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Role: Rush Student

GC: PhD

ENHANCED EXPRESSION OF CISH (CYTOKINE INDUCIBLE SH2-CONTAINING PROTEIN) DECREASES ANTI-TUMOR FUNCTION OF NK CELLS IN OVARIAN CANCER

Jasmin Acosta (RUMC), Amanda Magaña (RUMC), Amy Stasik (RUMC), Janice Bahr (UIUC), Animesh Barua (RUMC)

INTRODUCTION Ovarian cancer (OC) patients have an impaired immune response which contributes to a decreased survival rate. IL-10 may affect the anti-tumor immune function of NK cells. Constant exposure of NK cells to tumor-induced IL-10 may exhaust NK cells via increased expression of CISH. The objective of this study was to examine if IL-10 and CISH expression change during OC progression.

METHODS An exploratory study was conducted with normal and tumor ovaries from patients at early and late stages (n=5/group) and ovarian tumor from the laying hen, a model of OC (n=5/group).

Expression of CISH, IL-10 and GRP78 (a marker of cellular stress) were examined in all specimens by immunohistochemistry, genomic and proteomic studies. **RESULTS** Intense expression for IL-10, CISH and GRP78 was observed in tumor specimens compared with normal ovaries. Compared to normal, the frequency of CISH-expressing NK cells, intensity of IL-10 and GRP78 expression was greater in ovaries with tumors. Immunoblot and gene expression studies showed similar trends. **CONCLUSION** Results suggest that the expression of IL-10 and CISH increases during tumor progression and is associated with increased cellular stress. Tumor-induced expression of IL-10 and CISH may be involved in the decreased anti-tumor functions of NK cells. Support: Swim Across America. Abstract previously presented at AIC November 2021.

Primary Presenting Author: Ali Baird, B.S.

Role: Rush Student

RMC: M2

VARIATION IN RESPONSE TO CHEMORADIATION AND SURGERY FOR YOUNG PATIENTS WITH LOCALLY ADVANCED RECTAL CANCER

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INTRODUCTION: Rectal cancer makes up one third of colorectal cancers and the incidence in patients under 50 years old has increased 0.26% per year.¹ Younger patients also seem to present with more advanced disease.² Neoadjuvant chemoradiation to downstage the tumor before surgical removal has proven successful for patients with locally advanced rectal cancer.^{3,4} Given the rise of rectal cancer in younger populations, it is imperative to understand how they respond to neoadjuvant chemoradiation. The primary aim of this study is to compare tumor response to neoadjuvant chemoradiation between patients under and over 50 years old with locally advanced rectal cancer. Secondary aims are to compare local and distant recurrence and cancer survival rates between younger and older patients.

METHODS: A retrospective cohort analysis was performed including patients 18 and older from 1/2009-12/2019 at Rush University Medical Center (RUMC) who had locally advanced rectal cancer treated with neoadjuvant chemoradiation followed by oncologic resection. Demographics, tumor characteristics, tumor response (designated as complete, partial, or none), and oncologic outcomes data was collected. Statistical analysis was performed using SPSS 26 (Chicago, IL). **RESULTS:** 21 males and 27 females (total n=48) with an average age of 55 underwent treatment for locally advanced rectal cancer. 36.9% (n=19) of patients were under 50 years old. The average tumor size at diagnosis for younger patients was 6.17 cm, which was significantly larger than tumors measuring at 4.05 cm for patients over 50 ($p=0.008$). 31.6% of tumors in patients under 50 underwent complete pathological response (defined as ypT0N0), compared to 17.9% of tumors found in patients over 50 years old. However, the difference was not statistically significant ($p=0.276$). The downstaging of the tumor and pathologic response were not different between younger and older age groups. Oncologic outcomes relating to recurrence and cancer mortality were similar among groups. **CONCLUSION:** Our study supports that locally advanced rectal cancer in patients under 50 years old is a clinically relevant topic. There was no significant difference in tumor pathological response between age groups, which suggests that younger patients do benefit from neoadjuvant chemoradiation even while presenting with larger tumors.

Primary Presenting Author: Sarah Calhoun, BA

Role: Rush Student

GC: PhD

Acetyl-CoA Synthetases ACSS1 and ACSS2 are Tamoxifen Responsive Factors that Promote Survival in Tamoxifen Treated and Estrogen Deprived Cells

Sarah Calhoun (first author/presenting author, Rush University), Lei Duan (Rush University), and Carl Maki (Rush University).

INTRODUCTION: Acetyl-CoA synthetases ACSS1 and ACSS2 promote conversion of acetate to acetyl-CoA for use in lipid synthesis, protein acetylation, and energy production. These enzymes are elevated levels in some cancers and important for cell survival under hypoxia and nutrient stress. Tamoxifen (TAM) can induce metabolic changes that increase cancer cell survival. An effect of TAM on expression of ACSS1 or ACSS2 has not been reported. **METHODS:** ER α -positive MCF7 cells were treated with vehicle or an active metabolite of TAM, 4-hydroxytamoxifen (4-OHT) and protein and mRNA expression were assessed. Triple negative breast cancer cells were used to compare expression of ACSS1 and ACSS2 in ER+ cells to ER-negative cells. ER+ MCF7 and T47D cells were deprived of estrogen using charcoal stripped FBS and phenol-red free DMEM. ER+ PDX tumors were grown without supplemental estrogen to produce estrogen deprived tumors. ACSS1 and ACSS2 were inhibited with siRNA and chemical inhibition and cell viability and proliferation was measured. **RESULTS:** We found ACSS1 and ACSS2 are increased by TAM in ER α positive breast cancer cells and TAM resistant derivative cells. ER α knockdown blocked ACSS1 induction by TAM but not ACSS2. TAM also induced ACSS2 but not ACSS1 expression in triple negative breast cancer cells. Long-term estrogen deprivation (LTED) is a model for acquired resistance to aromatase inhibitors. We found LTED cells and tumors express elevated levels of ACSS1 and/or ACSS2 and are especially sensitive to viability loss caused by depletion of ACSS1 and ACSS2 or treatment with an ACSS2-specific inhibitor. ACSS2 inhibitor also increased toxicity in cells treated with TAM. **CONCLUSION:** We conclude ACSS1 and ACSS2 are TAM regulated factors important for breast cancer cell survival in TAM-treated and long-term estrogen deprived cells.

Primary Presenting Author: Ryan Hess, BSE

Role: Rush Student

RMC: M2

BIOPSY OUTCOMES DOCUMENTATION VALIDATION TO INFORM BREAST CANCER SCREENING GUIDELINES

Ryan Hess (Rush), Lisa Stempel, MD (Rush), Tyler Roberson (UIUC), Mia Levy MD, PhD (Rush)

INTRODUCTION Breast cancer screening saves lives, but uncertainty remains regarding best practices for supplemental screening modalities in high-risk populations. The cancer detection rate (CDR) is an essential measure of performance for screening and supplemental screening modalities to inform clinical practice guideline development. Calculation of CDR is currently a labor-intensive manual process, and there is desire to automate this process. The minimum data elements for CDR calculation are the number of biopsies attributed to each modality and essential pathology data related to each biopsy. Biopsy outcomes documentation (BOD) was previously developed and deployed at our medical center to consolidate data elements within a single form in the electronic medical record as the first step in enabling automated calculation. The purpose of this study is to evaluate the completeness and accuracy use of these BOD forms in practice. **METHODS** A random selection of 10% of all patients undergoing breast biopsy at Rush between August 20, 2020 and February 28, 2021 was performed. BOD records for these patients were manually validated against primary reports for completeness and accuracy in separate arms for imaging modality attribution and pathology data reporting. Results were scored in a binary all-or-none fashion and reasons for incompleteness or inaccuracy were further investigated. **RESULTS** 1,211 records were retrieved and 121 were selected for validation. In the imaging modality arm, 121 records (100%) were found to be complete and accurate for imaging modality attribution. In the pathology results arm, 92 of 119 (77.3%) included records were found to be complete and accurate in all fields and 111 of 119 (93.3%) included pathology records contained complete and accurate minimum data elements for CDR calculation. **CONCLUSION** Imaging attribution and pathology validation results show that BOD data is valid and can be used to calculate CDR for specific imaging modalities. Pathology data validation results show that this data is not ready for use in deeper analysis of clinical and tumor characteristics beyond the scope of CDR. Overall, this study demonstrates that the implemented forms and workflow collect data with sufficient accuracy and completeness to enable future work of automating CDR calculation processes.

Primary Presenting Author: Kody Jones, B.S.

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RMC: M2

SUPPLEMENTAL ABUS ON SAME DAY AS SCREENING MAMMOGRAM DOES NOT INCREASE CALL-BACK RATES IN PATIENTS WITH DENSE BREASTS

Kody Jones (Rush); Jordan Lieberenz (Rush); Shirlene Paul (Rush); Rosalinda Alvarado (Rush); Lisa Stempel (Rush); Mia Levy (Rush)

INTRODUCTION: While mammograms allow for early detection of breast cancer, patients with dense breasts may require supplemental screening with other imaging modalities such as automated breast ultrasound (ABUS). When used with mammogram, ABUS has been shown to increase cancer detection. However, it is important to consider the impact on patient call-back rates as these can be increased with heightened sensitivity of screenings. Here, we analyzed call-back rates among patients at RUMC to assess the impact of ABUS. **METHODS:** Data from August 20th, 2020 to August 19th, 2021 was extracted from the EMR and grouped into cohorts based on breast density and use of supplemental ABUS. Call-back rates for each cohort were calculated based on BI-RADS0 assessment codes, excluding those associated with "Technical Repeats" or "Priors for Comparison". A post-hoc chi-squared analysis was performed to determine the significance of the results. **RESULTS:** The BI-RADS assessment codes of 20160 patients were analyzed. Of the 11591 patients with not dense breasts (Cohort A), 1755 (15.14%) received call-backs. Of the 4958 patients with dense breasts who received only screening mammogram (Cohort B), 1240 (25.01%) received call-backs. Of the 3611 patients with dense breasts who received screening mammogram and ABUS on the same day (Cohort C), 842 (23.32%) received call-backs. Statistical analysis determined there was a significant difference in call-back rates between Cohort A vs Cohorts B and C (Bonferroni adjusted $p < .0001$), but no significant difference in call-back rates between Cohort B vs Cohort C (Bonferroni adjusted $p < 0.2139$). **CONCLUSIONS:** Call-back rates are increased in patients with dense breasts, regardless of supplementation with ABUS. In patients with dense breasts, screening mammogram with ABUS on the same day did not result in greater call-back rates than screening mammogram alone. These results indicate that the heightened sensitivity associated with supplemental ABUS is not associated with increased call-backs that present patient burdens, further validating the use of supplemental ABUS in patients with dense breasts. Future work will evaluate patient costs associated with supplemental ABUS.

Primary Presenting Author: Caitlin Maloney, BS

Role: Rush Student

RMC: M2

BREAST DENSITY STATUS CHANGES: FREQUENCY, SEQUENCE, AND PRACTICE IMPLICATIONS

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INTRODUCTION Dense breast tissue is more likely than non-dense tissue to obscure malignancy on mammography and is considered an independent risk factor for breast cancer. Because of its clinical significance, breast density has been incorporated into cancer risk assessment tools, supplemental screening recommendations, and patient notification laws. Changes in density status - whether due to intrinsic changes in tissue or to inter-radiologist variability in interpreting mammographic results - can therefore have significant implications for patients. The purpose of this study was to quantify the frequency and longitudinal sequence of breast density status changes among patients undergoing multiple mammograms. **METHODS** This retrospective cohort study tracked breast density changes among 37,156 patients who received multiple mammograms at a large academic medical center between October 1, 2015 and June 29, 2021. Breast Imaging-Reporting and Data System (BI-RADS) density categories A (least dense) through D (most dense) were visually determined by radiologists at the time of screening. BI-RADS density data was abstracted from medical records and dichotomized into one of two density statuses: non-dense ("ND", categories A and B) and dense ("D", categories C and D). A sequence analysis of longitudinal changes in density status was performed using SQL. **RESULTS** The majority (91.3%, n = 33,920) of patients maintained the same density status (D or ND), while the remaining 8.7% of participants (n = 3,236) experienced up to six density status changes over the six-year study period. Among patients who experienced any change between D and ND status, the vast majority (96.7%, n = 3,131) changed exclusively between BI-RADS categories B and C. The number of density changes was positively correlated with the average number of mammographic screenings patients underwent. **CONCLUSION** Some patients will experience multiple breast density status changes even over a relatively short period of time (<6 years), with more frequent changes being associated with more frequent mammograms. The disproportionate percentage of density status change patients who moved exclusively between BI-RADS categories B and C suggests a role for inter-radiologist variability in visual assessments of intermediate-density tissue. These findings have implications for how density status changes are incorporated into patient education, risk assessment, and supplemental screening recommendations.

Primary Presenting Author: Elizabeth Paris, B.A.

Role: Rush Student

GC: PhD

CHANGES IN EXPRESSION OF NUCLEAR PROTEIN NUCLEOLIN DETECTS MALIGNANT CHANGES IN THE FIMBRIA AND OFFERS A POTENTIAL MARKER FOR EARLY DETECTION OF OVARIAN CANCER

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INTRODUCTION: Fimbria of the fallopian tube is suggested to be an origin of high-grade serous carcinoma (HGSC) and lack of information on its malignant transformation is a significant barrier to the development of an early detection test for ovarian cancer (OVCA). The nucleus has long been used for detection of malignancy. Tumor-associated changes in the nucleus include rearrangements of nuclear matrix proteins and their shedding into circulation. Shed proteins or autoantibodies against them represent markers for early detection of OVCA. This study examined changes in serum prevalence of nucleolin, a nuclear protein, in association with malignant changes in fimbrial surface epithelial (FSE) cells and ovarian malignant development. Due to the difficulty in accessing fimbria from OVCA patients, we used laying hen models of spontaneous OVCA. **METHODS:** (1) Expression of nucleolin was examined in fimbrial tissues from subjects (BRCA1+) with risk of OVCA development who underwent prophylactic surgery and ovarian tumors from early-stage OVCA patients. (2) Serum, fimbrial and ovarian tissues from healthy laying hens, hens with fimbrial tumors, and hens with late-stage OVCA were examined for expression of nucleolin by immunohistochemistry, proteomic (Western blot, MS-MS) and gene-expression studies. Significant differences ($P < 0.05$) in the intensity of nucleolin expression among normal, fimbrial and ovarian tumor groups were determined. **RESULTS:** Intense expression for nucleolin was observed in FSE cells from BRCA1+ subjects and in ovarian tumors from OVCA patients. Similar patterns of nucleolin expression were detected in tumors in hens. Two-dimensional Western blotting detected nucleolin protein in fimbrial tumors in hens. MS-MS study showed spectra for nucleolin indicative of its serum prevalence in hens with fimbrial and ovarian tumors. Semi-quantitative and quantitative PCR showed strong amplification for nucleolin gene expression in hen tumor tissues compared with normal tissues. **CONCLUSION:** Expression of nucleolin increases in association with malignant transformation in the fimbria and ovary. Serum prevalence of nucleolin suggests that it may be used as a marker of early changes associated with OVCA development and may constitute a member of a panel of markers for early detection of OVCA. Support: NIH/NCI: CA210370 [Abstract presented at The American Association for Cancer Research Annual Meeting 2020]

Primary Presenting Author: Jessica Ramirez, M.S.

Role: Rush Student

GC: PhD

AGE-ASSOCIATED CHANGES IN IMMUNITY MAY PREDISPOSE THE OVARY TO OVARIAN CANCER (OC) DEVELOPMENT

Jessica Ramirez (Rush University Medical Center), Pincas Bitterman (Rush University Medical Center), Janice M Bahr (The University of Illinois at Urbana-Champaign), Animesh Barua (Rush University Medical Center)

INTRODUCTION Chronic inflammation and oxidative stress are hallmarks of malignancy. OC in most cases is a disease of postmenopausal women. Chronic inflammation is associated with ovarian aging. It is unknown if age-associated chronic inflammation and oxidative stress in the ovary are risk factors for OC development. The goal of this study was to examine if changes in expression of markers of inflammation (IL-16) and cellular stress (GRP78) increase during ovarian aging and if it is associated with OC development. **METHODS** IL-16 and GRP78 expression in pre- and post-menopausal ovaries and tumor ovaries at early-stage, and in laying hen model of OC were examined (n=5/group). IL-16 and GRP78 expression were examined by immunohistochemistry, genomic and proteomic studies. **RESULTS** Intense expression was observed for GRP78 and IL-16 in aging ovaries and ovarian tumors. Compared with premenopausal, GRP78 and IL-16 expression was higher in postmenopausal ovaries and ovarian tumors. Similar trends were observed in tumors from hens. **CONCLUSION** Similarities in the expression patterns of IL-16 and GRP78 in ovaries of postmenopausal women and ovarian tumors suggest that chronic inflammation and oxidative stress may predispose the ovary to OC development. Support: Swim Across America. This abstract was presented at AIC 2021.

