practice. In order to increase compliance during central line fluid changes, a PICC nurse was present to assist during the line change. Reeducation with a skills check-off on sterile technique and proper process for central line fluid changes was also done on the unit before the intervention began. The average compliance for this project was 42%. The overall percent change in the average CLABSI rate was 17%, but the overall percent change for CLABSIs related to maintenance was -50%. This quality improvement showed that the implementation of a PICC nurse to assist during central line changes, in addition to routine education may not result in an overall decreased CLABSI rate, but may result in reduced CLABSIs that can occur during the maintenance of central lines. This project showed that increasing compliance with proper procedure during central line changes, in addition to continued skills check-offs, can reduce CLABSIs caused by maintenance, resulting in decreased negative outcomes in extremely low birth weight (ELBW) infants.

#### 44. Two-year Retest Variability of ImPACT Baseline Concussion Testing in High School Athletes

*Vicki R. Nelson, Irfan M. Asif, Kyle J. Cassas, J. Brandon Harris, J. Aldrin Enabore, W. Franklin Sease, Jr.*

**Purpose:** To determine the value of repeat baseline neuropsychological testing in high school athletes.

**Method:** Between 2007 and 2017, 8<sup>th</sup> and 9<sup>th</sup> grade athletes from 42 schools and 22 sports were assessed via ImPACT testing, which was repeated 2 years later. Athletes who sustained concussion, reported learning disability or attention deficit disorder were excluded. Paired t- tests were used to assess change in composite scores for verbal memory (Verbal), visual memory (Visual), visual motor speed (Motor) and reaction time. Pearson's correlation coefficient was used to determine test-retest reliability.

**Results:** 2,442 athletes were included (63.2% male, mean age at initial testing 14.4±0.7 years) with a mean retest interval of 23.8±2.1 months. Significant changes were seen in all measures: Verbal (8.91±7.0, p<0.00001), Visual (10.61±7.9, p=1.2x10<sup>-20</sup>), Motor (4.54±3.6, p=13x10<sup>-130</sup>) and Reaction Time (0.07±0.08, p=0.0002).

Correlation coefficients demonstrate poor test-retest reliability in Verbal (r=0.36), Visual (r=0.47) and Reaction Time (r=0.42). Visual Motor Speed (r=0.71) was the exception demonstrating reliability between administrations.

**Conclusions:** 2-year repeat baseline ImPACT testing demonstrated significant changes in verbal memory, visual memory and visual motor speed indicating that re-testing of high school athletes is warranted.

**Significance:** This is the largest study to assess the utility of repeat baseline neuropsychological testing in high school athletes, which is important given the cognitive maturation occurring during adolescence. Repeat baseline neuropsychological testing at 2 years could be useful in the assessment of sports-related concussions.

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#### 45. On the path to total knee arthroplasty: a qualitative analysis of lifestyle factors, clinical management and phases of readiness for knee arthroplasty patients

*Alicia Oostdyk, Noor Alshareef, Rasmine Baker, Melanie Cozad, Sarah Floyd, Paul Siffri*

**Purpose Statement:** The choice to undergo total knee arthroplasty (TKA) is the terminal treatment point to alleviate symptoms that cannot be managed in other ways for patients with chronic degenerative knee osteoarthritis. This study elucidates phases of readiness and factors patients identify as important in shaping the decision to undergo TKA.

**Methods:** Semi-structured interviews were conducted with subjects over 18 years of age seeking treatment from a physician for a knee condition between August and December 2017 at the Steadman Hawkins Clinic of the Carolinas. Open coding content analysis was used to identify main themes and emerging patterns from individual chronologic timelines of readiness for TKA.

**Results:** Sixteen subjects with a chronic knee condition (8 females, 8 males) participated. The mean age of subjects was 58.31±10.53. Based on content analysis, timeline events were organized into 6 readiness phases across the patient lifespan. Differences in clinical treatment pathways emerged during the sixth phase. Patients over the age of 60 more quickly progressed to TKA, regardless of individual mental readiness and acceptance. Patients under 50 years were directed to non-operative treatments, coinciding with a period of waiting and symptom management regardless of desire for surgical treatment and mental readiness.

**Summary of Findings:** Subjects expressed individual levels of readiness for TKA, however the treatment options presented varied based on age and lifestyle factors.

**Applicability to Healthcare:** Patients under age 50 expressed dissatisfaction in treatment choices despite readiness; while patients over 60 were directed to undergo TKA, some were not accepting or mentally ready.

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#### 46. Can Commercially Available Voice Prompting Automatic Electrical Defibrillators (AEDs) be Utilized Effectively by Grade School Children.

*Sally Peterson, Phillip Moschella, Amy Ramsay, Dotan Shovrin*

**Purpose:** Out-of-Hospital survival rates and AED use in the US is poor despite known survival benefits. Lack of knowledge is cited as the main barrier to increased utilization. We sought to evaluate if grade school children can properly use an AED prompted only by the machine's voice/self-contained written instructions.

**Methods:** An IRB approved, pilot study was conducted using randomly selected grade school children attending a "Health Fair" at Clemson University. Single XX graders were given a commercially available AED, surveyed if they had any experience with the device, and then asked to use the device on a simulation mannequin. They received only the voice prompting/printed instructions from/on the device itself. The ability to correctly apply/discharge the device across several steps was charted by an observer on a yes/no basis along with the total time to correctly complete AED application in seconds.

**Results:** 35/37 students (95%) elected to participate. 100% of the students had never used the device previously. 31/35 children (88.5%) were able to correctly turn on the device. 24/35 students (68.5%) correctly removed and attached the pads to the mannequin chest /AED and 28/35 children (80%) correctly discharged the AED shock. The average time to correctly complete AED placement and shock was 81 seconds.

**Conclusions:** This pilot study demonstrates that grade school children can correctly use an AED with instructions provided by the device itself. Further education and training in grade schools may prove beneficial and cost efficient to improve overall community use of AEDs in out-of-hospital cardiac arrest.

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#### 47. Reducing Burnout and Improving Meaningful Work through Medical Resident Poverty Simulation: A Pilot Study *Camiron Pfennig, Chelsea LeNoble*

Healthcare professionals are at significant risk for burnout, characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment. As the intensity of healthcare work continues to escalate, the need for interventions aimed at mitigating burnout and increasing providers' sense of meaningful work is apparent.