Primary Presenting Author: Erin Anderson, BA

Role: Rush Student

CON: Masters

USE OF ACTIVE-LEARNING EDUCATION AMONG EMERGENCY DEPARTMENT NURSES TO FACILITATE PEDIATRIC SEPSIS INTERVENTIONS

Erin Anderson (Rush)

NATURE AND SCOPE OF THE PROJECT Globally, pediatric sepsis affects 1.2 million children annually and causes 8% of PICU admissions (Weiss et al., 2020). Sepsis can progress to shock in as little as four hours (Capp et al., 2015) and costs Americans over \$7 billion annually (Carlton et al., 2019). In 2020, the Surviving Sepsis Campaign released a clinical practice guideline for treatment of pediatric sepsis, including a bundle of interventions to be completed within 60 minutes. In the Emergency Department (ED) at an academic medical center, bundle completion substantially exceeded the 60-minute goal. This project is part of a broader effort to improve bundle completion time and therefore reduce morbidity and mortality associated with pediatric sepsis.

SYNTHESIS AND ANALYSIS OF SUPPORTING LITERATURE Based on literature assessing efficacy of different learning modalities for ED nurses, the authors used Ericsson's deliberate practice theory to design and implement an active-learning educational module for ED nurses to (1) increase knowledge of pediatric sepsis bundle components, (2) increase confidence in pediatric sepsis recognition, and (3) identify perceived barriers to bundle completion.

PROJECT IMPLEMENTATION The authors guided 74 ED nurses recruited during their shifts through an interactive 10-minute module. Significant challenges included busy shifts, lack of technology literacy, and short project implementation window.

EVALUATION CRITERIA The active-learning educational module was designed with immediate pre and post-module testing. Quantitative pre- and post-module data related to confidence and knowledge were analyzed using a paired T-test. Qualitative data related to perceived barriers underwent content analysis by two independent researchers.

OUTCOMES The data showed a statistically significant increase in knowledge of bundle components, but there was not a statistically significant difference in nurses' confidence regarding pediatric sepsis recognition. The most commonly identified barriers to bundle completion included establishing intravenous access, interdisciplinary delays, and insufficient staffing.

RECOMMENDATIONS This project demonstrates the effectiveness of targeted active learning modules for ED nurses and identifies future opportunities for improving time to bundle completion. We recommend that (1) this module be implemented with interdisciplinary teams within the ED setting to improve collaboration and communication, (2) nursing leadership clarify existing protocols for establishing intravenous or intraosseous access, and (3) consider implementation of a best practice alert to facilitate sepsis identification and timely implementation

Primary Presenting Author: Angela Rutkowski, Bachelor of Science in Neuroscience

Role: Rush Student

RMC: M2

PRIMARY LANGUAGE, RACE, AND LOCATION OF CARE AS MAIN DETERMINING FACTORS OF DECISION TO OPT OUT OF PERSONALIZED BREAST CANCER RISK ASSESSMENT

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INTRODUCTION: Personalized breast cancer risk assessment (CRA) and genetic counseling/testing for women have been shown to improve interventional and clinical outcomes. However, despite CRA being routinely offered to all women at our institution, not all women choose to opt into the program. This study evaluated the demographic distribution of patients that opted out of the CRA to identify potential components influencing this substantial decision. **METHODS:** Our medical center, located in four urban and suburban locations, piloted a clinical framework to provide CRA to all women between the ages of 25 and 75 with a qualifying mammogram. In this single institution retrospective study, we analyzed differences among patients who opted out of the program between July 20, 2020 and July 19, 2021. Data elements extracted from the electronic medical record include race, primary language, location of care, and decision to partake in CRA. Overall Chi-square tests and all pairwise comparisons with Bonferroni correction were used to statistically determine the impact of various demographics on opting out. **RESULTS:** 18726 women met criteria for inclusion and 2717 (14.5%) declined CRA. Within their respective racial groups, 122 (17.6%) Asian, 1175 (16.3%) Black, 455 (14.2%) Hispanic, 112 (15%) Other, and 853 (12.4%) White opted out. Within their identified primary language, 2370 (13.7%) English, 231 (23.1%) Spanish, 35 (19.7%) Bilingual, and 81 (35.2%) Other opted out. Based on their setting of care, 837 (16.8%) Location A, 1436 (14.2%) Location B, 270 (13.8%) Location C, and 174 (10.6%) Location D opted out. The differences between demographics and opting out were statistically significant for all analyses ($p < .0001$). **CONCLUSION:** The main variables mediating the decision to opt out of CRA are a non-English primary language, non-White race, and location of care, potentially due to inadequate interpretation services, barriers to education, and staffing shortages. Thus, these women are less likely to receive genetic counseling/testing or supplemental screening. Our study is the first to investigate the factors contributing to the uptake of risk assessment. Further study is needed to determine the clinical impact of this striking disparity.

Primary Presenting Author: Margaret Schermerhorn, BS

Role: Rush Student

RMC: M2

TARGETING HEALTH INEQUITIES IN BREAST CANCER TIME TO TREATMENT

Lilia Lunt, MD (Rush); Margaret Schermerhorn, BS (Rush); Andrea Madrigano, MD (Rush); Cristina O'Donoghue, MD, MPH (Rush)

INTRODUCTION Health inequities influence the treatment and outcomes of breast cancer patients. Delays in patient care are associated with worse treatment response and reduced overall survival. The goal of this study was to investigate the factors that led to increased time to treatment in order to provide equitable cancer care for all patients. **METHODS** A retrospective chart review was performed of 1638 female patients with stage I-III breast cancer receiving their initial cancer treatment at a single institution from 2015-2020. Univariate analysis was used to identify factors correlated with treatment delays (>60 days from diagnosis to first treatment), and then multivariate analysis was used to evaluate the impact of patient demographics and clinical characteristics on time to treatment. **RESULTS** For all patients, the median time to treatment was 37 days. 742 patients (45%) were diagnosed at an outside hospital. For those patients diagnosed at an outside institution, women in the highest income bracket were less likely than women in the lowest income bracket to experience treatment delays (OR 0.54, CI 95% [0.29-1.001]). Women with Medicaid were more likely to have a delay to first treatment than patients with private insurance (OR 2.58, CI 95% [1.43-4.62]). Patients with Stage III disease were more likely to have a delay (OR 3.16, CI 95% [1.66-6.02]). The type of hospital (academic vs community) where a patient received an initial biopsy, did not significantly impact time to treatment. For those patients diagnosed and treated at our center (896 women), insurance, income and stage did not have a statistically significant effect on time to treatment. Women of color did not have a delay in treatment regardless of where they were diagnosed in multivariate analysis. **CONCLUSION** When women were diagnosed at another hospital, having Medicaid insurance or being in the lowest income bracket was associated with increased delays in treatment. However, when patients were both diagnosed and treated at our institution, there was no predictive power in income or insurance status. While delays in treatment are often multifactorial, this indicates a specific cohort which can be further targeted in order to provide equitable healthcare for all patients.

Primary Presenting Author: Charalampos Siotos, MD

Role: Clinical Resident

BREAST CANCER RELATED LYMPHEDEMA: ANALYSIS OF PREDICTORS USING MACHINE LEARNING

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INTRODUCTION Breast cancer related lymphedema is a devastating condition that negatively affects quality of life. We sought to identify risk factors related to lymphedema development and factors that portended early lymphedema development. **METHODS** Patients with breast cancer that underwent sentinel lymph node biopsy (SLNB) or axillary lymph node dissection (ALND) at our institution between 2007-2021 were identified and sociodemographic and clinical information was extracted. Logistic regression identified risk factors related to lymphedema. Time to event analysis and cox-regression analysis identified factors related to earlier development of lymphedema. Additionally, machine learning prediction models and sensitivity analysis were employed. **RESULTS** We identified 1,100 patients, of which 143(13%) developed upper extremity lymphedema within on average 1.9(SD=2.3) years post-operatively. Patients with SLNB had significantly lower odds for lymphedema (vs. ALND, OR=0.24[0.12-0.47]). African American patients (vs. Caucasian, OR=1.84[1.08-3.14]), patients with stage II, III, and IV disease (vs. stage 0, OR=3.74[1.38-10.12]; OR=5.86[1.89-18.10]; OR=8.20[2.66-25.24]), and patients with Medicaid (vs. private insurance, OR=3.75[1.73-8.13]) had higher rates of lymphedema. Cox-regression analysis showed that African American (HR=1.63[1.02-2.63]), higher BMI (HR=1.04[1.01-1.06]), higher stage (stage III, HR=3.55[1.29-9.83]; stage IV, HR=4.02[1.47-10.99]), and Medicaid patients (HR=2.35[1.34-4.11]) had higher hazards for lymphedema. Patients with SLNB had lower hazards for lymphedema (HR=0.34[0.20-0.57]). Seven machine learning prediction models were created with an average accuracy range of 0.875-0.877. The sensitivity analysis identified age, stage of disease, and BMI as stronger predictors for development of lymphedema. **CONCLUSION** Lymphedema development has identifiable risk factors. These factors can reliably be used to predict the risk of lymphedema development and enable clinicians to educate patients better and formulate treatment plans accordingly.

Primary Presenting Author: Adam Takatsuka, B.S.

Role: Rush Student

RMC: M3

THE ROLE OF COLLABORATIVE CARE PROGRAMS IN PSYCHIATRIC TREATMENT OF CANCER PATIENTS

Adam Takatsuka (Rush); Luciarita Boccuzzi (Rush); Kimberly Morley (Rush); Aniruddha Deka (Rush); Shireen Samson (Rush); Anastasia Smith (Rush); Jonathan Kaplan (Rush)

INTRODUCTION: Rush University Cancer Center (RUCC) is one of few cancer centers in the United States providing psychiatric care through a tiered -model which includes Collaborative Care. This novel approach to psychiatric care for cancer patients was created with multiple goals in mind: increasing access to treatment, reducing cost, and improving outcomes. There is minimal research on patient and provider satisfaction of Collaborative Care programs in cancer centers. One year after implementation, we collected information on provider and patient satisfaction to provide program evaluation and quality improvement. **METHODS:** A Collaborative Care Model for psychiatric care was implemented at RUCC and our 3 satellite sites in September 2020. The Collaborative Care team consists of a Psychiatric Consultant, Psychiatry Resident Physicians, a Pharmacist, a Behavioral Health Care Manager, and the prescribing provider. The provider and patient satisfaction responses are being collected via anonymous surveys sent to any referring provider and any patient who has completed an initial evaluation during this first year. The data collection will be complete by the middle of February 2022. **RESULTS:** The general feedback from the cancer center patients and providers is positive. It is anticipated that patients appreciate the timeliness of referral to evaluation, flexibility of appointment modalities and frequent follow up. For providers, it is anticipated that they appreciate the accessibility of services, multi-disciplinary team approach to care, and being co-located with the psychiatry providers. One possible negative feedback from providers could be the feeling of increased burden. Potential negative feedback from patients might be difficulty managing additional phone appointments. **CONCLUSION:** Collaborative Care Psychiatry is a program that aims to provide patient-centered care and efficient access to cost-effective treatment. Information obtained from the surveys in this study will be used for program evaluation and quality improvement at RUCC. Beyond internal quality improvement, future directions include use of data collection to support broader dissemination and implementation of this model of care.

Primary Presenting Author: Francesca Caracci, Bachelor's of Arts

Role: Rush Student

RMC: M2

EXAMINING THE EFFECTS OF TRIKAFTA USE ON LUNG FUNCTION AND NUTRITIONAL STATUS IN CYSTIC FIBROSIS PATIENTS

Francesca Caracci (RMC), Sarah Peterson (RMC), Robert A. Balk (RMC)

INTRODUCTION: Cystic fibrosis (CF) transmembrane conductance regulator (CFTR) modulators have emerged as promising therapies for CF patients. Trikafta, the newest CFTR modulator, is a triple combination therapy that targets folding, trafficking, and potentiation of the faulty CFTR protein. The objective of the study is to investigate how Trikafta use impacts body mass index (BMI) and forced expiratory volume in the first second (FEV1) in CF patients at Rush University Medical Center (RUMC). **METHODS:** This cross-sectional (pre and post) study was approved by the RUMC IRB. Adult (≥ 18 years old) patients seen at the RUMC CF center who received Trikafta for at least 4 months were included. Age at the time Trikafta was started, sex, BMI (kg/m²) and percent predicted FEV1 (ppFEV1) were recorded from the patient's CF clinic visit immediately prior to starting Trikafta. Length of time on Trikafta and percent change in BMI and ppFEV1 were calculated between the patient's last clinic visit and baseline visit. A one-sample Wilcoxon signed rank test was used to determine if percent change in BMI and ppFEV1 were significantly different from zero. A Mann Whitney U test was used to compare percent change in BMI, between patients with a low (<18.5) versus normal (>18.5) BMI and to compare ppFEV1 between patients with impaired versus non-impaired lung function (ppFEV1 <40% vs. >40%). **RESULTS:** A total of 24 patients (54% male) with a median age of 30 (23, 38 years) were included. Patients received Trikafta for a median 17 (11, 19) months. Patients experienced a significant improvement in BMI (median percent increase 5%, $p < 0.001$) and ppFEV1 (median percent increase 14%, $p < 0.001$). Patients with a low BMI ($n=6$) had a larger, but not significant, increase in median BMI compared to patients with a normal BMI (0.8 kg/m², $p=0.673$). Patients with a low ppFEV1 ($n=4$) had a larger, but not significant, increase ppFEV1 (13%, $p=0.135$). **CONCLUSION:** Patients experienced a significant improvement in BMI and FEV1. Future work will focus on establishing how CFTR modulators alter lung microbiome resistance-patterns in CF patients over time.

Primary Presenting Author: Daniel Fecher, PharmD

Role: Clinical Resident

Efficacy and safety of direct oral anticoagulants for atrial fibrillation in an obese patient population

Daniel Fecher, PharmD (RUMC); Ivan Cunningham, PharmD, BCPS (RUMC); Luke Hvass, PharmD, BCPS (RUMC); Melissa Kocek, PharmD, BCPS (RUMC); Tiffany King, PharmD, BCPS (RUMC); Monika Hornung, PharmD, BCPS (RUMC)

BACKGROUND: In 2016, the International Society on Thrombosis and Haemostasis (ISTH) recommended against using direct oral anticoagulants (DOACs) in patients with actual body weight ≥ 120 kg or BMI ≥ 40 kg/m² due to lack of available clinical data in this patient population. In 2021, the ISTH provided updated guidance recommendations for venous thromboembolism treatment, including using standard doses of rivaroxaban or apixaban in these patients. ISTH has yet to update their guidance regarding atrial fibrillation. **OBJECTIVE:** The purpose of this study is to evaluate the efficacy and safety of apixaban or rivaroxaban compared to warfarin for atrial fibrillation in patients with actual body weight ≥ 120 kg or BMI ≥ 40 kg/m². **METHODS:** This is a single center, retrospective, observational cohort study of new start anticoagulation for obese adult patients with atrial fibrillation. Patients included were 18 years or older, actual body weight ≥ 120 kg or BMI ≥ 40 kg/m², and new start oral anticoagulation with warfarin, apixaban, or rivaroxaban for atrial fibrillation. The primary objective is composite of ischemic stroke, myocardial infarction, pulmonary embolism, or deep vein thrombosis within 1 year. The secondary outcome is composite of major bleeding, clinically relevant non-major bleeding, or death from any cause within 1 year. **RESULTS:** A total of 1,272 patients were reviewed, and 136 were included in this study. The warfarin and DOAC cohorts included 64 and 72 patients, respectively. The primary outcome occurred in 1.6% of patients in the warfarin group and 2.8% of patients in the DOAC group ($p = 0.999$). The secondary outcome occurred in 11.2% of patients in the warfarin group and 5.6% of patients in the DOAC group ($p = 0.251$). **CONCLUSION:** Overall, no difference was detected between the groups. Apixaban or rivaroxaban may be well-tolerated and effective anticoagulant options for patients with atrial fibrillation and actual body weight ≥ 120 kg or BMI ≥ 40 kg/m².

Primary Presenting Author: Krista Knudson, PhD, APRN

Role: Post-Doctoral Research Fellow

A DIGITAL ICU DIARY FOR ADULT PATIENTS TREATED WITH EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

1st author: Krista A. Knudson, PhD, APRN. TL1 postdoctoral fellow, Institute for Translational Medicine; Student, Rush University Master of Science in Clinical Research program 2nd author: Shannon Halloway, PhD, RN, FAHA. Assistant Professor, Rush University College of Nursing 3rd author: Tae Song, MD. Assistant Professor of Surgery, University of Chicago 4th author: JoEllen Wilbur, PhD, APN, FAAN. Professor and Independence Foundation Chair in Nursing; Associate Dean for Research, Rush University College of Nursing

INTRODUCTION Survivors of critical illnesses requiring treatment with extracorporeal membrane oxygenation (ECMO) frequently experience long-term mental health impairments, such as anxiety, depression, and posttraumatic stress disorder (PTSD) symptoms. One factor that contributes to mental health impairments is memory gaps of the intensive care unit (ICU) period. The purpose of this study is to develop and test the feasibility of a digital ICU diary intervention that provides survivors with factual memories of the ICU period and includes 3 components: content authored by family member/clinicians, ICU virtual reality (ICU-VR) module of ICU environment, and post-ICU visit with a mental health professional. **METHODS** Phase I: Focus groups will be conducted with an advisory panel (5 ECMO survivors/ family member) and an expert panel (5 ICU clinicians). Diary content will be identified and adapted to a digital platform with a programmer and an ICU-VR module created with a media designer. Phase II: A one-group pre-post design will be used to determine feasibility of implementing the digital ICU diary. A family member/clinicians will contribute to digital ICU diary for 5 patients during ICU stay. Four weeks after discharge, survivors will review diary content and ICU-VR module with a mental health professional. Survivor outcomes (ICU memory, anxiety/depression, PTSD) will be evaluated at discharge and 8 weeks post-discharge. Participants for both phases will be recruited from a regional ECMO center at an urban medical center. **RESULTS** Focus groups will elucidate participants' needs, attitudes, and experiences and inform iterative development of the intervention. Feasibility results will illustrate outcomes related to (a) recruitment, (b) engagement (family member/clinician use of diary during ICU stay, completions of mental health professional visit), (c) survivor/family member satisfaction, and (d) retention (completion of survivor outcome measures). **CONCLUSION** This intervention, the first of its kind, is informed by ECMO survivors, family members, and clinicians and includes a digital ICU diary, VR modules, and opportunity to review diary contents with a mental health professional. We hypothesize that implementation of this intervention will result in improved mental health outcomes for this population.

Primary Presenting Author: Daven Patel, MD, MPH

Role: Clinical Fellow

VARIATION IN THE DISTRIBUTION OF PULMONARY EDEMA IDENTIFIED WITH LUNG ULTRASOUND

Daven Patel, MD (Rush) Gary Peksa, PharmD, MBA(Rush) John Bailitz, MD (Northwestern) Faith Geevarghese (High School) Fae Kayarian, BS (Rush) Jonas Neichin, BA (Rush) Miranda Viars, BFA (Rush) Simone Ymson, BS (Rush) Michael Gottlieb, MD(Rush)

INTRODUCTION: Ultrasound is a valuable tool for assessing pulmonary edema. Assuming fluid and hence sonographic findings are consistently distributed based on gravity, clinicians may be tempted to examine only one intercostal space (ICS) within a lung region, potentially reducing accuracy. Our objective was to assess the potential impact of visualizing only one ICS by determining whether B-lines are consistent across adjacent ICS among patients with suspected pulmonary edema. **METHODS:** This was a prospective, observational study of adult (age ≥ 18 years) Emergency Department patients without COVID-19 who presented with suspected pulmonary edema assessing for the frequency of inconsistent ICSs. An ICS was considered "inconsistent" when there was a negative or indeterminate lung ultrasound finding with a positive finding for pulmonary edema located in the ICS both superior and inferior to it. A trained sonographer obtained short video loops of the lung in each successive ICS down a vertical line in 3 planes bilaterally, comprising 6 total views per patient. Images were saved and interpreted for B-lines, which were defined as single, discrete, hyperechoic image artifacts originating from the pleural line that extend the length of the screen and appear to move with the lung. An ICS was considered positive for pulmonary edema when ≥ 3 B-lines were present, indeterminate when there were 1-2 B-lines, and negative when there were 0 B-lines. **RESULTS:** 21 patients have been enrolled in the study to date, of which 117/126 (93%) lung planes were of sufficient quality for inclusion. Of the total lung planes, 36 (31%) had at least one inconsistent ICS. There were 41 total inconsistent ICS; 25 (65%) ICS were negative and 17 (35%) were indeterminate for pulmonary edema. These inconsistent ICS were most common in the right posterior (9/20; 45%) and left lateral (8/21; 38%) lung planes. **CONCLUSION:** Among patients with suspected pulmonary edema, our initial data suggest that B-lines can be inconsistent, with nearly one-third of lung planes having a negative or indeterminate ICS despite having a positive ICS superiorly and inferiorly. To ensure accuracy, clinicians should visualize multiple adjacent ICS when feasible.

Primary Presenting Author: Andres Pelaez, B.S. in Genetics, M.S. in Stem Cell Biology

Role: Rush Student

GC: PhD

MECHANISM OF ATRIAL FIBRILLATION IN AN ANIMAL MODEL OF INFLAMMATORY BOWEL DISEASE

Andres F. Pelaez, M.S. (Rush University) Disha Varma, PhD (Rush University) Carlos H. Pereira, M.S. (Rush University) Jonathas F. Almeida, PhD (Rush University) Jeremy Wasserlauf, MD (Rush University) Ali Keshavarzian, MD (Rush University) Kathrin Banach, PhD (Rush University)

INTRODUCTION: Ulcerative colitis (UC) is an inflammatory bowel disease with a relapsing and remitting course. UC has extraintestinal manifestations and UC patients exhibit twice the risk for atrial fibrillation (AF) during acute disease activity. In the current study we test the hypothesis that during active UC a dysregulation of vagal signaling increases a patients' propensity for AF. **METHODS:** Mice (male, C57BL/6) were treated with Dextran Sulfate Sodium (DSS: 3%) supplemented drinking water for 7 days to disrupt intestinal barrier function and mimic the disease phenotype of acute UC (IACUC protocol: 19-626). Changes in atrial electrophysiology were quantified in vivo (EKG), on the whole heart and the cellular level (Fluo-4AM) during peak inflammation (DSSA) and remission (DSSR). **RESULTS:** DSSA mice exhibited an attenuated heart rate (HR) in vivo (Control (CTL): 491 ± 11 bpm, $n=10$; DSSA: 448 ± 11 bpm, $n=16$; $p < 0.05$) and in excised perfused hearts (CTL: 321 ± 15 bpm, $n=3$; DSSA: 256 ± 17 bpm, $n=4$; $p < 0.05$). The P-wave duration was prolonged (EKG: CTL: 25.5 ± 0.6 ms, $n=10$; DSSA: 30.2 ± 0.5 ms, $n=16$; $p < 0.0001$) and HR variability was attenuated (Standard Deviation of Normal-to-Normal (beat-to-beat) intervals (SDNN): CTL: 11.3 ± 1.1 ms, $n=10$; DSSA: 8.2 ± 0.7 ms, $n=16$; $p < 0.05$). The attenuated HR variability is an indicator for an attenuated vagal tone and in the DSSA mice coincided with an increased sensitivity to the vagal agonist Carbachol (EKG: CCh 150 ng/g, change in HR: CTL: -3.8 ± 4.4 %, $n=6$; DSSA: -42.2 ± 4.8 %, $n=10$; $p < 0.0001$). After burst pacing DSSA hearts exhibited a prolonged corrected sinus node recovery time (CTL: 11.2 ± 1.4 ms, $n=3$; DSSA: 25.5 ± 2.1 ms, $n=4$; $p < 0.0001$), an increased AF propensity, and prolonged durations of AF episodes (CTL: 0.8 ± 0.17 s, $n=3$; DSSA: 2.4 ± 0.31 s, $n=4$; $p < 0.05$) in the absence and presence of CCh. No changes in atrial myocyte calcium handling properties were determined. After remission HR, P-wave duration, and HRV in DSSR mice returned to control values. **CONCLUSION:** The data suggests that the attenuated sinus rhythm and the exacerbated responsiveness to vagal stimulation increase the propensity for AF during active UC by facilitating reentry of excitation. If these changes are the direct consequence of the attenuated vagal tone remains undetermined.

Primary Presenting Author: Carlos Pereira, PhD

Role: Post-Doctoral Research Fellow

ROLE OF PAK1 IN SINUS NODE FUNCTION

Carlos H. Pereira (RUSH); Disha Varma (RUSH); Kathrin Banach (RUSH)

INTRODUCTION: Sinus node (SN) dysfunction (SND) and atrial arrhythmia frequently occur simultaneously with a hazard ratio of 4.2 for new onset atrial fibrillation (AF) in SND patients. We demonstrated previously that loss of p21-activated kinase 1 (Pak1) increases the propensity for AF by increasing cellular production of reactive oxygen species (ROS). Here we tested the hypothesis, that loss of Pak1 (Pak1^{-/-}) leads to attenuated SN function. **METHODS:** Sinus rhythm (SR) was quantified in wild type (WT) and Pak1^{-/-} mice in vivo and the isolated perfused heart using ECGs and multi-electrode array recordings. **RESULTS:** In vivo WT and Pak1^{-/-} animals exhibited no difference in basal SR (WT: 450.3 ± 6.7 bpm, n=16; Pak1^{-/-}: 440.3 ± 6.67 bpm, n=13), but intrinsic SR after autonomic blockage, was reduced in Pak1^{-/-} (WT: 399 ± 8.06 bpm, n=16; Pak1^{-/-}: 365.5 ± 9.68 bpm, n=13, p<0.05). The result was confirmed in the isolated perfused heart (WT: 364.8 ± 12.73 bpm, n=12; Pak1^{-/-}: 293.9 ± 7.58 bpm, n=21, p<0.01) suggesting attenuated SN function. To determine changes in the contribution of different mechanisms to pacemaker activity, hearts were perfused with cyclopiazonic acid (CPA: 5 μM) a blocker of the sarcoplasmic reticulum Ca ATPase or ivabradine (3 μM), a blocker of the pacemaker current (HCN4). CPA attenuation of the SR was not different between WT and Pak1^{-/-} hearts (-21.7 ± 4.4 % and -21.6 ± 3.3% respectively), however ivabradine induced a larger suppression in SR in WT than in Pak1^{-/-} (WT: -45.1 ± 2.5 %, n=6; Pak1^{-/-}: -22.2 ± 3.2 %, n=7, p<0.001), eliminating the difference in spontaneous activity (WT: 186.3 ± 17.6 bpm; Pak1^{-/-}: 234.7 ± 15.52 bpm). The contribution of HCN4 to SR in Pak1^{-/-} hearts could be rescued by the treatment with a histone deacetylase blocker (LMK235: 5mg/kg/day, 2 days) (WT/LMK: -38.9 ± 8.3%, n = 5; Pak1^{-/-}-LMK: -38.7 ± 1.2%, n= 4) or a ROS scavenger (Tempol: supplemented drinking water, 2 mmol/L, 2 days) (WT/Tempol: -46.3 ± 3.7 %, n = 5; Pak1^{-/-}-Tempol: -41.6 ± 2.5 %, n= 5). **CONCLUSION:** Attenuated Pak1 activity promotes SND by ROS dependent HDAC activation and suppression of HCN4 expression.

Primary Presenting Author: Sarah Abdel-Hadi, Bachelor of Science

Role: Rush Student

Summer Research Fellowship

UV-ACTIVATED FLUORESCENT IMAGES AS NOVEL NYCTALOPIA SCREENING TOOL

Sarah Abdel-Hadi, Rhona Ke, Sahitya Raja, Daisy Pacelli, Mathew MacCumber

INTRODUCTION: The tools and equipment used to diagnose and evaluate patients with retinitis pigmentosa present with many barriers to diagnosing affected children earlier in life. Patients are screened and evaluated using dark adaptometry or electroretinography (ERG). These methods require invasive procedures and expensive equipment. A more affordable and accessible screening tool has been developed to make evaluations more accessible; a book consisting of black photopaper with pictures of animals in UV-activated fluorescent ink. Our goal is to evaluate the accuracy of this alternative and more accessible screening tool. Our study will include 20 controls and 20 subjects diagnosed with nyctalopia. Our hypothesis is that the book will be an accurate and effective tool to use to evaluate and screen patients for nyctalopia. **METHODS:** Subjects are dark adapted for 15 minutes in a dark room. Subjects are then asked to cover their left eye. The UV flashlight is used on the test book at a distance of 25cm to activate fluorescence in the printed images. Subjects are asked to point to and name the animal pictured on each page with different intensities of fluorescence. The number of identified images is recorded, and the procedure is repeated with the subject covering their right eye, using the second set of test pages printed in the test book. Subjects will also be tested with dark adaptometry, to compare the night blindness measured by the two techniques. **RESULTS:** Preliminary data shows that 95% of healthy controls first recognized fluorescence at 10% intensity. Stimulus intensity recognition with dark adaptometry ranged from -54dB to -62dB in healthy controls. Patient recruitment is ongoing; of the 4 patients enrolled, stimulus intensity recognition ranged from -12dB to -60dB with dark adaptometry testing, 25% of patients first recognized fluorescence at 10% intensity, 50% first recognized fluorescence at 25% intensity, and 25% first recognized fluorescence at 50% intensity with results from dark adaptometry correlating to those of the book in each patient. **CONCLUSION:** Preliminary data suggests that there is a strong correlation between the dark adaptometry results and the book testing results, suggesting the book can be effectively used as an alternative screening tool for young patients suspected to have nyctalopia.

Primary Presenting Author: Mohammed Abdul Sami, BS, Biology, Loyola University Chicago

Role: Rush Student

RMC: M2

PATIENTS LOST TO FOLLOW UP WITH PROLIFERATIVE DIABETIC RETINOPATHY & DIABETIC MACULAR EDEMA: VISUAL AND ANATOMIC OUTCOMES & PATIENT CHARACTERISTICS

Presenting/First author: Mohammed Abdul Sami (Rush Medical College) Vivek Chaturvedi, MD (Rush)

INTRODUCTION There have been limited studies on the treatment outcomes of patients with diabetic retinopathies such as proliferative diabetic retinopathy (PDR) or diabetic macular edema (DME), particularly in patients who are lost to follow-up (LTFU) after treatment. Our retrospective cohort study aims to analyze visual and anatomic outcomes in patients who are LTFU after receiving panretinal photocoagulation (PRP), anti-vascular endothelial growth factor (anti-VEGF) injections, or focal laser for PDR or DME from the Rush University Medical Center and Rush Eye Clinic. We seek to better understand significant differences in visual acuity, treatment risk, and widen the database for follow-up results. By comprehensively studying various patients, data can elucidate previously unknown information that may influence treatment options. **METHODS** Our project is a retrospective cohort study intended to study patients with PDR or DME treated primarily with PRP, anti-VEGF injections, or focal laser at the Rush Eye Clinic at Rush University Medical Center (RUMC) in Chicago, Illinois from 2013 to 2020. We plan to conduct thorough analyses of patient fluorescein angiography (FA) and Optical Coherence Tomography (OCT) to delineate significant differences in patients from baseline following their LTFU period (defined as a period of absence greater than six months). Following patient data collection and in accordance with previous research studies, we plan to use SPSS (Statistical Package for the Social Sciences, v26) to analyze patient data. Analyses will be conducted with chi-squared testing for the identification of significantly different categorical variables, multiple logistic regression, and histograms to visualize patient characteristics within our dataset. **RESULTS** While the results of this study are still pending, we have narrowed down over 500 eligible patients to a pool of 35 LTFU patients, reflecting a rate consistent with previous research. However, we hypothesize that patients with PDR or DME who received a greater number of treatments prior to being LTFU, regardless if they were treated with PRP, focal laser, or anti-VEGF injection, should reflect better outcomes in visual acuity. **CONCLUSION** While our conclusions are still pending, we hope this will potentially aid future treatment protocols in diabetic retinopathies or personalized medical treatments and serve as a foundation for future studies.