Healthcare professionals may experience burnout symptoms when patients miss appointments or do not adhere to prescribed treatments, as this diminishes a sense of meaning in their work. Many times, these behaviors are not a result of the patients' lack of effort, but stem from external factors related to socioeconomic status and health disparities. To obtain better insight into the lives of their patients, medical residents at a large hospital system participated in a poverty simulation—an immersive experience in which participants take on the identity of a person in poverty and navigate their daily challenges.

To examine the impact of the simulation, 24 medical residents who completed a poverty simulation and 43 medical residents who did not participate reported their sense of meaningful work and emotional exhaustion both before the poverty simulation and again one month later. Results indicate that residents who participated in the poverty simulation reported an increase in meaningful work compared to the control group from Time 1 to Time 2. While emotional exhaustion slightly increased for the poverty simulation group, the average score was significantly lower than the control group. These findings provide initial support for the effectiveness of a poverty simulation in reducing burnout and improving meaningful work of medical residents.

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#### **48. Initiation of an Osteoporosis Treatment Program at Our Institution**

*Drew Ratner, Billy Clark, Amy Trammell, Laura Boineau, Kyle Jeray*

The purpose of this study is to examine the effectiveness of our osteoporosis program at preventing future fragility fractures in our population of patients with hip fragility fractures, including how many patients were started on an osteoporosis treatment.

Institutional Review Board approval was obtained for this retrospective review. We reviewed all patients treated at our institution for hip fragility fractures from the time period of January 2013 to July 2013. The primary outcome measure was the number of patients who met with the osteoporosis nurse practitioner (ONP) and started an osteoporosis medication. Initiation of calcium and/or vitamin D and subsequent fragility fracture were also examined. We also examined length of stay in hospital, time from admission to surgical intervention, time from surgery to discharge, ambulatory status upon admission and discharge, location of discharge, and mortality.

There were 151 hip fractures deemed to be fragility hip fractures during the time period reviewed. The average time to surgery was 37 hours (SD=2.1). Forty-two patients (28%) previously had a fragility fracture. Forty-seven (31%) followed up with the ONP. Of those, 34 were started on an osteoporosis medication, and all of them were started on calcium and vitamin D. Overall, 13 patients re-presented before 2017 with a subsequent fragility fracture (mean time 398 days to refracture), five of which were being treated by the ONP. This is an improvement compared to nationwide averages (~20%).

This study shows promise for the initial stages of our osteoporosis program in providing osteoporosis treatment following fragility fractures.

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#### **49. Understanding, Assessing, and Alleviating Provider Burnout: Influencing Factors, Processes, and Outcomes**

*Dotan Shvorin, Kevin Taaffe, Ron Pirrallo, Andrew Connor, Cole Matthews, Michael Ramsay, Phillip Moschella, Kalyan Poosarla, Vishnunarayan Girishan Prabhu, Harrison Albo, Cole Barker, Paul Rosenberger*

The purpose of this research is to investigate the factors and processes that influence provider stress which leads to burnout and how patient-care units in GHS can organize to alleviate it. This will be accomplished by examining physician stress levels in the emergency department. Burnout in physicians is increasing every year and the most prone group is emergency medicine physicians (Medscape, 2017). This study will analyze the role of events in ED, shift length etc. that causes stress in resident and attending physicians and how their experience levels allow them to manage such events. The research will be performed at the Greenville Memorial Hospital emergency department by collecting data on residents and attending physicians during the same shift. Data will be collected using an Empatica biomarker device and verified questionnaires. Physiological biomarkers that will be measured include heart rate, electrodermal activity, bvp, skin temperature, and sympathetic nervous system activity. Questionnaires will be used to gather subjective data based on physicians' interpretations of their stress and burnout levels. We hypothesize that more experienced physicians will be able to better deal with stress in the ED. The applications this research will have to the healthcare field could include developing better coping- mechanism and training program for resident physicians to manage stress from ED events.

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## 50. Bioelectrical Impedance Analysis Accuracy: Factors that Affect Test Results

*Maeve Murphy, Brandi Ingram, Sarah Feus, & Jillian Robert*

Bioelectrical impedance analysis (BIA) is a commonly used technological method for determining body composition. BIA determines the opposition to electrical current flow through the body, or electrical impedance, and this data can be used to determine Total Body Water (TBW). TBW can be used to determine fat free mass (FFM), fat mass (FM), and overall cellular health. This research aims to understand BIA and the factors that could possibly alter BIA results. Altering factors include: hydration status, fasting status, caffeine and alcohol consumption, physical activity, body positioning, and pregnancy. Using a population of participants from the FirstLine Therapy Program (through CU First at the Joseph F. Sullivan Center), the BIA results were assessed in relation to the altering factors. Each patient was given preparatory guidelines to follow prior to BIA testing; however, in a community health setting (reaching a larger population) it is not always feasible for patients to have the knowledge or ability to follow the guidelines. The purpose of this study was to determine whether there was a significant impact of following the guidelines on the participants' body composition readings. It was concluded that there was no significant impact of following the recommended preparatory guidelines in relation to the accuracy of BIA measurements. BIA technology is a thorough way of evaluating body composition in a cost-effective way for many community health organizations.

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## 51. Return to Sport as Outcome Measure for Shoulder Instability: Surprising Findings in Non- Operative Management in a High School Athlete Population

*Ellen Shanley, Charles A. Thigpen, Lauren Ruffrage, Douglas J. Wyland, Michael J. Kissenberth, John M. Tokish*

**Background:** Approximately 50,000 ACL injuries occur in US high school athletes each year. Previous research indicates varied rates of return to sport across all ACL injuries, and treatment type and timing. Few studies have examined these variables in high school athletes. The purpose of this study is to determine if time to surgery and number of PT visits impact the athlete's ability to return to sports.

**Methods:** 79 (30F, 49M) high school athletes (avg. 15.9 yo $\pm$ 1.6) participated in the study. Each athlete underwent ACL reconstruction and reported intention to return to sport. ATs documented the date, mechanism, and sport of injury. Orthopedic surgeons reported the type of surgery, graft type, date of surgery and clearance to return to sport. Physical therapists documented number of therapy visits prior to completion of care. Chi square analyses and Univariate ANOVAs were used to compare ability to RTS based on gender, graft type, delay to surgery and average PT visits ( $\alpha=0.05$ ).