Primary Presenting Author: Sara Beugen, MSN

Role: Rush Student

CON: Masters

INVESTIGATING THE NEED FOR IMPLICIT BIAS TRAINING ON A LABOR & DELIVERY UNIT

Sara Beugen (RUMC, CON), Kristin Fritts (RUMC, CON), Amanda Anderson (RUMC, CON)

INTRODUCTION: U.S. Black women are three to four times more likely to die from birth complications than White women. A contributing factor to this health disparity is implicit bias (unconscious attitudes/stereotypes affecting understanding, actions, decisions). The purpose of this project was to examine implicit bias among healthcare providers working on a labor and delivery unit and to determine interest in implicit bias training. **SYNTHESIS AND ANALYSIS OF SUPPORTING LITERATURE:** Perinatal patients of color report provider lack of respectful communication and support for shared decision-making. This has been attributed to provider implicit bias. There is a need to address the internal culture of a health care institution and investigate the extent to which implicit bias affects quality of care. No implicit bias training currently exists within the labor & delivery unit of a large, urban medical center. **METHODS:** A descriptive survey design was used. The setting was a 10-bed, Level III Labor and Delivery unit. There are 2,300 deliveries annually with 47 nurses and 53 physicians. An email was sent to all providers with a flyer describing the study with a link to a REDCap survey. Also, over 4 weeks they were introduced to the study at shift change. Three email reminders were sent. **EVALUATION CRITERIA:** Implicit bias was measured with the Harvard Skin Tone Implicit Association Test which measures the strength of bias based on the speed a participant assigns positive/negative words to photos of people with varying skin tones. Scores range from 0 strong to 6 little/no automatic preference for any skin tone. Additional items included: participant's job category, surprised by score (yes/no), does implicit bias affect clinical decision-making (yes/no), and could benefit from implicit bias training (yes/no). **RESULTS:** Of the 108 flyers distributed, 17 responded (10 nurses, 7 physicians). Only 29% (5) reported little to no preference for a skin tone. All agreed that bias could affect clinical decision making and agreed they could benefit from bias training. **CONCLUSION:** Findings show implicit bias with the majority of participants reporting a preference for light skin. Implicit biases must be addressed to better provide culturally congruent, equitable maternal healthcare.

Primary Presenting Author: Sarah Brennan, BS, OTD Candidate

Role: Rush Student

CHS: Clinical Doctorate

TRAINING HOSPITAL EMERGENCY DEPARTMENT STAFF FOR EFFECTIVE DOCUMENTATION OF INTELLECTUAL AND DEVELOPMENTAL DISABILITIES

Bathje, Molly. (Rush), Brennan, Sarah (Rush), DiGiulio, Rose (Rush), McCormack, Maeve (Rush), Snyder, Marisa (Rush), Bhardwaj, Aman (Rush), Johnson, Tricia (Rush), Hohmann, Sam (Vizient Inc), & Ailey, Sarah. (Rush)

INTRODUCTION: Secondary IDD diagnosis is often not documented in the health record leading to difficulty studying and understanding the needs of population. **OBJECTIVE:** To identify the efficacy of a training module for Emergency Department (ED) providers to increase documentation of IDD as a secondary diagnosis. **METHODS:** We invited ED providers to participate in a virtual training about identifying and documenting IDD. Providers (n=94) including nurses (48%), physicians, other advanced practitioners (39%), students (6%), and patient support staff (6%) completed the training along with a pre and post test survey of knowledge, behaviors and beliefs about documenting IDD and the acceptability of the training. **RESULTS:** The majority of participants (70%) reported they had never received training to identify and document IDD prior to this training. The majority of participants (74%) reported training as helpful. There were increases in participants' confidence in ability to identify ($z = -4.42, p = 0.00, r = -.57$) and document ($z = -4.21, p = 0.00, r = -.73$) IDD, and their belief that documenting IDD impacts hospital finances ($z = -6.03, p = 0.00, r = .62$). **CONCLUSION:** A lack of training for healthcare professionals related to IDD was confirmed. It is possible to deliver training aimed at increasing identification and documentation of IDD in the ED that is virtual. Occupational therapy practitioners can advocate for people with IDD by designing and delivering training to educate other health professions about the population's healthcare needs.

Primary Presenting Author: Megan Charlton, Masters

Role: Rush Student

CHS: Masters

A SURVEY OF FEEDING PRACTICES WITH THE USE OF HIGH FLOW NASAL CANNULA OXYGEN THERAPY

Megan Charlton, Msc (Rush); Sarah Peterson, PhD (Rush); Lisa LaGorio, PhD (Rush); Sara Mirza, MD (Rush); J. Brady Scott, PhD (Rush)

INTRODUCTION: High flow nasal cannula (HFNC) oxygen therapy is commonly used for patients with hypoxic and/or hypercapnic respiratory failure. Known benefits of HFNC oxygen therapy include precise FIO₂ delivery and decreased work of breathing due to air flow matching patient demand. A supposed advantage of HFNC includes allowing oral feeding while on the device, although little data supports this practice. The purpose of this study was to identify current practices and opinions regarding feeding practices during HFNC oxygen therapy. **METHODS:** A survey related to the practice and opinions of feeding practices during HFNC oxygen therapy was developed and sent to respiratory therapists (RTs), speech-language pathologists (SLPs), physicians, advanced practice providers (APPs), and registered dietitians (RDs) via communication channels of their respective professional associations. The survey was open for at least 30 continuous days, and reminder emails were sent at the discretion of the associations. **RESULTS:** Respondents included 307 professionals from 14 different countries. The most common respondent age range was 36-45 (n = 102, 33.2%), with the majority having 16 or more years experience practicing (n = 128, 41.7%). Most respondents worked in an academic/teaching hospital (n = 174, 56.7%) with patients aged 18 years or older (n = 282, 91.9%). Most respondents stated that their institution did not have a specific feeding protocol for HFNC oxygen therapy (n = 246, 80.4%) and felt patients could have an oral diet during HFNC oxygen therapy if not in imminent danger of being intubated (n = 264, 86.3%). The majority of respondents felt patients should have a bedside/clinical swallow exam before eating/drinking during HFNC oxygen therapy (n = 143, 46.7%). By profession, most physicians/APPs, RTs, and RDs felt that bedside/clinical swallow exams were unnecessary before eating/drinking with HFNC, but SLPs were in favor (n = 77, 75.5%). **CONCLUSION:** Most facilities do not have a protocol to guide feeding practices when HFNC oxygen therapy is used. Most providers feel an oral diet is safe for stable patients not in danger of being intubated. In general, SLPs feel patients on HFNC oxygen therapy should undergo a bedside/clinical swallow exam prior to eating/drinking.

Primary Presenting Author: Kerma LuAnn Cook, MN, ANP-BC, RN, DNP candidate

Role: Rush Student

CON: DNP

PROVIDER OFFSITE VISIT PROGRAM IN A RURAL COMMUNITY

K. LuAnn Cook, MN, ANP-BC, RN, DNP-candidate Masako Mayahara, PhD, RN Advisor, RUSH CON Laura Tivis, PhD, Site Facilitator, St Luke's Health System Boise Idaho

PROBLEM/FOCUS Older rural residents, compared to their urban counterparts, are faced with fewer options to access health care for chronic management of disease. There are limited number of health care providers in rural settings so rural residents frequently use emergency departments (ED) for non-urgent care. Emergency department utilization has risen in recent years with national expenditure equaling \$23 billion spent annually. Proactive provider off-site visit has shown to reduce over utilization of the ED, improved patient outcome, and decrease per capita expense. **PURPOSE** The purpose is to determine the impact of proactive provider off-site visits on patient outcomes of older adults living in assisted living/memory care. **SEARCH STRATEGY** An integrated review was performed for peer reviewed studies published in PubMed, Scopus, and Cochrane Library from January 2010 thru March 2021. Relevant articles were also searched in Agency for Healthcare Research and Quality, Centers for Medicare and Medicaid Services databases, and grey literature. **RESULTS** One hundred six studies were identified, and 17 studies met the eligibility criteria. Reference lists from selected articles were also reviewed and additional 20 studies were included for this review. Of the 37 studies 26 of the studies were community based, 5 studies were conducted in nursing home and 4 were conducted in assisted living/memory care. Of the 37 studies 23 showed a reduction or impact in ED utilization but none of these studies were conducted in rural setting. **SYNTHESIS OF EVIDENCE** The findings suggest the provider off-site visits have been shown to reduce ED utilization. However, most studies were conducted in the community setting and there was limited evidence to support the use of offsite visits in reducing ED visits in the assisted living and memory care communities. The lack of studies in rural care setting is a significant gap in the literature. **IMPLICATIONS FOR PRACTICE** Based on the data, the proactive provider offsite visit program is a promising approach to over utilization of the ED for older rural adults in the assisted living and memory care communities. More studies are needed to assess the impact of provider off-site visits in rural settings.

Primary Presenting Author: Wadi Eghterafi, B.S.

Role: Rush Student

RMC: M1

MACHINE LEARNING APPLICATIONS IN COVID-19 CHEST X-RAY MODALITIES

Wadi Eghterafi (RU)

INTRODUCTION: Chest X-ray imaging is a cost-efficient tool in diagnosing COVID-19 which can be further optimized through convoluted neural network technology (CNN). A CNN is an artificial network which interprets images and can, for example, classify a chest X-ray as COVID-19 positive or negative.

Optimizing and evaluating this technology is critical for advancing cost-effective chest X-ray technology in COVID-19 diagnoses. The objective of this study is to evaluate MobileNetV2, an image-classifier designed for smartphones, and compare it to a traditional convoluted neural network model (TCNN).

METHODS: Using the University of Montreal's publicly available and declassified COVID-19 Image Dataset, this study created a MobileNetV2 model (2,261,827 parameters) and a TCNN model (6,819,523 parameters). The database's 317 scans were pre-classified as having COVID-19, viral pneumonia, or benign features (the training and validation split was 3:1). In this study, each model was applied to the data on ten separate trials with two epochs to calculate an average accuracy. Afterwards, a two-tailed t-test was utilized to compare the accuracy of the two models. **RESULTS:** The TCNN and MobileNetV2 model accuracies were 84 and 85 percent, respectively. Additionally, there was no significant difference between the two model's accuracies ($p > .05$). **CONCLUSION:** A conclusion of this study is that convoluted neural networks have the capability of surpassing 80 percent accuracy in chest X-ray imaging with limited training and sample size. Another conclusion of this study is that MobileNetV2 scored similarly to a TCNN in accuracy despite having half of the training parameters. MobileNetV2 is therefore a potential real-time COVID-19 chest X-ray analysis tool because of its efficiency compared to traditional models. Limitations in this study include the small sample size of declassified, COVID-19 X-ray databases available to the public.

Primary Presenting Author: Lena Eskin, BA

Role: Rush Student

RMC: M3

Relation of Income to Disability-Free Survival in Older African Americans

Lena Eskin, BA (Rush); Raj C. Shah, MD (Rush); Ana W. Capuano, PhD (Rush); Bryan D. James, PhD (Rush); Crystal M. Glover, PhD (Rush); Lisa L. Barnes, PhD (Rush)

INTRODUCTION Few studies have examined the relationship between income and disability-free survival in African Americans, a population burdened with health disparities, particularly low life expectancy. In order to address the literature gap, we aim to examine this relationship and assess whether it is modified by select clinical and social factors. **METHODS** Our data come from the Minority Aging Research Study, a longitudinal cohort study of cognitive decline in older African Americans. The exposure of interest was income, dichotomized to represent below and above 200% of the federal poverty level. The main outcome was the first event of death, dementia, or persistent disability (requiring help with activities of daily living as measured at two consecutive evaluations) after baseline. We hypothesized that lower income is associated with higher likelihood of one of these events occurring, indicating lower disability-free survival. We used discrete-time Cox proportional hazards models to examine the relationship between these variables. **RESULTS** The 691 participants included in the analysis had mean age = 73.7 (6.0) years; median annual income range = \$30,000-\$34,999; and 76.6% were female. There were 112 deaths, and 62 and 61 developed dementia or disability, respectively, over a mean of 6.3 (4.4) years of follow-up. Those with incomes below the poverty level had a higher probability than those above of meeting an endpoint of death, dementia, or persistent disability (HR=1.57, 95% CI 1.12-2.19, p=0.008), after adjusting for medical conditions, depressive symptoms, loneliness, and self-reported experiences of discrimination. Being below the poverty level was associated with hazard ratios above one when each component of disability-free survival was examined as an individual outcome, but confidence intervals were wide and only statistically significant for persistent disability. **CONCLUSION** Our results indicate a significant association between income and disability-free survival among a cohort of older African Americans. Additional work should be done to better understand the mechanism of this relationship.

Primary Presenting Author: Wanissa Ford, MSN, FNP-BC

Role: Rush Student

CON: DNP

TRANSCEND: BRIDGING TRANSPLANT TO ENDOCRINE FOR EARLY DETECTION OF PTDM VIA THE PERFORMANCE OF DIABETES RISK SCORES IN THE CLINICAL SETTING

Wanissa Ford MSN, FNP-BC (RU/RUMC); Masako Mayahara, PhD, RN, FPCN, CHPN (RU); Louis Fogg, PhD (RU); Sumeet Jain, MD (RUMC)

BACKGROUND: Post-transplant Diabetes Mellitus (PTDM) affects 4% to 25% of kidney transplant recipients. Delays in detecting PTDM can have a negative impact on patient outcomes. The Health Belief Model maintains that perceived severity and susceptibility to a disease serve as the guiding force in determining the performance of appropriate health behaviors. Therefore, informing patients of their risk for PTDM can lead to positive behavioral changes and optimize disease management. Diabetes risk assessment tools are effective in identifying patients who are at high risk for developing type 2 diabetes mellitus. There are many validated diabetes risk assessment tools available, but none are validated in post-transplant populations. The purpose of this study is to compare the accuracy of four diabetes risk assessment tools in identifying PTDM. **METHODS:** A retrospective chart review of adult patients who received transplants at a large academic medical center in the Midwest. Data were extracted from electronic medical records if patients were age 18 or older, had no history of diabetes, received a kidney transplant between 2017 and 2018, and developed PTDM within 3 years of receiving the transplant. PTDM risk for each patient was calculated using four validated diabetes risk screening instruments (San Antonio Diabetes Prediction Model [SADPM], Cambridge Diabetes Risk Score, Chakkerla Pretransplant Risk Score, and the Framingham Offspring Study). Sensitivity, specificity, predictive values, and area under the receiver operating characteristic curve (AUC) were calculated for each test. **RESULTS:** A total of 212 patients without diabetes received transplants between 2017 and 2018. Of the 212 patients, 41 (19%) developed PTDM within the first 3 years post-kidney transplant. All tests were fair predictors of PTDM (AUCs > 0.70, $p < 0.05$). Although SADPM had the highest AUC (0.76), none of the AUCs differed significantly from each other (p 's > 0.42). **CONCLUSIONS:** Although the SADPM was the most accurate in predicting PTDM, any of these instruments could be useful for predicting PTDM to facilitate prevention, timely diagnosis and management of PTDM after kidney transplantation. Future research should examine the use of these instruments in this population and whether it can be used to reduce rates of PTDM.

Primary Presenting Author: Reilly Frauchiger-Ankers, Bachelor of science

Role: Rush Student

RMC: M2

Protocol development for Crouzon and Apert syndrome surgical outcomes study

Reilly Frauchiger-Ankers, Amir Dorafshar MD, Christina Tragos MD, Sara Fuentes-Lara

INTRO: Crouzon's and Apert's syndromes are rare genetic diseases associated with mutations in FGFR2 gene that result in craniosynostosis. Many of these patients are treated with Le Fort I/II/III osteotomy or monobloc advancement to correct midface hypoplasia and resulting clinical symptoms. On attempts to retrospectively study pre and post-operative outcomes, it was discovered that insufficient data was available for analysis. Therefore, we intend to review available data and identify gaps to create a protocol for future efforts to study airway management outcomes in this cohort. **METHODS:** Patients with a diagnosis of Crouzon or Apert syndrome who have undergone Le Fort I/II/III osteotomy or monobloc advancement at Rush between 10/21/02 and 9/21/20 were included. Data collected for qualitative analysis includes 3D head CT scans, sleep studies, and follow up visit 3D CT scans. Invivo6 software was used to measure pharyngeal airway volume on 3D head CT scans. **RESULTS:** 2 out of 11 patients who had CTs taken pre and post operatively had airways that were able to be measured. Limitations to analysis included intubation or other hardware in place at time of scan, timing of scan in close proximity to surgery, types of CT scans, and limited number of CTs. 3 of 11 patients had accessible pre and postoperative sleep studies. Standard practice for measurement using invivo6 has not been defined. **DISCUSSION:** Data inconsistencies were reviewed and study protocols were developed around identified factors of interest. In all patients, CT scans should be limited to only 3D head view with head in neutral position. Preoperative scans will be taken 1-10 days prior to surgery and post-operative scans will be taken between 4-6 weeks following surgery. Corresponding sleep studies will be performed at time of CT scans, with follow up measurements taken yearly. Airway measurement technique will use a 3D calculation of nasopharyngeal volume and pharyngeal upper airway volume between C5 and the inter-maxillary fissure. This protocol enables future study of patients undergoing airway correction procedures for Crouzon's and Apert's syndrome.

Primary Presenting Author: Lauren Gregory, DNP

Role: Rush Student

CON: DNP

IMPROVING ACCESS TO CARE FOR PEDIATRIC PATIENTS WITH HYPERTENSION

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INTRODUCTION Nationally, pediatric hypertension affects 3.5% of children. According to the American Academy of Pediatrics (AAP) once a diagnosis of hypertension is suspected, an Ambulatory Blood Pressure Monitor (ABPM) should be initiated. In the target setting this can take 1-4 months to complete. Barriers include lack of access, lack of a clear protocol, and delayed ABPM placement. Delays put patients at risk for untreated, longstanding hypertension leading to target organ damage. The main objective was to increase access to care for patients with hypertension by decreasing the time from recognition to placement of ABPM. Patients with elevated blood pressure in childhood are at risk for hypertension in adulthood. To reduce risk and follow the AAP guidelines, the project leads determined the solution included designing a new Advanced Practice Registered Nurse (APRN) clinic to streamline the process of ABPM placement. **METHODS** Implementation steps included budget approval for new ABPMs, clinic space acquisition, Epic template design, workflow creation, and provider education on referral protocol. Patients were referred by their provider to the bimonthly APRN clinic for monitor placement, instructions, lifestyle modification education, and goal setting. **RESULTS** Three criteria were used to evaluate the APRN clinic: time from elevated blood pressure measurement to placement of ABPM, number of monitors placed, and revenue generated. Data from February 2018 to January 2019 (pre-intervention) were compared to data from February 2019 to January 2020. During the pre-intervention period, 106 ABPMs were placed and the typical turnaround time ranged from 1-4 months. During the first six months post-implementation, 112 ABPMs were placed and the typical turnaround time was reduced to 48-72 hours. Revenue during the first six months was \$27,357. Due to the success of the clinic, seven new ABPMs were purchased and more clinic days added. Statistical analysis for the entire implementation period will be presented. **CONCLUSION** The clinic has dramatically improved access and management of patients with hypertension. This approach should be considered in other settings where there are delays in the placement of ABPMs.

Primary Presenting Author: Mary Clare Houlihan, MS, RN

Role: Rush Student

CON: PhD

A REVIEW OF CLINICAL TRIALS OF ADVANCE CARE PLANNING INTERVENTIONS ADAPTED FOR LIMITED HEALTH LITERACY

Mary Clare Houlihan, MS, RN Masako Mayahara, PhD, RN Barbara Swanson, PhD, RN LouisFogg, PhD

INTRODUCTION Advance care planning allows patients to receive end-of-life care that is consistent with their care preferences. Despite the benefit, only 11% of Americans have discussed advance care planning with a healthcare provider. Patients with limited health literacy are less likely to participate in these discussions due to limitations in understanding and communicating health information. Therefore, the purpose of this review is to systematically examine randomized controlled trials that address the effects of limited health literacy on advance care planning and evaluate the quality of these studies.

METHODS We reviewed randomized controlled trials published from January 1997 to July 2020. A search was conducted using the PubMed, CINAHL, PsycINFO, and Scopus databases. Study quality was independently evaluated by two reviewers using the Joanna Briggs Institute Critical Appraisal Tool.

RESULTS The database search yielded 253 studies and five studies were included in the final review. Studies were conducted mainly in urban, outpatient clinics in the United States and included mostly White patients. Interventions focused on writing text at appropriate reading levels, creating videos to enhance communication, and adding images to education materials. Interventions were found to improve patient knowledge, increase preference for comfort care, advance care planning engagement, and documentation of their care preferences. There were several methodological issues identified in the studies, including baseline differences in intervention and control groups, lack of reliable and valid outcome measures, and inappropriate statistical analyses.

CONCLUSION When discussing advance care planning with patients who have limited health literacy, health care providers must frequently assess their patients' understanding of advance care planning. Future intervention studies should use reliable and valid outcome measures to assess intervention effects. Additionally, there is a need for more high-quality intervention studies that examine the effects of limited health literacy on advance care planning in a variety of populations and settings.

Primary Presenting Author: Daniel Hurowitz, MSN

Role: Rush Student

CON: Masters

Prevention of Respiratory Device-Related Pressure Injuries on RUMC MICU

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Nature and scope of the project: During FY21 the medical intensive care unit (MICU) at Rush University Medical Center experienced increased incidence of hospital-acquired pressure injuries (HAPIs), with 54% to the face, nose, and ears. Increased reliance on high-flow nasal cannulas (HFNC) and high-flow, high-humidity nasal cannulas (HFHNC) were contributing factors. Unit leadership expressed the need for an evidence-based bundle to reduce HAPI incidence. The purpose of this project is to develop such a bundle to submit for consideration to MICU leadership and other relevant stakeholders. Synthesis and analysis of supporting literature: Despite support for medical device-related HAPI prophylaxis, no known evidence-based protocols exist to reduce HFNC and HFHNC-related HAPIs. The use of hydrocolloid and transparent dressings applied under tubing of respiratory devices were effective at delaying/preventing HAPI incidence (Cooper et al., 2020; Ozbudak & Yesilbalkan, 2020). Others urge the practice of regularly-scheduled skin checks under device tubing (Cooper et al., 2020), and the use of foam dressings for HAPI prophylaxis to the face (Bishop et al., 2019; Kim & Mullins, 2016). Project Implementation: Attendees at several unit-based and house-wide skin protection meetings provided comments and edits to be incorporated into the bundle and educational materials. Subsequently, frontline staff (i.e. staff RNs, RTs, and PCT/NAs) surveys assessed perceptions of its feasibility and their willingness to implement it. Evaluation criteria: Stakeholder approval of the algorithm and skin tip was the primary evaluation criteria of the project. Feasibility and willingness to implement by frontline staff were secondary evaluation measures. Outcomes: 95 (73%) MICU staff RNs received training on the bundle, along with 5 float RNs, 5 PCT/NAs, and 10 respiratory therapists. Though a minority (23%) of attendees completed the survey, 95% were willing or very willing to implement the bundle and 95% thought the bundle would be feasible or very feasible to implement. Recommendations: Next steps for the project include collecting patient data and looking at the impact on prevention of HAPI. If patient data indicate success, implementation may be warranted in other ICUs where HFNC and HFHNC are used for HAPI prevention. A pilot trial is underway.

Primary Presenting Author: Ikenna Ifearulundu, BS, MPH

Role: Rush Student

RMC: M3

HEALTH INEQUALITIES OF DELAYED ONSET OF CARE RELATED TO COVID-19 OUTCOMES WITHIN RUSH UNIVERSITY HOSPITAL SYSTEM

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INTRODUCTION: Racial and ethnic inequities in health care have been well established. One study demonstrated the delayed onset of medical care in the emergency department (ED) for African American (AA) patients. Racial minorities have been disproportionately affected by the COVID-19 pandemic. The impact of delayed treatment on racial minorities with COVID-19 has not been studied. We sought to determine whether AA patients experienced worse outcomes from COVID-19 and the impact of ED wait times. **METHODS:** We conducted a retrospective, cross-sectional, IRB-approved analysis on COVID-19 adult patients who initially presented to the ED at three Rush locations between 3/4/2020 - 8/30/2021. The Rush COVID Biorepository and electronic medical records were used to gather patient demographics, social history, comorbidities, and disease characteristics. Independent variables measured were clinical outcomes stratified into four groups for analysis; non-admitted, hospitalized, ICU admissions, and mortality. Exploratory analyses included descriptive statistics on COVID-19 cases. **RESULTS:** Preliminary results showed 26,236 COVID-19 cases during this period. 23,191 patients met initial inclusion criteria. Demographics showed majority sex: female (n=13,005; 56.1%), majority ethnicity: non-Hispanic (n=12,938, 55.8%), even distribution of race (White n=6996, 30.2%; AA n=6598, 28.5%; Others n=6988, 30.1%) and majority primary language: English (n=17,933, 77.3%). Patient social factors included smoking (n=1,433, 6.2%), alcohol use (n=6432, 27.7%), recreational drug use (n=718, 3.1%), employment (n=6728, 29.0%), living with family/others (n=8990, 38.8%) and insured by Medicare/Medicaid (n=749, 3.2%). Comorbidities of diabetes (n=301, 1.3%), hypertension (n=256, 1.1%), end stage kidney disease (n=118, 0.5%) and congestive heart failure (n=115, 0.5%) were most common. Clinical outcomes measured 8,590 cases (37%) required hospital admission, of which 3592 admissions were AA (41.8%). The remaining 14,601 patients did not require inpatient care. 789 (3.4%) cases required ICU care of which 284 were AA (36%). 426 (1.8%) cases resulted in mortality of which 117 were AA (27%). ED wait times are being confirmed via collection tools. **CONCLUSION:** Preliminary findings may support our initial hypothesis and prior research demonstrating AA patients with higher COVID-19 related complication rates. Future analysis of ED wait time within COVID-19 patients will improve our understanding of existing disparities.

Primary Presenting Author: Sameera Khan, BS, BA

Role: Rush Student

RMC: M3

IMPACT OF A RAPIDLY PROGRESSIVE FEEDING PROTOCOL ON NUTRITION OUTCOMES FOR PRETERM INFANTS IN THE NEONATAL INTENSIVE CARE UNIT

Megan Kraemer (Rush), Sameera Khan (Rush), Leah Cerwinske (Rush), Hillary Zellner (Rush), Alok Patel (Rush), Rakhee Bowker (Rush)

INTRODUCTION: Optimal feeding practices in preterm, very low birth weight (VLBW) infants in the NICU remain controversial due to balancing growth with infants' increased susceptibility to feeding intolerance and necrotizing enterocolitis. Prolonged use of parenteral nutrition (PN) to meet early nutritional requirements increases risk of infection and metabolic complications. An early standardized transition to complete enteral feeding may reduce need for PN and subsequent need for central vascular access. This study aims to evaluate the effect of implementation of a rapidly progressive feeding protocol on nutrition outcomes in a level 3 NICU. Secondary outcomes include nutritional milestones, central line days, and adverse events. **METHODS:** Retrospective study of 186 infants admitted before ("slow era" 2016-2017) and after ("rapid era" 2019-2020) implementation of a rapidly progressive feeding protocol. Inclusion criteria: admission within 48h of life, birth weight (BW) <1500g or gestational age (GA) <32 weeks. Exclusion criteria: aneuploidy, major congenital anomalies, transfer < 30 days, spontaneous intestinal perforation, major surgery, and death within 7 days of life. Data were analyzed using t-tests, Mann-Whitney U test, Chi-square and Cox regression. **RESULTS:** Nutritional milestones were achieved significantly earlier in the rapid era cohort: age at full feedings (10[9,15] vs. 13[10,17.5] days; $p=.002$); time to full feedings (8[6,11] vs. 10[8,14]) days, $p<.001$); time to regain BW (6[4,9] vs. 8[6, 12] days, $p<.001$). Rapid era was associated with improved weight gain (z-score change from birth to discharge: rapid -0.50[-1.13,0.01] vs. slow -0.58[-1.13,0.25], $p=.042$). In the multivariate regression analysis, rapid era was significantly associated with earlier achievement of full feedings (hazard ratio 1.5, 95% CI [1.1, 2.1], $p=.008$). PN and central line days were reduced but not statistically significant. **CONCLUSIONS:** Implementation of a rapidly progressive feeding protocol was associated with earlier achievement of nutritional milestones with no difference in morbidity. Use of a standardized progressive feeding advancement protocol improves nutrition outcomes and may decrease PN and central line days without increasing morbidity in preterm infants admitted to the NICU.

Primary Presenting Author: Jessica Kulawiak, PharmD

Role: Clinical Resident

INCIDENCE OF MEDICATION RELATED PROBLEMS FOLLOWING PEDIATRIC EPILEPSY ADMISSION

Jessica Kulawiak, PharmD (Rush University Medical Center); Sara Hovey (Brown), PharmD, BCPPS (Rush University Medical Center); Joette Amundaray Miller, PharmD, BCPPS (Rush University Medical Center)

INTRODUCTION: An estimated 26-33% of pediatric patients are reported to have at least one medication discrepancy at hospital discharge. Pediatric epilepsy patients may be at greater risk due to complex medication regimens and frequent hospital readmissions. At Rush University Children's Hospital (RUCH) pharmacists are consulted for discharge education for some but not all pediatric epilepsy patients. The aim of this study is to quantify the proportion of pediatric epilepsy patients at RUCH experiencing medication related problems after hospital discharge and to determine if pharmacist involvement in discharge counseling decreases these errors. **METHODS:** This is a retrospective cohort study including patients 0-21 years of age with epilepsy admitted to the children's hospital for electroencephalography monitoring, increased seizure frequency, or status epilepticus. Group 1 consists of patients who did not receive pharmacist discharge counseling and group 2 includes patients who received pharmacist discharge counseling. Patients will be enrolled in the cohorts in a 2:1 ratio, with a goal of 243 total patients enrolled in the study. The medical record is reviewed from the time of inpatient discharge to the first neurology follow up to identify any medication related problems that occurred in this period. The primary outcome is the difference in proportion of medication discrepancies between the two cohorts. The secondary outcomes are overall incidence of medication discrepancies and incidence of discrepancies with the potential to cause harm in both cohorts. Descriptive statistics, chi-square or Fischer's exact test, and students T test or Mann Whitney U test will be used in analysis as appropriate. **RESULTS:** These are preliminary results as data collection is ongoing and expected to be completed within the next month. Data has been collected for 207 patients (162 patients in group 1 and 45 in group 2). There have been 55 medication discrepancies identified (48 occurred in group 1 and 7 in group 2). Currently the incidence of medication related problems is 29% in the non-pharmacist group and 16% in the pharmacist group. **CONCLUSION:** Based on preliminary results, patients who received a pharmacist education may be less likely to experience medication problems after discharge.

Primary Presenting Author: Amanda LaMonica-Weier, DNP, MAT, MSN

Role: Rush Student

CON: DNP

KIDS FIRST: MULTICOMPONENT ON-BOARDING FOR CLINICAL TRAINEES IN A SCHOOL-BASED HEALTH CENTER

Amanda LaMonica-Weier, DNP-FNP Spring 2021 Graduate (Rush) Presenting/first author Margaret Bavis, DNP-FNP, Assistant Professor, Advisor (Rush)

INTRODUCTION: School-Based Health Centers (SBHCs) aim to expand access to healthcare for children while delivering age-appropriate care. SBHCs often serve vulnerable populations who have been exposed to adverse childhood experiences (ACEs) which have been tied to an increase in adult health risk factors. At an urban SBHC serving adolescent students, 75% of patients reported three or more ACEs. This SBHC also had multiple clinical trainees monthly. There was not a multicomponent on-boarding that established a standard of care addressing the SBHC model, adolescent care, and ACEs. By on-boarding frequent clinical trainees, care provided to this vulnerable patient population can be more consistently aligned to evidenced-based care appropriate for the SBHC model, adolescent care, and ACEs. The literature supports unit specific orientations for short term rotations as these aids in patient population care (Sobolewski et al., 2016). Trauma-Informed Care (TIC) training increased patient-centeredness when treating those with reported ACEs (Green et al., 2015). **METHODS:** A multicomponent onboarding was created to the Patient Interaction Standard of Care, addressing the SBHC model, adolescent care, and ACEs. Orientees were expected to demonstrate proficiency on a knowledge based post-assessment and adherence to the PISC via a self-assessment after each clinical day. **RESULTS:** • 80% or 12/15 clinical trainees completed the multicomponent on-boarding • 100% or 15/15 completed a self-assessment • 67% or 16/24 self-assessments were completed after the multicomponent on-boarding • Post multicomponent on-boarding completion there was 97% adherence to the Patient Interaction Standard of Care "Always" or "Most of the Time" **CONCLUSION:** Adherence to the Patient Interaction Standard of Care was reported at higher levels after the multicomponent on-boarding completion. By on-boarding frequent practitioner-students, care provided to this vulnerable patient population was more consistently aligned to evidenced-based care appropriate for the SBHC model, adolescent care, and ACEs. However, not all clinical trainees completed this multicomponent on-boarding prior to patient interaction. This demonstrates the importance of mandatory compliance and further implementation across other SBHCs.