**Results:** Of 79 scholastic athletes, 62 (75%) were cleared to return to their sport of injury the following season, 17 did not. Of the athletes unable to return to sport, a significantly longer average time to surgery was noted (97 vs 47 days,  $P=0.005$ ). There was no difference in gender ( $P=0.17$ ), graft type ( $P=0.7$ ), or PT visits ( $P=0.4$ ) when comparing those cleared versus those unable to RTS.

**Conclusion:** The ability of an athlete to obtain clearance to return to sport appears to be negatively influenced by a significant delay in surgical ACL reconstruction.

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## 52. Leveraging Electronic Health Record Data to Improve Diabetes Control and Prevention: the DART Quality Improvement Program

*Sara M. Sarasua, Kim Roberts, Susan E. Sutherland, Robert A. Davis, David A. Ramsey, C. Shaun Wagner, Brent M. Egan*

**Purpose:** To develop a scalable quality improvement (QI) program for primary care practices to improve diabetes control and prevention while not adding to the burden of busy practices.

**Methods:** A 9-month QI program “DART” was developed that uses existing electronic health record (EHR) data and centralized reporting to create daily gaps-in-care “huddle” reports, practice facilitation, and monthly feedback reports to providers to track progress on diabetes control and prevention. The focus of DART is to increase screening for prediabetes and diabetes (Diagnose early), increase initiation of treatment (Act quickly), and increase usage of Diabetes Self-Management Education, Diabetes Prevention Programs, weight loss, and healthy lifestyle interventions (Refer appropriately and Teach healthy behaviors).

**Results:** DART is being pilot tested in three sites. Baseline diabetes control as of January 1, 2018 showed 51-69% of diabetic patients had an HbA1c <8%. Among patients at-risk for prediabetes, 52-88% of patients were screened for prediabetes.

**Summary:** The burden of chronic disease is increasing at the same time that primary care practices are being asked to care for more complex patients, improve the quality of care, provide substantial reporting, and reduce costs. DART was designed to use EHR data to improve diabetes control and prevention, improve practice efficiency by flagging gaps in care ahead of a scheduled patient visits, support patient centered medical homes with daily huddle reports, and help improve quality metrics.

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## 53. Employing the Patient-Centered Collaborative Care Approach: A Case Study of a Complex Geriatric Patient with Psychopathology of Treatment Resistant Depression and Primary Hyperparathyroidism

*Joel R. Saul, Sharon M. Holder, Jonathan S. Lokey*

Primary hyperparathyroidism is a relatively common endocrine disease with many non-specific physical symptoms as well as potentially serious psychiatric effects. The incidence of the illness, severity of symptoms, and poorer outcomes are all positively correlated with increasing patient age. The Patient Centered Collaborative Care Approach is a demonstrable method of coordinating patient care, reducing the burden on patient advocates, and improving patient outcomes. The use of the Patient Centered Collaborative Care Approach has not previously been well described in treatment of psychiatric manifestations of primary hyperparathyroidism.

Using the example of an elderly woman admitted with complex psychopathology and a diagnosis of primary hyperparathyroidism, this case illustrates the value of the Patient-Centered Collaborative Care Approach in (1) establishing accurate diagnoses, (2) reducing harm from comorbidities, (3) improving patient outcomes, and (4) potentially reducing hospital costs.

The case exemplifies the potential benefits of implementing the Patient-Centered Collaborative Care Approach in the treatment of a medically complex patient hospitalized for psychiatric complaints.

A diagnosis of Primary hyperparathyroidism (PHPT) was made and a multidisciplinary team was employed in the treatment for this patient utilizing the Patient centered Collaborative Care Approach. This included the psychiatric treatment team, internal medicine, endocrine surgery, as well as significant family involvement. Parathyroid adenoma was confirmed and mass was removed surgically. The patient made a rapid and dramatic improvement and her depressive symptoms remitted. The critical importance of clinical flexibility, questioning available data, and a collaborative team approach to the evolution of a diagnosis is discussed.

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**54. Caring for Caregivers: Identifying Personality Risk Factors in Burnout Development**  
**Nastassia Savage, Zachary Klinefelter, Marissa L. Shuffler, Camiron Pfennig, Ronald Pirrallo**

Burnout is a well-recognized issue in healthcare, where it negatively impacts patient care (e.g., Atkinson et al., 2017) and physician suicide risk (Shanafelt et al., 2011). Although the estimates of burnout prevalence vary, one study found 50% of medical residents and fellows were burned out and exhibited symptoms of depression (Dyrbye et al., 2014). One predictor has been personality (i.e., extraversion, agreeableness, conscientiousness, intellect, neuroticism) as certain traits were more prone to burnout (e.g., McManus et al., 2004; Ripp et al., 2011; Swider & Zimmerman, 2010; Zellars et al., 2000). This study assesses the role of personality in burnout development longitudinally.

We used the mini-IPIP to evaluate personality in 10 first-year ED residents prior to residency (June 2017) and the MBI-HSS to assess burnout before residency and every four weeks starting in September, 2017. Using general linear model repeated measures analyses, results indicate that extraversion and intellect significantly predict burnout development for emotional exhaustion and depersonalization and agreeableness, conscientiousness, and neuroticism did not.

These results should be used cautiously as they are limited by the small sample and reliance on self-report, survey data. However, it provides some support for the role of personality in burnout development in residents and should be reassessed in other, larger, more diverse samples (e.g., departments). This could help target interventions to offer assistance to residents who are more at-risk for developing burnout than others. Additionally, at-risk residents could be offered extra support and guidance (e.g., mentors, relaxation activities) to limit the development of burnout.

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**55. Using Epic to measure referral rates by GHS pediatricians to developmental and behavioral support services**  
**Schmalz M.R., Moss J.L., Forrester J.E., Griffin S.F., Wilson C.M., Sease, K.K.**

The purpose of this study was to examine the rate at which Greenville Health System (GHS) pediatric primary care providers refer patients with developmental and behavioral concerns to Help Me Grow South Carolina (HMG SC), and to understand the most common concerns among children being referred.