Primary Presenting Author: Meghan Garland, MSN CNM

Role: Rush Student

CON: PhD

THE WOMEN'S LIFESTYLE PHYSICAL ACTIVITY PROGRAM: SELF-EFFICACY, OUTCOME EXPECTATIONS, GROUP SOCIAL SUPPORT, AND ADHERENCE TO PHYSICAL ACTIVITY IN AFRICAN AMERICAN WOMEN

Meghan Garland MSN, CNM Rush University JoEllen Wilbur, PhD, APN Rush University Louis Fogg PhD Rush University Shannon Halloway PhD, RN Rush University Lynne Braun PhD, CNP Rush University Arlene Miller PhD, RN Rush University

BACKGROUND African American women have the lowest levels of leisure-time physical activity, particularly when compared to White American women. Intervention studies, and especially those that are based on social cognitive theory, have shown modest and short-term improvements in physical activity. Understanding the social cognitive constructs that underlie these theoretically based interventions may provide direction for the further development of successful physical activity interventions. **OBJECTIVE** The aim of the study was to examine the relationships among social cognitive constructs (self-efficacy, outcome expectations/realizations, group social support) and change in physical activity from baseline to 48 weeks in African American women participating in a lifestyle physical activity program. **METHODS** This was a secondary data analysis of a 48-week randomized controlled trial with three intervention conditions randomly assigned across six community health care sites. Each intervention had six group meetings over the 48 weeks with one of three conditions: no calls, personal motivation calls, or automated motivational calls between meetings. The participants were 288 sedentary, midlife African American women with no major signs or symptoms of cardiovascular disease. Measures included: self-efficacy at baseline and 24 weeks, outcome expectations at baseline, outcome realizations at 24 weeks, group social support at 24 weeks, and physical activity (self-report and device-measured) at baseline and 48 weeks. **RESULTS** In a hierarchical regression model predicting change in self-reported, moderate-vigorous physical activity, baseline physical-outcome expectations and 24-week psychological-outcome realizations were significant positive predictors ($R^2 = .11$, $F [5, 250] 6.58$, $p < .001$). In a hierarchical regression model for change in device-measured steps, self-efficacy change from baseline to 24 weeks was a significant positive predictor ($R^2 = .10$, $F [3, 148] 5.25$, $p = .002$). Treatment condition was not significant in either model. **DISCUSSION** Outcome expectations/realizations and self-efficacy may be important constructs to consider when designing interventions for midlife African American women.

Primary Presenting Author: Genesis Mancha, MD

Role: Clinical Resident

Ten Year Review of Neonatal Neurosurgical Outcomes and Cost Analysis

Genesis Mancha, MD (Rush University Medical Center); Suhagi Kadakia, MD (Rush University Medical Center); Sarah Basharkhah, BS (Rush Medical College); Laura Seske, MD (Rush University Medical Center)

Introduction Neurosurgical interventions in neonates may contribute to increased Neonatal Intensive Care Unit (NICU) stay due to increased risk of surgical complications, morbidity, and mortality. The impact of neurosurgical interventions on length of stay (LOS) and cost is not well-documented in the literature. In addition to LOS, other factors may impact overall resource utilization, including complexity of care and sequelae of interventions. Our objective was to perform a cost analysis of high-risk neonates who underwent neurosurgical procedures during the initial hospitalization, 30-day readmissions, and ED visits. **Methods** Hospital IRB approved this study. A retrospective chart review was performed on NICU patients who underwent ventriculoperitoneal (VP) shunt and/or subgaleal shunt placement between January 1, 2010, to April 30, 2021. Postoperative outcomes were analyzed, including LOS, revisions, infections, ED visits following discharge, and readmissions accounting for health care utilization cost. **Results** 66 neonates underwent a VP and/or subgaleal shunt placement during our study period. Data were analyzed using descriptive statistical analysis. 40% (n=27) of the infants had IVH. 81% (n=54) of the patients had hydrocephalus. 11% (n=7) had an identified or suspected infection within 30 days after surgery. The average LOS was 59 days in contrast to 67 days for patients with an infection. Following discharge from the NICU, 21% of patients (n=14) presented to the ED within 30 days of discharge. Of these ED visits, 57% (n=8) led to readmission. 20% (n=2) of patients were direct admissions. Consistent definitions and costing methodology available since 2015 were used to complete cost analysis for 35 out of 66 patients. The average LOS for these patients was 63 days. The average cost of admission for these patients was \$209,703.43, ranging from \$28,515.51 to \$1,491,942.40. Of these 35 patients, 5 required hospital readmission. Average cost of readmission was \$25,757.02, ranging from \$1,998.71 to \$56,805.36. **Conclusion(s)** In neonates who underwent neurosurgical procedures during NICU admission, adverse outcomes increased LOS and health care utilization costs compared to average neonates or those who underwent uncomplicated procedures. Further research is needed to optimize health care utilization for these high-risk neonates.

Primary Presenting Author: Anna Moshkovich, B.S.

Role: Rush Student

RMC: M3

ASSESSMENT OF PATIENT FACTORS AND PORT INFECTION RATES OF RUMC VIR

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INTRODUCTION: Ports are frequently used as long-term central venous access but carry risk and are responsible for an estimated 80,000 bloodstream infections and 30,000 deaths annually in the United States. Minimizing procedure-related infections is important as patients requiring ports often have chronic diseases affecting immunocompetence and wound healing (e.g. cancer, hematologic disorders, etc.). Although patient factors have been linked to increased procedure-related infection risk, the Rush University Medical Center Vascular & Interventional Radiology (RUMC VIR) department placement experience has not yet been reviewed. **METHODS:** A retrospective study of 375 patient encounters from July 2018 - June 2019 yielded 353 patients who underwent port placement by the RUMC VIR department. Patient characteristics evaluated within 5 days of port placement date included WBC count < 3, ANC < 0.5, PLT count < 100, albumin < 3.5, presence of a hematologic malignancy, port placed for TPN use, or same-day cannulation. Presence of a procedure-related port infection was determined by port removal or infusion nurse documentation of infection-like processes (e.g. erythema, port pocket dehiscence) within 30 days. Statistically analysis was performed using Fisher's Exact Test. **RESULTS:** Total procedure-related port infection rate over this period was 9/353 (2.2%). No statistically significant differences were found in infection rates of the evaluated patient characteristics. **CONCLUSION:** Overall procedure-related infection rate of ports placed by RUMC VIR between July 2018 - June 2019 was at or below similar cohorts. While no patient-related factors were linked to an increased procedure-related infection risk, this is confounded by the overall low number of infections. The results suggest that same-day cannulation rates may not result in increased infections, which may improve patient satisfaction from less frequent hospital visits during treatment.

Primary Presenting Author: Rachel Muthui, MSN

Role: Rush Student

CON: PhD

THE PROCESS OF ADVANCE CARE PLANNING IN NURSING HOME SETTINGS: AN INTEGRATED LITERATURE REVIEW

Rachel Muthui (Rush) and Dr. Olimpia Paun (Rush)

TITLE The process of advance care planning (ACP) in nursing home settings: An integrated literature review.

PROBLEM Overwhelming, nursing home residents with Alzheimer's Disease and related Dementias (ADRD) lack ACP and end up with unwanted or unnecessary aggressive interventions.

PURPOSE Examine the evidence on the process of conducting ACP with residents with ADRD and their families in nursing home settings. **RESEARCH QUESTION** What is known about when, who and how ACP is being conducted with residents with ADRD and their families in nursing home settings?

METHODS PubMed, Scopus, and CINAHL databases were searched using the MESH terms, "Advance Care Planning", "advanced directives", "end of life decision making", "Dementia", and "Alzheimer's Disease". A hand search was also completed. Inclusion criteria were: a) studies focusing on ACP, b) published between 2011- 2021, c) full text, in English, d) including samples of residents with ADRD and/or their families, e) in nursing home settings. Exclusion criteria were: a) specific ACP such as euthanasia or gastrostomy tube feedings, b) terminal diagnoses such as cancer, c) ACP interventions did not address the process of implementation. **RESULTS** Of the 1551 articles identified, 690 duplicates were excluded, 657 were eliminated after abstract and title reviews. Remaining 204 full texts were reviewed, and 188 were excluded based on exclusion criteria. Hand search added 1 study. 17 studies, most originating from Europe and the US were included in the review. The evidence indicates: a) lack of ethnic and racial minorities in samples, b) lack of consistent or systematic approach to addressing ACP in nursing homes, c) lack of staff knowledge and skills to conduct ACP conversations, d) ACP is most often initiated by nursing staff in the absence of available physicians, e) families lack understanding of the terminal nature of ADRD, limiting their meaningful participation in the ACP process.

IMPLICATIONS To effectively address ACP with residents with ADRD and their families, nursing homes need to develop a systematic approach. Families and nursing home staff need education on ADRD and disease trajectory. ACP education including a resident-centered approach is needed. More studies including ethnic minority samples are needed.

Primary Presenting Author: Grant Owen, BA

Role: Rush Student

RMC: M2

LONG-TERM RECURRENCE RISK FOLLOWING PLEURECTOMY OR PLEURODESIS FOR PRIMARY SPONTANEOUS PNEUMOTHORAX

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INTRODUCTION: Recurrent primary spontaneous pneumothorax (PSP) is often managed with blebectomy and either pleurectomy or pleurodesis to reduce recurrence. There is limited data regarding which approach leads to better long-term control. Our objective was to evaluate long-term recurrence rates following pleurectomy or mechanical pleurodesis for recurrent PSP. **METHODS:** The PearlDiver Mariner Patient Claims Database was queried for patients ages 10-25 who presented with PSP and underwent either pleurectomy or mechanical pleurodesis between 2010-2020. This database provides national all-payer patient claims data with the ability to capture longitudinal patient follow-up data. Outcomes included recurrence rates, length of stay, opioid prescriptions at discharge up to 30 days, and reimbursement. Kaplan Meier analysis and Cox proportional hazards regression models were used with adjustment for age and gender. Institutional Review Board provided protocol exemption for this study (IRB No. 2010-1501). **RESULTS:** Of 18,955 patients that had PSP, 5.1% (n=968) were managed operatively with either pleurectomy (18.3%, n=177) or mechanical pleurodesis (81.7%, n=791). There was no difference in the rate of recurrence between pleurectomy as compared to mechanical pleurodesis (5-year risk of recurrence: 25.8% vs 26.5%, adjusted hazard ratio=1.12 [95% confidence interval: 0.79, 1.58]) (Figure 1). There was no difference in median length of stay (6 days vs 6 days, p=0.33) or rate of outpatient opioid prescription (49.2% vs 52.8%, p=0.58) between pleurectomy and mechanical pleurodesis, respectively. Median reimbursement was higher following pleurectomy compared to pleurodesis (\$14,040 vs. \$5,811, p=0.02). **CONCLUSION:** There is no significant difference in recurrence based on type of procedure performed for recurrent primary spontaneous pneumothorax. However, pleurectomy is associated with higher costs. This may be due to increased pain necessitating additional inpatient therapy. Given similar outcomes but substantially higher costs associated with pleurectomy, mechanical pleurodesis may be considered a superior therapy.

Primary Presenting Author: Avelina Padin, PhD

Role: Post-Doctoral Research Fellow

SCREENING FOR PTSD DURING PREGNANCY: A MISSED OPPORTUNITY

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INTRODUCTION Prenatal posttraumatic stress disorder (PTSD) is often overlooked in obstetric care, despite evidence that untreated PTSD negatively impacts both mother and baby. OB-GYN clinics commonly screen for depression in pregnant patients; however, prenatal PTSD screening is rare. Although the lack of PTSD screening likely leaves a significant portion of pregnant patients with unaddressed mental health needs, the size of this care gap has not been previously investigated.

METHODS This retrospective chart review study included data from 1,402 adult, pregnant patients who completed PTSD (PTSD Checklist-2; PCL) and depression (Edinburgh Postnatal Depression Survey; EPDS) screenings during a routine prenatal care visit. Descriptive statistics identified screening rates for PTSD and depression, and logistic regression analyses identified demographic variables associated with screening outcomes and assessed whether screening results (+PCL/+EPDS, +PCL/-EPDS, -PCL/+EPDS, -PCL/-EPDS) were associated with different provider intervention recommendations.

RESULTS 11.1% of participants screened positive for PTSD alone, 3.8% for depression alone, and 5.4% for both depression and PTSD. Black (OR=2.24, 95% CI [1.41,3.54]) and Latinx (OR=1.64, 95% CI [1.01,2.66]) patients were more likely to screen positive for PTSD compared to White patients, while those on public insurance were 1.64 times (95% CI [1.21,2.22]) more likely to screen positive compared to those with private insurance. Patients who screened positive for both depression and PTSD were most likely to receive referrals for behavioral health services (44.6%), followed by -PCL/+EPDS (32.6%), +PCL/-EPDS (10.5%), and -PCL/-EPDS (3.6%). A similar pattern emerged for psychotropic medication prescriptions.

CONCLUSION Over ten percent of pregnant patients in the current study screened positive for PTSD without depression, highlighting a critical mental health need left unaddressed by current obstetric standards of care. Routine PTSD screening during prenatal care alongside strategies aimed at increasing referral resources and access to mental health services are recommended.

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REDUCING OPIOID EXPOSURE FOR WITHDRAWING INFANTS

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NATURE AND SCOPE OF PROJECT Opioid use in pregnant women contributes to neonatal abstinence syndrome (NAS) and postnatal opioid exposure. Eat, Sleep, Console (ESC) is a protocol that uses nonpharmacologic interventions (NI) before opioid prescription to manage withdrawal, and will replace the current protocol at a large Midwest hospital (5,000 annual births). Postpartum and neonatal intensive care unit (NICU) nurses need to adopt NI as routine care for infants withdrawing before transitioning to ESC. The objectives of the project were to: (1) increase NI to manage neonatal drug withdrawal through staff education, (2) reduce hospital length of stay (LOS), and (3) reduce opioid doses.

SYNTHESIS AND ANALYSIS OF SUPPORTING LITERATURE NI such as swaddling, pacifiers, low stimulation, and low lights reduce infant withdrawal symptoms. Literature also supports breastfeeding, holding, positioning, and rooming-in to reduce LOS, NAS symptoms, and pharmacologic treatment.

PROJECT IMPLEMENTATION This project targeted postpartum and NICU nurses (n = 157) who care for withdrawing inborn infants at least 36 weeks gestation from January 2020 to July 2021. First, nurses were surveyed about current NI use in NAS infants. An electronic educational poster was created to educate nurses on NI based on survey results, and the electronic medical record (EMR) was modified to allow documentation of NI.

EVALUATION CRITERIA Pre-intervention infants (n = 17) and post-intervention group (n = 17) were compared on three outcomes (number of NI used each shift, opioid doses, and LOS) using the Mann-Whitney test.

OUTCOMES There was a statistically significant increase in the number of NI per 12-hour shift ($M_{pre}=1.71$ $SD_{pre}=0.96$, $M_{post}=3.65$ $SD_{post}=1.20$; $u=30.05$, est. $Z=-0.482$, $p<0.001$). There were meaningful decreases in the mean and maximum LOS in hours ($M_{pre}=212.44$ $Max_{pre}=208.07$, $M_{post}=158.07$ $Max_{post}=121.45$) and morphine doses per infant ($M_{pre}=19.94$ $Max_{pre}=236$, $M_{post}=7.41$ $Max_{post}=72$).