The study examined a cohort of patients between May 2016 and April 2017 that may have benefited from HMG services based on age (< 4 years) and identification of a possible developmental delay (through commonly-used diagnosis codes). Referrals to HMG, as well as to early intervention services, were analyzed. In this population (n=1,654), the most frequent diagnoses were general speech and developmental delays. Average age at diagnosis was 20.3 months; the majority were male (63.3%). 7.8% of patients were referred to HMG, however, 74.2% of patients referred to HMG were connected to early intervention services.

GHS physicians who utilize HMG are making age- and diagnosis-appropriate recommendations to HMG, resulting in a clinically significant rate of connection to services; however a missed opportunity exists currently due to low referral rates. The sample also displayed a gender disparity in the diagnosis of developmental delays and behavioral concerns – similar to results found in existing literature.

The study highlighted the need for a more streamlined approach to physician referral into HMG and other support services, and informed a pilot project (GHS Pediatric Support Services) whereby physicians can easily refer to HMG and other community services through one simple referral within the medical record.

**56. Impact of an alert reduction strategy on pharmacist alert override rates within a clinical decision support system**  
*John Schoonover; Becky Sawyer; Lucy Crosby; Alyson Ghizzoni-Burns; Jun Wu*

Clinical decision support (CDS) provides information electronically to help the clinician make informed treatment decisions. Benefits of CDS include reduction of medication errors, improved quality of care, and improved efficiency. A major consideration of CDS implementation is the large number of clinical checking alerts that are generated during order entry and verification. If alerts are frequent but not consistently meaningful and actionable, clinicians become desensitized over time. Desensitization, also known as alert fatigue, can lead to clinician frustration and patient harm as important alerts are overlooked. Opportunities exist within CDS systems to customize alerts by various methods, including: filtering visibility by certain disciplines only (i.e. pharmacists only); filtering by severity level; changing the severity level; and turning off/on completely.

The study objective is to determine if reducing pharmacist-specific alerts reduces alert fatigue (override rates per 100 orders) and improves pharmacist perceptions of utility. This prospective, system-wide, pre/post intervention, quality improvement study will be conducted over a 6 month period. The pre- intervention phase will include pharmacist education and a brief satisfaction survey. Following the education and a committee-based review and approval process, CDS alerts will be modified to target a 10% reduction. Pharmacist satisfaction and override rates will be measured and compared to pre-intervention values during the post-intervention phase. The primary endpoint is pharmacist override rate per 100 orders. Secondary endpoints include change in total number of alerts, pharmacist override reasons, satisfaction survey results, pharmacist intervention data, and number of reported medication events. Study outcomes and data collection are currently underway.

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**57. Comparing Telephone Based Diabetes Education To Resident Clinic Standard of Care In Uncontrolled Type 2 Diabetes Patients**  
*Henry Schwartz, Caroline Clary, Gail Chastain, Meenu Jindal*

**Introduction:** The morbidity and mortality of type 2 diabetes, as well as the disease's contribution to our national health care cost burden, cannot be overstated. The resident clinic with its primarily underserved population of patients offers a unique opportunity for residents to care for notoriously difficult to manage diabetes patients.

**Methods:** Fifty-two patients utilizing our internal medicine residency clinic for primary care were enrolled August 2016. Primary enrollment criteria were a diagnosis of Diabetes Mellitus Type 2, and a most recent Hemoglobin A1c >9.0 at the time of enrollment. Twenty-six patient's were randomized into the intervention arm of the study. These patients received 6 months of diabetic education over the telephone via a certified diabetic educator employed by the clinic. The primary outcome measure was hemoglobin A1c as collected by the PCP as part of standard of care.

**Results:** Following a rolling schedule of enrollment starting August 2016 the intervention arm of the study was completed in August 2017. Hemoglobin A1c data was gathered and analyzed comparing trends between the control and intervention arms.

**Conclusion:** Developing new and innovative ways to improve blood glucose control in historically difficult to control diabetic patients represents an exciting area of ongoing research in primary care medicine. A cost effective telephone intervention program used to both educate patients and identify barriers to care would be a perfect example of such an intervention. As any intervention needs to be evidence based, this study represents the first stages of development of such a program.

**58. Comparison of high versus low fidelity simulation models for AHA CPR training in Middle School Students.**  
*Bijal Shah, David Wong, Sally Peterson, Phillip Moschella, Amy Ramsay, Dotan Shvorin*

**Purpose:**

To test the ability of middle school students to learn AHA “CPR Anytime” training utilizing both high and low fidelity simulation models.

**Background:** Current rates of bystander CPR in South Carolina remain dismal despite known survival benefits. Programs have been targeted at high schools and adult community events with mixed results. Multiple countries have trialed CPR training in elementary and middle schools, but the cost of the simulation models necessary for training are expensive and bulky.

**Methods:** Commercially available high-fidelity simulation mannequin models will be assessed against simple air bellows foot pumps to test their non-inferiority during AHA “CPR Anytime” training of 450 students at a local charter middle school. These results will also be compared to a historical cohort of high school students using similar mannequin-only based training. We will test for retention and ability using established methods from the AHA included with the training program.

**Outcomes:** We anticipate that the simple air bellows will provide a non-inferior training model as compared to the expensive and bulky mannequins. These widely available air bellows are inexpensive and may entice more districts/school to implement training that would otherwise have been deemed too costly.

**Conclusion:** This program is designed to expand the scope and dissemination of “CPR Anytime” training by providing a lower cost/fidelity option that is comparable to the AHA CPR training, thus hopefully improving bystander CPR rates through education of local youth.

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**59. Assessing an Exercise Vital Signs in Pediatric Patients: The Relationship Between Physical Activity, Obesity and Hypertension**

*Emily Sherrard, Robert V. Masocol, Irfan M. Asif, J. Alex Ewing, Vicki Nelson*

**Purpose:** This study assesses the utility of the exercise vital sign, and its correlations with obesity and hypertension, in a pediatric population.

**Methods:** Patients at the Center for Family Medicine were assessed via the EVS, a self-reporting of exercise frequency and duration, during their appointments. Patients were categorized into 3 activity groups: inactive (EVS=0 minutes/week), underactive (1-419), and sufficiently active ( $\geq 420$ ). Associations were tested between EVS, hypertension (systolic or diastolic blood pressure  $\geq 95\%$  ile) and obese or overweight BMI ( $\geq 85\%$  ile) utilizing ANOVA. Chi-square-tests compare results to 2015-2016 National Health and Nutritional Examination Survey (NHANES) accelerometer data.

**Results:** 255 pediatric patients were included. Youth ( $n=118$ , aged 5-11 years) reported an average EVS of  $384.9 \pm 218.1$  minutes/week, with 55.1% of participants reporting sufficient activity, 42.4% underactivity, and 2.5% inactivity. Adolescents ( $n=137$ , aged 12-18) reported a lower average EVS of  $278.3 \pm 199.6$ , with 29.2% reporting sufficient activity, 56.2% underactivity, and 14.6% inactivity. Males reported more activity than females ( $355.1$  vs  $298.6$ ;  $p<0.05$ ). Obesity ( $p<0.001$ ) and hypertension ( $p<0.02$ ) were significantly associated with reported EVS. More children reported meeting guidelines for physical activity by EVS than reported nationally via NHANES (55% vs. 42% for youth,  $p<0.004$ ; 29% vs 8% for adolescents,  $p<0.0001$ )

**Conclusion:** This is the first investigation to evaluate the EVS in a pediatric population. Associations between EVS, BMI and systolic blood pressure, suggest the EVS may have utility screening to identify children at-risk for obesity or hypertension. Importantly, the EVS provides clinicians an opportunity to dialogue about physical activity with children and their parents.

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## 60. PNEUMATIC DILATION IMPROVES ESOPHAGEAL EMPTYING ON TIMED BARIUM ESOPHAGRAM IN PATIENTS WITH ESOPHAGO-GASTRIC JUNCTION OUTFLOW OBSTRUCTION.

*Shin, Claire, Blonski, Wojciech C., Ewing, Joseph A., Richter, Joel E., Clayton, Steven*

**Background:** Functional esophago-gastric outflow obstruction (EGJOO) is a delayed esophageal emptying secondary to a poorly relaxing lower esophageal sphincter (LES). The aim of this study is to investigate the clinical response of pneumatic dilation (PD) by comparing changes in standing barium column in EGJOO patients before vs after undergoing PD.

**Methods:** EGJOO patients with >1cm of retained liquid barium in the esophagus at 1 min and/or with pill arrest in esophagus at 5min were included. Post-PD TBEs were obtained. The barium column height (BCH) measurements were tested using Mann-Whitney U test. The pill passed and symptom assessment were tested with a Chi-squared.

**Results:** The demographics, HRM, dysphagia characteristics, patient outcome of 33 patients are described in Table 1. A significant number of patients showed symptom improvement ( $p=0.014$ ). 67% of EGJOO patients reported subjective positive symptom relief, 18% improved and symptoms recurred, 6% were lost to follow-up, and 9% reported no change. TBE of pre-PD showed 1min BCH of 11.0cm and 5min BCH of 1.7cm (Table 2). Post-PD TBE showed 1min BCH of 0cm and 5min BCH of 0cm. 20 patients were able to pass the pill in post-PD TBE vs. 8 patients in pre-PD TBE.

**Conclusion:** PD is an effective initial treatment for EGJOO patients with abnormal TBE. PD relieved symptoms ( $p=0.014$ ) and improved esophageal emptying. There was significant decrease in 1min BCH and width ( $p<0.001$  and  $=0.001$ ), and improvement in pill passing ( $p=0.006$ ) after PD. The finding can help reduce medical cost by serving as therapy selection criteria for PD.

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## 61. Critical Social Thinking & Mindfulness Skills as Levers for Facilitating Healthcare Unit Engagement & Unit Climate for Patient Safety: A Longitudinal Examination of the Impact of Conscious Leadership & Professionalism

*Marissa Shuffler, Chelsea LeNoble, Michelle Flynn, Dana Verhoeven, Nastassia Savage, Pamela Farago, Tiffany Cooper, Sharon Wilson, Terrie Long*

In healthcare, emotional demands and stress can negatively impact relationships among employees, reducing engagement and increasing turnover (Ahearn, 2006). Leaders can play a key role in addressing these challenges. In particular, leaders who are provided with developmental activities to refine the skill of navigating relationships with and among their employees are more likely to set team climates that foster employee engagement and reinforce patient safety. Empirical evidence has suggested that focusing on self-awareness, social dynamics, and mindfulness may be particularly beneficial for healthcare leadership. Accordingly, this research provides a multi-method, multi-source, long-term examination of the impact of a leadership and professional skill development program focused on such competencies: the Conscious Leadership & Professionalism program. This program is derived from evidence-based practices and principles of leadership development and training design. Data from 1,189 healthcare units and their leaders were collected over the course of four years to evaluate longitudinal effects on unit outcomes of engagement and climate for patient safety. Multilevel structural equation modeling analyses demonstrated that program participation and learning are significantly and positively predictive of leader-employee relationships, greater workplace engagement, and positive perceptions of patient safety climate. Accordingly, this type of training program is a promising avenue for continued exploration and application in healthcare, as it may help to improve both employee engagement and the patient experience. Limitations and future research and practice implications will be described in the full poster presentation.

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## 62. Strategic Development of a Research Experience Enrichment Program (REEP) in the Emergency Medicine Department

*Dotan Shvorin, Ronald Pirrallo, Kevin Taaffe, Phillip Moschella*

**Objective:** To establish a GHS-Clemson University (CU) collaboration that seeks to improve patient care processes and outcomes by applying engineering methods within the GHS Department of Emergency Medicine.

**Background:** The Creative Inquiry (CI) program matches motivated undergraduate and graduate students with CU Faculty to facilitate imaginative engaged learning and cross- disciplinary interactions to produce the next generation of scholars.

**Hypothesis:** Can the CU CI program be adapted to the GHS health care environment to advance GHS scholarship and workforce development?

**Methods:** Under the leadership of an embedded CU scholar, 6 teams of CI students were matched with GHS EM Clinical Faculty and EM Residents to investigate topics ranging from CPR training effectiveness to quantifying physician distractions to clinician decision making under fatigue to describing clinician physiologic biomarker variability during a shift to understanding the effect of consultant use on ED operations to TB screening modelling.