RECOMMENDATIONS Educating nurses and modifying the EMR to facilitate NI's shifts the management strategies toward NI use as first-line treatment. Full adoption of ESC as the primary protocol for withdrawing infants should further reduce neonatal opioid exposure.

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CONTENT VALIDITY OF A MEASURE OF PEDIATRIC ACUTE CARE PROVIDERS' KNOWLEDGE, ATTITUDES, AND SKILLS REGARDING MOTHER'S OWN MILK FEEDING

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BACKGROUND: Mother's own milk (MOM) provides optimal infant nutrition, but lack of acute care provider support can be a barrier to continuing MOM in the acute care setting. Acute care providers are focused on care of critically ill children and attention to MOM may not be a priority. A first step in developing interventions to support MOM in the acute care setting is to assess providers' knowledge, attitudes, and skills. Current measures are limited to use with maternal/child and primary care providers. **PURPOSE:** To develop and test the content validity of a measure of MOM knowledge, attitudes, and skills for use with acute care providers. **THEORETICAL FRAMEWORK:** The study was guided by Lynn's methodology for content validity evaluation. **METHODS:** Items were developed from 3 domains and 27 respective competencies for all health care providers (knowledge 11, attitude 11, and skill 5), and 15 competencies for providers caring for women/children from the 2010 US Breastfeeding Committee Core Competencies in Breastfeeding Care and Services for All Health Professionals. The 42 competencies were organized into a matrix and cross-referenced with six maternal/child and primary care provider measures of MOM knowledge, attitudes, and skills. The result was a 58-item acute care provider MOM measure covering knowledge (23), attitudes (19), and skills (16). Items were scored on representativeness (1=not representative to 4=representative) and clarity (yes/no). Responders commented on low representativeness and unclear items. An email with a REDcap© link was sent to 31 providers at one urban acute care setting. Items with a representativeness content validity index (I-CVI) >0.7 (sum experts scoring at 3-4/total number of experts) were considered valid. **RESULTS:** Twenty percent (6/31, nurses) responded. Sixty-nine percent (40/58) of items had I-CVI >0.7. Of the 18 items with a low I-CVI, 12 were retained and modified based on respondent's comments. The final 52-item measure included 19 knowledge, 21 attitude and 12 skill items. **CONCLUSIONS:** The measure demonstrated acceptable content validity. Construct validity and reliability are needed. Once validated, the instrument may be used to assess acute care providers' knowledge, attitudes, and skills and develop interventions to increase MOM continuation in acute care settings.

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SOCIAL DETERMINANTS OF HEALTH AND THEIR ASSOCIATION WITH POSTOPERATIVE OUTCOMES FOLLOWING COLORECTAL SURGERY: A NATIONAL POPULATION BASED STUDY

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INTRODUCTION Colorectal surgeries are among the most common procedures performed in the United States. They are used to treat both benign and malignant disease and postoperative complications are common. Studies have identified many risk factors for poor outcomes, including socioeconomic determinants of health (SDOH). While work to address these disparities is being done on the population and policy levels, a lack of standardized data collection has prevented the use of SDOH to inform care on the patient level. The inclusion of Z-codes in the 10th revision of the International Classification of Diseases (ICD-10) offers the first nationally standardized, codified way to document SDOH in patients' electronic medical records (EMR). This study aims to analyze the relationship between SDOH documented in patients' EMR and colorectal surgical outcomes. **METHODS** This retrospective cohort study used data from an all-payer insurance claims database containing 91 million patients' medical records. Patients who underwent colectomy or proctectomy for benign or malignant disease between 2010-2020 were included. SDOH were identified using ICD-10 Z-codes and their analogous ICD-9 diagnosis codes. The relationships between SDOH, length of stay, and postoperative complications were evaluated using multivariable linear and logistic regression models. **RESULTS** The 30-day postoperative complication rate among all 333,387 patients (mean age, 59 years; 58% female) was 27%. 15,751 (4.72%) of these patients had at least one SDOH in their EHR at the time of their surgery. SDOH were associated with higher odds of 30-day postoperative complications (OR: 1.16, 95% CI: 1.12-1.20), including urinary tract infection (OR:1.27, CI: 1.20-1.35) anastomotic leak (OR: 1.22, CI: 1.16-1.28), pneumonia (OR:1.19, CI: 1.11-1.27), deep vein thrombosis (OR:1.13, CI: 1.02-1.23), sepsis (OR:1.12, CI: 1.07-1.18), disruption of wound (OR: 1.12, CI: 1.03-1.21), and acute kidney injury (OR: 1.04, CI: 0.99-1.10). SDOH were not associated with increased length of stay. **CONCLUSION** SDOH encoded in patients' EMR are associated with worse postoperative complications following colorectal surgery and may help identify high-risk patients preoperatively.

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Harnessing Technology: A Video-based Intervention to Increase Advance Care Planning Knowledge and Readiness to Participate in Middle-aged Adults with Chronic Disease

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Introduction: Mortality increases with age and older adults are disproportionately affected by serious chronic conditions. Therefore, the prevalence of advance care planning (ACP) is much higher among adults ages 65 or older than in younger adults. However, the ACP is beneficial for all adults regardless of their health status. When the ACP is initiated prior to a medical crisis, patients are more likely to receive medical care consistent with their values and wishes. Despite the benefit, very few studies examine ACP engagement in adults ages 45-65 years with chronic conditions. The use of digital technologies can be valuable tools for facilitating APC among younger adults. Therefore, the purpose of this project was to evaluate the effect of a video-based ACP intervention in increasing patient knowledge and engagement in the ACP process. **Methods:** This was a one-group, pretest/posttest study. The Transtheoretical Model of Behavior Change guided the project. The project was implemented at two ambulatory clinics located in the Midwest. Inclusion criteria for the intervention were ages 45-65 years and without documented ACP. Each participant was assigned two ACP videos via their electronic health portal. During routine appointments, the participants were asked to view the videos on a provided tablet. Their knowledge of, engagement in, and readiness for advance care planning were assessed using the Advance Care Planning Engagement Survey (10-items). They completed a semi-structured, post-intervention interview which was conducted via telephone or in-person. **Results:** A total of 11 patients participated in the project. The mean age of the participants was 56.3 years old. The majority were Black or African American and the mean Charlson Comorbidity Index score was three. There was a significant improvement in patient ACP knowledge and readiness after the intervention ($p < 0.05$). **Conclusion:** This project demonstrated that adults younger than 65 with multi-morbidities benefit from earlier engagement in the ACP process using short educational videos. Additional studies are needed to determine whether patients' participation in the video intervention increases their completion of an advance directive.

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PRESSURE INJURIES IN COVID-19 PATIENTS: A TERTIARY CENTER EXPERIENCE

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BACKGROUND: Pressure ulcers continue to severely impact patient outcomes and increase health care costs. We aimed to examine the incidence of pressure ulcers among COVID-19 patients and to identify risk factors associated with pressure ulcer development in this population. We hypothesized that prone position may increase the risk of pressure ulcers. **METHODS:** A retrospective, single-center case-control study was conducted to compare COVID-19 patients who developed new pressure ulcers during their admission between March 2020 and April 2021 to a control group of COVID-19 patients without any new pressure ulcers. Baseline differences among the two groups were examined using chi-square and Fischer's exact test. We then performed logistic regression to examine the association of the collected variables to development of new pressure ulcers. **RESULTS:** 4,608 patients were admitted with a diagnosis of COVID-19 during our study timeline, of which eighty-three (1.8%) acquired new pressure ulcers. Risk factors associated with increased incidence of newly acquired pressure ulcers included increased age, peripheral artery disease, abnormal albumin levels, vasopressor therapy, but not prone position. Development of a new pressure ulcer was associated with readmission to the hospital within 60 days. **CONCLUSION:** The COVID-19 pandemic poses numerous challenges to the healthcare system, including the development of new pressure ulcers in affected patients. We did not find increased incidence of pressure ulcers with prone positioning, likely because of good nursing and pressure reducing techniques. Physicians should be aware of the various risks to patients associated with this novel disease.

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OUTCOMES OF SIMULATION-BASED EXPERIENCES RELATED TO FAMILY PRESENCE DURING RESUSCITATION: A SYSTEMATIC REVIEW

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INTRODUCTION: Family presence during resuscitation (FPDR) remains recommended, yet controversial, clinical practice. Although supported by professional guidelines and family-centered care, FPDR is inconsistently offered due to barriers including lack of clinician knowledge, experience, and confidence. Simulation-based experiences may offer a strategy to address barriers and close the practice gap; however, the evidence has not been appraised and synthesized. This systematic review aimed to describe use of simulation related to FPDR, including modality, simulation components (best practice standards), and outcomes examined. Findings will guide clinicians, educators, and researchers to strategically use simulation to address barriers to offering FPDR. **METHODS:** PRISMA (Preferred Reporting Items for Systematic Review and Meta-analysis) guidelines were followed. A search was performed in PubMed, Scopus, CINAHL, PsycINFO, and Google Scholar. Inclusion criteria were research-based articles, published in English, that included simulation related to FPDR. No exclusions were set on publication date, study design, population, or setting. An author-developed data collection tool was used to describe selected variables, level of evidence, and quality (including risk of bias). **RESULTS:** Seventeen studies were included. Study designs were experimental (5), quasi-experimental (6), non-experimental (2), qualitative (3), and mixed method (1). Modalities included high-fidelity manikins (14), simulated participants (14), and case-based learning (3). Missing simulation components included learning objectives, description of scenario development, and formal prebriefing and feedback/debriefing methods. Outcomes examined were: (a) clinician competencies (13): knowledge, affective (attitudes, beliefs, perceptions), technical performance; (b) practice changes (2); and (c) resource development (2). Study limitations included bias related to small sample sizes, short-term evaluation, inconsistent simulation rigor, and lack of stakeholder (family) involvement in scenario development. Current evidence shows positive effects of simulation related to FPDR on clinician knowledge and affective competencies, practice changes, and resource development. Inconsistent effects on clinicians' technical performance competencies were noted. A limitation of this review is only English language articles were included. **CONCLUSION:** Evidence suggests the benefit of simulation related to FPDR for overcoming clinician competency barriers. There is a need for increased rigor to replicate simulation interventions related to FPDR and to determine long-term effects on clinician competencies and practice changes.

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Medication Use Evaluation of IV Diphenhydramine

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INTRODUCTION Diphenhydramine is a common medication that has many indications including anaphylaxis, itching, rash, or even sleep. There is a lack of guidelines or data regarding the appropriate indications of intravenous (IV) diphenhydramine. A retrospective study was conducted in patients with sickle cell vaso-occlusive crisis receiving IV or oral (PO) diphenhydramine for management of opioid-induced pruritus. The average number of admissions was significantly higher in the IV versus oral group (2.45 vs. 1.20; $p = 0.005$) with average and median length of stay also significantly higher in the IV versus oral group (30.57, 16.0 vs. 10.67, 10d.0; $p = 0.003$). Additionally, patients receiving opioids may request IV diphenhydramine. When combined with IV opioids, IV diphenhydramine has been associated with an increased "high". Due to a lack of data and potential patient requests, we suspect that IV diphenhydramine is being overused. **METHODS** A retrospective cohort study was conducted. IV and PO diphenhydramine orders for 6 months were pulled. Patients were randomized and 25 charts were collected from each arm. Patients who received both PO and IV diphenhydramine and diphenhydramine ordered as part of a premedication order set (such as for IVIG, rituximab, etc.) were excluded. **RESULTS** IV opioids were more frequently administered with IV diphenhydramine compared with PO diphenhydramine (48% vs. 36%). However, PO opioids were more commonly administered with PO diphenhydramine compared with IV diphenhydramine (52% vs. 44%). Insomnia was the most common indication for IV diphenhydramine (22%), followed by pruritus of skin (15%). Pruritus of skin was the most common indication for PO diphenhydramine (52%), followed by insomnia (24%). Fall data was gathered, however zero patients in either arm fell while admitted. If PO diphenhydramine was used instead of IV, it could have resulted in a cost savings of \$12.10. **CONCLUSIONS** IV opioids were more commonly associated with IV diphenhydramine than PO diphenhydramine. Additionally, the most common indications for IV diphenhydramine were insomnia or pruritus of skin. Ideally, IV diphenhydramine would be limited to patients who are NPO or where there is a concern for anaphylaxis. With this information, we hope to suggest specific indications for IV diphenhydramine, decrease costs, and improve patient outcomes.

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HOME SLEEP TESTING FOR PEDIATRIC PATIENTS: ARE CAREGIVERS INTERESTED?

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INTRODUCTION In-lab polysomnography (PSG) is the gold standard in diagnosis of pediatric obstructive sleep apnea (OSA). However, PSG is expensive, cumbersome, and not easily accessible. Home sleep testing (HST) is a reasonable and sometimes mandatory first step in the diagnosis of OSA in adults but not yet recommended for use in children. We investigate patient characteristics associated with caregiver interest in HST over in-lab PSG. **METHODS** Retrospective chart review of all pediatric PSG completed in 2018 at Rush Children's Hospital. Inclusion criteria was completion of pre- and post-PSG questionnaires and baseline PSG. Exclusion criteria was age <2 or >18 and completion of titration PSG. Univariate then multivariate logistic regression analysis was used to determine association of patient characteristics (demographics, PSG indication, co-morbid conditions), caregiver reported patient symptoms, and parent preference for HST (yes/no for: "If available and appropriate, would you prefer an at-home sleep test for your child?"). **RESULTS** Analysis of 136 questionnaires that met inclusion and exclusion criteria. Cohort characteristics include: 41% female (41 of 101), 39% Hispanic/Latino (52 of 134), 18% had prior PSG (23 of 130), 51% seen by ENT prior to PSG (69 of 136), 31% with history of adenotonsillectomy (28 of 90), 42% obese (40 of 95), 9% with ADHD (8 of 87), 38% reported snoring nightly (51 of 135), 26% witnessed apnea (35 of 135), 19% reported gasping/choking episodes (25 of 135), and 24% report of co-sleeping (33 of 136). Of those, majority 60.3% (n=82) preferred in-lab PSG over HST for their child. Those who were completing PSG for pre-operative purposes also prefer in-lab PSG over HST ($p = 0.02$). Alternatively, HST preference was indicated by caregivers who reported that their child had symptoms of gasping/choking ($p = 0.01$) or startle/jumping ($p = 0.046$) during sleep. No differences were found with gender, ethnicity, prior PSG, snoring nightly, apnea, or co-sleeping. **CONCLUSIONS** Most caregivers surveyed prefer in-lab PSG over HST, especially in the preoperative setting. Symptoms of gasping/choking and startle/jumping are associated with an increased caregiver predilection for HST. While HST may be a valuable diagnostic tool in pediatric OSA, parental perceptions of HST may be a barrier to its widespread use.

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Breast Reconstruction Enhanced Recovery After Surgery (ERAS) Nausea and Vomiting Review

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INTRODUCTION Most women diagnosed with breast cancer will undergo surgery as a part of their curative treatment. Postoperative nausea and vomiting (PONV), complications that can negatively impact patient outcomes, have been reported to be as high as 80%. Enhanced Recovery After Surgery (ERAS) protocols are a combination of evidence-based strategies applied to traditional perioperative practices to reduce postoperative complications. ERAS remains underutilized in investigating PONV in breast surgeries. We sought to investigate if the implementation of ERAS in patients undergoing mastectomy with breast reconstructive surgery have a decreased LOS and decreased PONV. **METHODS** Our data set consisted of 138 ERAS cases and 96 non-ERAS controls. All patients were >18 years old and underwent mastectomy with immediate implant or tissue expander-based reconstruction between 2/6/2018-1/23/2020. The non-ERAS group consisted of procedure-matched controls that were not treated under the ERAS protocol since July 31, 2016. We conducted a chart review to gather the following data: migraine history, presence of PONV, length of PONV, duration of operation, total IV fluids, estimated blood loss, LOS, patient smoking status, induction of a pectoral nerve block, administration of Celebrex, IV Tylenol, Gabapentin, Scopolamine patch, and Zofran use post-operatively. **RESULTS** In univariate comparisons, we find presence of post-op nausea, number of days of post-op nausea, LOS and postop use of Zofran are significantly different between ERAS and non-ERAS controls. Patients that underwent mastectomy with immediate reconstruction under the ERAS protocol had significantly decreased postop nausea when compared to the control group (mean 37.5% of controls vs. 18.1% of ERAS, $p < 0.001$). Additionally, ERAS patients experienced shorter LOS and were able to return home more quickly than the control group (1.21 vs 1.49 days, $p < 0.001$). Using a multivariable regression to control for potential confounders, ERAS protocol was associated with less post-operative nausea (odds ratio [OR] = 0.54, 95% confidence interval [CI] 0.13-0.5), length of stay 1 day vs >1 day (OR=0.19, 95% CI 0.1-0.35) and less post-operative Zofran use (OR=0.03, 95% CI 0.01-0.07). **CONCLUSION** Our results indicate that implementation of the ERAS protocol in women undergoing mastectomy with immediate reconstruction does improve patient outcomes in nausea and LOS.