**Outcomes:** 6 teams incorporating 12 EM GHS Faculty, 6 EM residents, 18 Undergraduates and 5 graduate students formed the Research Experience Enrichment Program (REEP) to answer 6 research questions in this academic year. The 6 teams generated 6 confirmed abstract conference presentations that secured a CU internal award of \$6k for dissemination.

**Conclusion:** The REEP appears to have adapted the CU CI framework to produce promising scholarly work and expose nearly 2 dozen CU students to the health care environment this year. Future work will evaluate if these teams generate peer reviewed manuscripts and track how many CU REEP participants pursue careers in health care.

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## 63. Statin Shared Decision Making and Patient Education Study

*B. Kizer Stovall, Alexa Bianchi, Meenu Jindal*

The 2013 American College of Cardiology (ACC) / American Heart Association (AHA) task force on practice guidelines demonstrated a new perspective focusing on atherosclerotic cardiovascular disease (ASCVD) risk reduction from statins. With a paradigm move to patient-centered medicine, shared decision making (SDM) tools have created a collaborative way for medical decision making. One key question remains: Does SDM and the use of an aid increase patients' knowledge and continuation of taking statins?

The study population consisted of lower socioeconomic status, current statin use, and no known hx of CVD or CAD. The sample size was 27 individuals. During their clinic visit, patients were asked to answer a survey regarding their knowledge of the mechanism of action, risks, and benefits of statins. After finishing the initial survey, patients then underwent a SDM session utilizing the Mayo Clinic SDM Statin Aid. After the session, the patients were asked to complete a post-intervention survey. Scores of the initial and post-intervention surveys were compared by paired t test.

Two main areas that were assessed were the association between statin SDM aid and education, as well as the impact on their decision to continue to take a statin. There was a 33% increase in patient education with a p-value of <0.001 as well as a 94% willingness to continue to take their statin after the SDM. Therefore, SDM was shown to be effective for patient education; SDM should be encouraged and emphasized in academic training regardless of educational level or socioeconomic status.

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#### 64. Improving Population Health through Hypertension Control

*Susan E. Sutherland, Brent M. Egan, Robert A. Davis, David A. Ramsey, Robert B. Hanlin.*

**Purpose:** Improving blood pressure (BP) control is a key national strategy for preventing cardiovascular events. A prior pilot study using the MAP framework, **M**easure accurately, **A**ct rapidly, **P**artner with patients, demonstrated feasibility and effectiveness by improving BP control from 61.2% to 89.8% in a single clinic over a 6 month period. The purposes of this study are to determine if (1) MAP improves BP control across multiple, diverse sites, and (2) effects are sustainable.

**Methods:** Sixteen primary care sites throughout the Greenville Health System received education and training to implement MAP through practice facilitation for 6 months. Each site received an automated BP monitor and monthly performance reports with key metrics. All sites received recognition for their efforts at 6 months when facilitation efforts ended. Institutional Review Board (IRB) approval was obtained with waiver of consent. Data were abstracted from electronic health records throughout the study. Controlled BP was defined as systolic <140 mmHg and diastolic <90 mmHg.

**Results:** The clinics served a combined 21,035 hypertensive adults, ages 18–85, with mean age 60.4 years, 53% female, 65% white. BP control improved from 65.6% at baseline to 74.9% at 6 months ( $p < 0.001$ ). BP control was 74.1% at 12 months.

**Conclusions:** The MAP framework provided an effective tool for improving BP control across diverse primary care settings. The short-term benefit at 6 months was retained at 1 year.

**Applicability:** Rapid and sustainable BP control is an achievable goal which supports the national cardiovascular event reduction objective and improves population health.

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#### 65. Supportive care metrics for a community oncology AYA program

*Elizabeth H. Cull, John Mcalwany, Sarah B Taylor, Heather Bowers, Kerri Susko, Aniket Saha*

**Purpose:** Adolescent and young adult (AYA) oncology patients have a unique set of needs that are often not addressed by primary providers in a busy clinical setting. These needs include genetic counseling, fertility preservation, clinical trial enrollment and psychosocial support. The AYA Cancer Program was created to address these issues and mitigate the disparity in care and outcomes seen in the AYA cohort.

**Methods:** The study assessed patients actively under treatment between ages 15-39 from September 1, 2016 to September 1, 2017. The number of referrals to the AYA program, participation in the AYA program, and met supportive care needs (fertility, genetics, clinical trial participation) were examined.

**Results:** During year one of the program, 62 (22%) of 288 AYA eligible patients were seen in the AYA clinic. An additional 34 (12%) patients were referred but did not attend the appointment. 192 (67%) patients were not referred.

Compared to non-referred patients, AYA clinic patients were more likely to be enrolled on a clinical trial (53% vs. 18%), have a documented fertility counseling discussion (95% vs. 15%) and receive a genetics referral (69% vs. 43%).

**Conclusion and Application to Population Health:** Patients seen in the AYA program were more likely to receive fertility referrals, genetic referrals and had increased clinical trial participation compared to patients that were not referred. This highlights the essential role of the AYA program in meeting these under addressed needs in the AYA population.

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## 66. Reduction in Type 2 Diabetes Markers with Longer Duration of Breastfeeding in the Peri/postnatal Epigenetic Twins Study (PETS): Theoretical Epigenetic Mechanisms

*Heide S. Temples, Yuk Jing Loke, William Bridges, Richard Saffery, Jeffrey M. Craig*

**Purpose:** The purpose of this study was to assess the markers for type 2 diabetes (T2D) in association with duration of breastfeeding

**Design:** Cross-sectional longitudinal research study of children 6-7 years of age participating in the PETS (n=94).

**Methods:** Investigate the relationship between duration of breastfeeding and T2D markers (insulin and Homeostasis Model Assessment Insulin Resistance levels [HOMA2-IR]).

**Results:** Infants breastfed for more than 4 months had significantly lower mean insulin levels (22.8 pmol/L; 95% confidence interval [CI], 4.05- 22.0, P=0.005) and significantly lower mean HOMA2-IR levels (0.41; 95% CI, 0.07- 0.40, P=0.005) than the infants breastfed for less than 4 months.

**Conclusions:** Breastfeeding for more than 4 months protects against the risk of developing insulin resistance associated with the development of T2D in the PETS children, supporting the idea that T2D may be partially programmed by diet in early life.

**Clinical Relevance:** Understanding the interactions of diet and nutrition with our epigenome allow healthcare providers to tailor education and interventions focused on early life nutritional habits to help prevent T2D.

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## 67. New Public Health Partnership: GHS Emergency Department and SC DHEC HIV Surveillance Program *Ben Theobald, Jackie Barnabe, Phillip Moschella*

**Purpose:** To describe the implementation, relevance, and results of ED based HIV surveillance system.

**Methods and Results:** DHEC and GHS have partnered to establish a program in which DHEC subsidizes “opt-out” HIV screening as performed on existing blood samples from individuals between the ages of 18-64 presenting to the Emergency Department with unknown HIV status. Newly diagnosed HIV positive patients are then linked to initial treatment and follow up. From December 1, 2017 to March 1, 2018, this program has tested 1123 individuals with 7 initial positives and 3 confirmed HIV diagnoses (0.26%). Of the remaining initial positive results, two were negative on confirmatory testing, and 2 others were previously diagnosed but were unknown in our medical record system.

**Summary:** HIV screening in the ED setting results in identification of undiagnosed individuals and successfully links them to treatment and follow up.

**Clinical Relevance:** Our program demonstrates how a government supported, ED based population health surveillance program can provide a positive impact on public health. With 30.2% of all HIV transmissions in the US coming from undiagnosed individuals, the Office of National AIDS Policy set a goal of no more than 10% of HIV positive patients in the US remain undiagnosed. Currently that rate is 14% nationally, and 16.6% in South Carolina, indicating a need for increased HIV surveillance. This program serves this purpose by identifying undiagnosed cases of HIV, subsequently decreasing HIV transmission rates and prevalence in South Carolina.

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## 68. Cardiorespiratory Health, Muscular Strength/Endurance and Fat Free Mass are Improved after 12 Weeks of Exercise Therapy in Cancer Survivors

*Jennifer Trilk, Ryan Porter, Noreen Denham, W. Larry Gluck*

No studies to our knowledge have examined the effects of a nurse-supervised exercise program using Certified Cancer Exercise Trainers on anthropometric and physiological variables in cancer survivors across multiple diagnoses.

**Purpose:** To evaluate effects of the Greenville Health System (GHS) Cancer Institute's Oncology Rehabilitation program called "Moving On."

**Methods:** GHS oncologists referred eligible cancer survivors to "Moving On," (12-weeks, 1 hour, 3 days/week of exercise therapy) after having completed initial chemotherapy, or on maintenance chemotherapy and/or current radiation therapy. Baseline and follow-up evaluations included body mass index (BMI), body composition (body fat mass [FM]; fat free mass [FFM]), peak oxygen uptake (VO<sub>2</sub>peak), muscle strength (1-repetition maximum [1-RM]) and muscle endurance (repetitions at 40% 1-RM).

**Results:** Survivors (N=11, 54.5±14.8 years of age; 82% women) who completed the program with ≥80% attendance were evaluated. No change in BMI or FM occurred; however, body FFM as well as truncal FFM increased 3.5% (3.3 lbs, p=0.02) and 3.8% (1.7 lbs, p=0.01), respectively. VO<sub>2</sub>peak increased 20.2% (3.5±0.9 ml/kg/min; p<0.01), upper and lower body 1-RM increased 27.4% (24.8±8.6 lbs, p<0.05) and 19.1% (35.8±11.3 lbs, p<0.05), respectively. Upper and lower body muscular endurance increased 76.8% (+18.1±1.9 repetitions, p<0.001) and 76.3% (+13.7±2.8 repetitions, p=0.001), respectively (absolute data reported as mean±SE).

**Conclusion:** Cancer survivors across diagnosis groups and age ranges experienced anthropometric and physiological benefits of the Moving On program.

**Applicability to Healthcare:** Standard-of-care for cancer survivors should include exercise therapy to help ameliorate the deleterious effects of cancer therapy and maximize return to function and quality of life.

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## 69. Project REVISE—The Impact at GHS

*Elizabeth Tyson, Karen Eastburn, Jeremiah Smith, Kevin Polley*

**Background:** Project REVISE (Reducing Excessive Variability in Infant Sepsis Evaluations) is a multi-site project sponsored by the AAP designed to reduce unnecessary testing and treatment in young infants with fever while ensuring those at risk for serious infection are appropriately evaluated.

**Methods:** An evidence-based, algorithmic approach to fever management in infants 7-60 days was devised by an expert group within the collaborative. Providers were educated on the new approach via email, conferences, and monthly meetings. Baseline and intervention data were collected by each site and uploaded into a national AAP database. Each site had access to its own and collaborative data for analysis. Outcomes measured included appropriate workup and admission, rates of bacterial infection, antibiotics used, length of stay and readmission for missed bacterial infection.

**Results:** Baseline period was September 2015 to August 2016 (129 patients at GHS). Intervention Period was March to November 2017 (135 patients at GHS). Percentage of patients treated with antibiotics decreased from 74% to 52% and average length of stay decreased from 52 hours to 39 hours in the baseline and intervention periods respectively. There were no readmissions for missed bacterial infection in the intervention period.

**Discussion:** Fever in young infants is common and has traditionally resulted in invasive testing and admission for intravenous antibiotics due to perceived risk of serious bacterial infection. Most of the infants have a self-limited viral infection. Our practice change, facilitated by the national collaborative, reduced antibiotic exposure and length of stay in our patients without missing serious bacterial infection.

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## 70. Using X-ray Excited Luminescent Chemical Imaging (XELCI) to Image Changes in pH on the Surface of Implanted Medical Devices in order to Detect and Monitor Implant-associated Infection.

*Unaiza Uzair, Donald Benza, Fenglin Wang, Yash Raval, Tzuen-Rong J. Tzeng, Caleb Behrend, Jeffrey N. Anker*

Implant-associated infection is a leading cause of fixation failures and is often challenging to detect due to lack of symptoms and specific tests to detect localized infection. There is evidence of low pH associated with infection contributed to acidic products from bacterial metabolism and inflammatory responses of the body. It has still not been established how low the pH drops and how the infection propagates in case of implant-associated infection. Detecting changes in pH on the implant surface can provide a better understanding and help to detect, treat and monitor such infections more effectively thereby reducing the need for revision surgeries. We are developing an X-ray Excited Luminescent Chemical Imaging (XELCI) system to work with a smart device surface to image changes in pH on the surface of implanted medical devices. The implanted device surface is coated with a bottom layer of scintillator particles (Gd<sub>2</sub>O<sub>2</sub>S:Eu) and a pH sensing top layer. The scintillator layer acts as an in situ X-ray irradiated light source emitting red light which is differentially absorbed by the pH sensitive film on the top depending on the pH of the area thus producing a pH modulated final signal. XELCI allows noninvasive point by point mapping of the implant surface through tissue with minimum background, high spatial and pH resolution thus creating a pH image of the device surface. We imaged pH changes through tissue in-vitro and ex-vivo. Further studies are planned to image pH changes on device surface during infection and antibiotic treatment in animal models.

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## **71. Factors Affecting Salvage Rate of Infected Prosthetic Mesh**

**Warren JA, Beffa LR, Couto FJ, Hancock BH, Morrow DL, Burnikel AJ, Ewing JA, Cobb WS, Carbonell AM  
BH Hancock Presenting**

Prosthetic mesh infection (PMI) is a challenging complication after ventral hernia repair (VHR). There is no clear optimal treatment strategy, leaving only experience and judgment to guide surgical decision-making. Retrospective review of patients with PMI was performed. Subsequent abdominal operation (SAO) constitutes any intraabdominal operation occurring after the index hernia repair prior to PMI presentation. Any mesh removal was considered salvage failure. Analysis was performed using Chi-square test, Fishers Exact, or Mann-Whitney U test.

We identified 165 instances of PMI. Most cases (60%) involved intraperitoneal mesh. Thirty-eight percent of patients had an SAO, 64.1% of which were CDC wound class 2,3 or 4, and 67.2% involved intraperitoneal mesh. Enteroprosthetic fistula was found in 15.2%. Mean time to presentation was 17 mos after index hernia repair or SAO for infection alone, and 54 mos when a fistula was present ( $p=0.015$ ). Macroporous polypropylene mesh was salvaged in 66.7% of cases overall, and 72.7% when positioned in an extraperitoneal space. Mesh salvage was not possible in any case involving composite or PTFE mesh, and rarely for microporous polypropylene (7.7%) multifilament polyester (5.9%), or intraperitoneal mesh (6.1%). Closure of the defect after mesh removal, with or without component separation or mesh reinforcement, significantly lowers recurrence rate ( $p<0.001$ ).

PMI involving composite, PTFE, multifilament polyester, or microporous polypropylene mesh requires explantation. Infected macroporous polypropylene mesh in an extraperitoneal position is salvageable in most cases. The risk of secondary mesh infection after SAO, particularly with intraperitoneal mesh, should be considered during index VHR.

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## **72. Randomized Controlled Trial of a 4-week Mindfulness Intervention among Cancer Survivors**

**Michael D. Wirth, Regina Franco, Sara Wagner Robb, Katie Daniels, Kerri Susko, Matthew F. Hudson, Mark A. O'Rourke**

Mindfulness-based practices encourage palliation through meditation, thus reducing stress and distress. This study examined a 4-week Mindfulness-Based Cancer Survivorship (MBCS) program among cancer survivors within the Greenville Health System. Cancer survivor participants applied mindfulness practices to managing pain, fatigue, sleepiness, depression, and inflammatory and metabolic biomarkers. Investigators enrolled and randomized forty cancer survivors, to an intervention or control arm. The intervention group received a four-week MBCS program with a 3-month follow-up post-intervention. The control group received standard breathing exercises. Outcome measures assessed at baseline and one week post-intervention included: Pittsburg Sleep Quality Index (PSQI), the Perceived Stress Scale (PSS), actigraphy data, and inflammation and metabolic biomarkers.

Analyses did not reveal any differences between intervention and control participants for the 4-week or 3-month time points. The intervention arm evidenced a reduction in sedentary hours at 4-weeks compared to baseline (-0.3 hours,  $p=0.04$ ). At the 3-month follow-up, the intervention arm significantly reduced their PSS (13.2 vs. 11.0,  $p=0.06$ ), PSQI score (8.1 vs. 6.3,  $p=0.01$ ), and sedentary hours (-1 hour,  $p=0.03$ ) compared to baseline. Their steps also increased by 1,128 steps per day ( $p=0.04$ ). No changes were observed for biomarkers.

This study suggests that cancer survivors exposed to a mindfulness intervention report favorable changes to self-perceived stress, sleep quality, and physical activity. However, future research may identify potentially mediating factors such as dose of session, feasibility, and effectiveness among cancer patients. Additionally, future studies should consider enrolling more symptomatic patients to better evaluate effectiveness of such programs.

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**73. Immediate and delayed retention of stroke and healthy lifestyle education among middle school students**  
***Leah Wormack, Jordan C. Gainey, Amber Frazier, Chibueze Ubah, Chloe Gonzalez Jackso<sup>1</sup>, Anita Venkatesh, Natalia Rincon, Leanne Brechtel, Brantley Dick, Megan Fredwall, Jennifer Cook, Sarah konklin, Vivek Venkatesh, Thomas I. Nathaniel***

**Purpose:** Stroke intervention campaigns seek to improve stroke awareness and healthy lifestyle education as the means to prevent disease. We describe a program that integrates social interaction and active learning activities to target a middle school audience, thus allowing for early education and prevention.

**Method:** We tested the impact of a novel interventional program, that integrated social interaction and active learning, on student's ability to retain knowledge both immediately after and three weeks following the intervention. We stratified the data by grade level to assess the immediate and delayed retention of stroke and healthy lifestyle education in middle school students.

**Result:** Baseline knowledge was initially low in the immediate testing for all parameters in all grade levels except for knowledge of whether strokes are preventable. ANOVA with repeated measures found a significant difference in the immediate retention of the signs of stroke (FAST) between grades. In the delayed testing, there was a significant difference among grades in the retention of the fact that stroke occurs in the brain.

**Conclusion:** An intervention that utilizes a combination of social interaction and active learning as the means of educating middle school students, showed that youth can retain information about stroke and healthy lifestyle education. This intervention educated students on recognition the signs of stroke, localization of stroke to the brain, urgent actions to take if ever witnessing a stroke, and how to prevent stroke and promote a healthy lifestyle through the knowledge of exercise, low calorie drinks, and healthy food.

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