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RMC Summer Research Fellowship

ASSOCIATION BETWEEN PERFLUOROCARBON LIQUID (PFCL) AND OPEN ANGLE GLAUCOMA (OAG) AS A LATE COMPLICATION OF VITRECTOMY

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INTRODUCTION: Vitrectomy is the second most common surgical procedure in ophthalmology after cataract surgery. For many retinal procedures, Perfluorocarbon liquids (PFCLs), like perfluoro-N-octane (PFO), are employed because of their ease of use and ability to unfold and flatten the retina during vitrectomy. Current research has not considered PFO's potential contribution towards the post-operative development of glaucoma. Because modalities known to increase glaucoma risk during the peri/post-operative period (scleral buckle, lensectomy) are used with PFO, it is reasonable to believe the harmful effect of PFO may be masked or wrongfully attributed. **METHODS:** Retrospective chart review of 202 patients (404 eyes) treated with PFO during vitrectomy between 2011-2015. The use of scleral buckle and lensectomy during the peri-surgical period was noted. Progress notes at a minimum 5 years after vitrectomy were reviewed and information on glaucoma, ocular HTN and glaucoma suspect diagnoses, family history of glaucoma, medications, Intra-ocular Pressures, Cup-to-Disc ratios and history of subsequent vitrectomies were collected. **RESULTS:** Eyes treated with PFO during vitrectomy were compared against the fellow eye for the diagnosis of glaucoma, ocular hypertension and glaucoma suspect (combined and referred to as GlaucomaDx). Analysis shows a statistically significant association between GlaucomaDx and the use of PFO during vitrectomy ($p = .0217$). Using a logistic regression model adjusting for lensectomy and scleral buckle, it was determined that eyes treated with PFO at the time of vitrectomy had 11 (95% CI 1.42-85.20) times the odds of developing a GlaucomaDx compared to the fellow eye. Fisher exact test showed that no statistically significant interaction exists between family history of glaucoma and the post-vitrectomy GlaucomaDx in our sample ($p = .4248$). **CONCLUSION:** An association exists between the late development of glaucoma, glaucoma suspects and ocular hypertension and the peri-operative use of PFO. Outside research has shown a relationship between vitrectomy and an increased risk of glaucoma which may limit the strength of the association found in the present research. These findings can help guide clinical decision making on follow up times and help limit preventable blindness. For these reasons, further investigation into the potentially harmful effects are warranted.

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RMC: M2

EVALUATING THE IMPACT OF ROUTINE PHARMACOLOGICAL DILATION ON INTRAOCULAR LENS CALCULATIONS

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INTRODUCTION This study aims to determine the effect of ocular dilation on intraocular lens calculations. Such calculations are normally determined prior to cataract extraction and intraocular lens implantation. As ocular dilation is routinely conducted during complete eye exams, significant results could remarkably change how IOL calculations are conducted. **METHODS** A prospective cohort study was conducted. Patients were recruited from University Ophthalmology Associates, an Ophthalmology clinic at Rush University Medical Center in Chicago, Illinois. Patients between the ages of 55 to 90 upon presentation were included in the study. Patients with bilateral pseudophakia were excluded from the study. Subjects who enrolled and consented for the study underwent ocular biometry and topography using Lenstar LS900 and Atlas Topography 9000, respectively. Tropicamide 0.5% or 1.0% and phenylephrine 2.5% dilating drops were then instilled in the subjects' eyes bilaterally. After 20 minutes, the subjects underwent repeat IOL calculation measurements. **RESULTS** 100 subjects (182 eyes) were recruited. When compared to Lenstar LS900 measurements before dilation, significant increases were found in anterior chamber depth ($p < 0.001$), aqueous depth ($p < 0.001$), white-to-white standard deviation ($p = 0.01$), and steep axis meridian standard deviation ($p = 0.01$) after dilation. When examining Atlas Topography 9000 measurements, there were significant increases found in flat axis meridian ($p = 0.04$) and steep axis meridian ($p = 0.01$) after dilation. No significant differences were observed in IOL calculation or theoretical postsurgical refractive error using Hoffer Q, Holladay II, SRK/T, Olsen, Barrett, and Hill RBF equations before and after dilation. **CONCLUSIONS** Current dogma warns against instilling any medications before IOL measurements. However, no significant differences in IOL calculation or theoretical postsurgical refractive error before and after dilation were demonstrated, despite differences in topographic and biometric measurements. Thus, clinical significance of such principles is limited.

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A REEVALUATION OF THE COMPLICATION RATES AND FOLLOW-UP PROTOCOL OF ND:YAG LASER CAPSULOTOMY

Jacob M. Weber, BS (Rush); Leah R. Greenfield, BS (Rush); Carter N. Do, BS (Rush); Oscar Chen, MD, MS (Rush); Vanee V. Virasch, MD (Rush)

INTRODUCTION Although Nd:YAG laser capsulotomy is a safe and effective treatment for posterior capsule opacification, sight-threatening complications can arise. We aim to reevaluate the complication rate of the Nd:YAG laser capsulotomy and the follow-up protocols after this treatment. **METHODS** A retrospective cohort study was conducted. Patients from two departments at Rush University Medical Center, Rush University Eye Center Physicians and University Ophthalmology Associates, who have undergone Nd:YAG laser capsulotomy between January 1st, 2015 and January 1st, 2021 comprises the study population. Patients were excluded if they were under 18 years of age or did not follow-up within 90 days of the procedure. Study parameters were evaluated prior to procedure and during initial follow-up. Parameters included an association of prior ocular history, prior retinal pathology, prior intravitreal injection, number of spots and energy used during procedure, and refractive error with visual acuity, IOP, and treatment complications including retinal detachment/tear (RD/T), IOL damage, macular edema, macular hole, iris hemorrhage, corneal edema, and uveitis/iritis. Statistical analysis included two sample t-test was used for continuous variables and Chi-squared test or Fisher's exact test were used for categorical variables. **RESULTS** 1214 patients were included in the final analysis. There was no significant difference in clinical outcomes between providers, clinics, gender, and eye. Three parameters were associated with a significant increase in IOP post-procedure: prior intravitreal injections ($p=0.001$), history of retinal detachment and tear ($p<0.001$) and previous laser/retinal surgery ($p<0.001$). There was no significant association between the number of spots applied and energy used, refractive error, or past ocular history involving the macula with an increase in complications. Complication rates of post Nd:YAG laser at an average 42 day follow-up include: RD (2, 0.16%), RT, (1, 0.08%), macular edema (9, 0.74%), macular hole (4, 0.33%), iris hemorrhage (0, 0.0%), corneal edema (3, 0.25%), uveitis/iritis (9, 0.74%), and elevation in IOP (21, 1.73%). **CONCLUSION** In this retrospective study, Nd:YAG laser capsulotomy is a safe procedure where the rates of serious adverse events such as retinal tears and detachments are similar to the general population. Thus routine follow-up with a dilated fundus exam post-YAG laser may not be necessary.

Primary Presenting Author: McKenzie Young, PharmD

Role: Clinical Resident

EVALUATION OF THE EFFECTS OF ANTITHROMBIN III REPLACEMENT DURING ECMO IN NEONATAL AND PEDIATRIC CRITICAL CARE PATIENTS FOLLOWING VIAL-SPARING PROTOCOL IMPLEMENTATION

McKenzie Young, PharmD (Rush); Sara W. Hovey, PharmD (Rush); Mindy Simpson, MD (Rush); Erica Bak, MS (Rush), Taemyn Hollis, MD (Rush); Valerie Kalinowski, MD (Rush); Jessica L. Jacobson, PharmD, BCPS, BCPPS (Rush)

INTRODUCTION Pediatric patients on extracorporeal membrane oxygenation (ECMO) receive systemic anticoagulation to prevent thrombotic complications. Heparin is most commonly utilized for this purpose, which binds to an endogenous molecule, antithrombin III (AT3) to cause systemic anticoagulation. Neonatal populations commonly have low endogenous AT3 activity, which may result in poor systemic heparin response. In pediatric ECMO patients at Rush, exogenous AT3 is administered to improve heparin response. In 2013, a weight-based continuous infusion protocol of AT3 replacement was implemented for all pediatric ECMO patients ("Protocol 1"). In 2016, the protocol was transitioned to a vial-sparing protocol as a cost-savings measure ("Protocol 2"). The purpose of this study is to determine if outcomes are different when comparing the two protocols. **METHODS** This is a single-center, retrospective cohort study approved by Rush IRB. The protocols of AT3 replacement are compared for efficacy, safety, and cost. The primary outcome (efficacy) is the percentage of anticoagulation levels in the therapeutic range. Patient safety is assessed by total exogenous blood product administration and number of thrombotic and/or bleeding events. Cost savings is assessed using the 2021 market value of AT3 and comparing units dispensed per protocol. **RESULTS** Full results including statistical analysis will be presented with final poster; estimated sample size is 50 patients. Preliminary results were collected for 10 patients (n=5 on Protocol 1; n=5 on Protocol 2). For Protocol 1, 47.7% of anticoagulation levels were therapeutic compared to 41.4% of levels for Protocol 2. Patients received average 42.2 mL of blood products per ECMO day for Protocol 1 and 31.6 mL per ECMO day for Protocol 2. Protocol 1 patients spent 95.9% of heparin days on AT3 compared to 54.1% with Protocol 2. A total 28,947.5 units were dispensed on Protocol 1, for total cost of \$1,901.92 per day of AT3. Protocol 2 dispenses were 11,942 units, for total cost of \$1,401.31 per AT3 day. Average cost savings is \$500.53 per patient day of AT3. **CONCLUSION** Based on preliminary data, a vial-sparing AT3 replacement protocol for pediatric ECMO patients has similar outcomes and demonstrates a cost savings of \$500.53 per patient day of AT3.

Primary Presenting Author: Swapnil Shah, Bachelor of Science

Role: Clinical Fellow

EXTENDING ACCESS TO OTOLARYNGOLOGY CARE FOR THE HOMELESS THROUGH TELEMEDICINE

Swapnil V. Shah (Creighton University School of Medicine); Evan A. Patel (Rush University); Ashok A. Jagasia (RMC)

INTRODUCTION: There is a demonstrated need for consistent and reliable access to specialty healthcare for homeless populations. This deficit is especially apparent when considering the prevalence of otolaryngology care. The unique problem calls for an innovative approach that is cohesive and continuous. One possible solution is a telehealth-based, virtual care program for homeless shelters in urban areas. The introduction of telemedicine to homeless populations will allow for significantly improved access to care and lowered costs resulting from the reduced frequency of visits to the emergency room. This type of system for delivering otolaryngology care utilizing both telemedicine and in-person visitation will serve as a model system, which can be later implemented to other specialties.

METHODS: We have launched a virtual care program to improve access to otolaryngology care for the homeless community through Rush University Medical Center and local homeless advocates such as Featherfist Hope Village shelter on Chicago's South Side, with plans to expand to additional shelters as well. The framework of these virtual visits are as follows: a patient-privacy protected computer and kiosk, housed at each respective shelter, will allow residents to undergo regular visits with an otolaryngologist from a large academic center. Although driven by its virtual nature, the model will include periodic in-person visits by a physician.

RESULTS: This type of system for delivering otolaryngology care utilizing both telemedicine and in-person visitation will act as a model system, later translatable to other specialties across the United States. Prominent diagnoses evaluated in this underserved homeless population include allergic rhinitis, sensorineural hearing loss, otorrhea, chronic sinusitis, and rhinorrhea, in addition to multiple requests for dental pain examination.

CONCLUSION: Based on our preliminary information, which we intend to follow up with a larger scale study, our experiences indicate that the addition of telemedicine will be an effective approach in meeting the needs of homeless care in otolaryngology. By doing so, we seek to improve access to health care, reduce overall costs, and provide timely and effective care to the residents of homeless shelters - a vulnerable segment of our society that deserves access to the same resources as their counterparts.

Primary Presenting Author: Abby Blasco, Adult Gerontology Primary Care Nurse Practitioner

Role: Rush Student

CON: DNP

Program Evaluation of A Safe Haven Rush Respite Shelter Unit, a COVID-positive homeless shelter

Abby Blasco (Rush University)

BACKGROUND/SIGNIFICANCE: The CARReS Unit was founded by the Chicago Department of Public Health to address a city-wide need for COVID-positive isolation housing/care for the homeless of Chicago. Since the founding of the CARReS Unit was a crisis response, no program features had been evaluated. The purpose of this DNP project was to perform a comprehensive program evaluation of the CARReS Unit. **PROJECT IMPLEMENTATION:** An extensive literature review, a chart audit of the patients at the CARReS Unit, and review of patient satisfaction surveys were conducted to compile program data. **EVALUATION CRITERIA:** Evaluated outcomes included: utilization rates, number of asymptomatic versus symptomatic patients, top three medical and psychiatric diagnoses, referral rates and types, number of emergency department (ED) visits during the first 3.5 months, reasons for emergency transfers, survival outcomes, and patient satisfaction. **OUTCOMES:** All patients were discharged from the CARReS Unit alive, with 10.59 days being the average length of stay. Average patient age was 48.17 years (SD=15.98); range = 1 to 96 years. The majority (69.8%) of patients were male. Of the 200 patients evaluated, 62.8% were asymptomatic on arrival to the CARReS Unit, but 21.7% later began to show symptoms consistent with COVID-19. The majority of patients (69.5%) had at least one medical diagnosis, and 57.5% had at least one psychiatric diagnosis prior to admission. During their stay, 10.5% had to be transferred to an ED. Patients with two or more comorbidities (hypertension, diabetes, or asthma) had significantly higher risk of being transferred ($\chi^2=10.097$, $df=2$, $p=0.006$). Of all patients, 12.5% were referred to other specialties. Of 46 satisfaction surveys analyzed, 89.1% of patients would recommend the CARReS Unit to others. This first program evaluation of a COVID-positive isolation shelter revealed that all patients survived and most thrived at the shelter with minimal transfers to the ED. **RECOMMENDATIONS:** Patients at this site could have benefited from access to onsite psychological resources. To reduce ED visits, future planning could include a comprehensive monitoring protocol (i.e. increasing vital signs to 4-hour intervals) for patients with multiple comorbidities.

Primary Presenting Author: Brett Boyer, BS

Role: Rush Student

RMC: M3

Racial and Ethnic Disparities of Sudden Unexpected Infant Death in Large US Cities

Brett T. Boyer, Gina S. Lowell MD, MPH, Douglas R. Roehler PhD, MPH, Kyran P. Quinlan MD, MPH Author
Affiliations: Rush Medical College, Chicago, Illinois; Department of Pediatrics, Rush University Medical Center, Chicago, Illinois

INTRODUCTION: Sudden unexpected infant death (SUID) accounts for ~3,400 deaths per year in the United States, and minimal progress has been made in reducing SUID over the past two decades. Nationally, non-Hispanic Black (NHB) infants have twice the risk of SUID compared to non-Hispanic White (NHW) infants. In Chicago, this disparity is greatly magnified. **METHODS:** To explore this, we analyzed SUIDs by race and ethnicity for a seven-year period from the 10 most populous US cities based on 2010 census data (New York, Los Angeles, Chicago, Houston, Phoenix, Philadelphia, San Antonio, San Diego, Dallas, San Jose). **RESULTS:** Nationally, between 2011 and 2017, there were 0.891 SUIDs per 1,000 live births, with a rate of 0.847 for NHWs, 1.795 for NHBs, and 0.522 for Hispanics. In most study cities, the NHB and Hispanic SUID rates were higher than the corresponding national rate. Hispanic SUID rates were higher than NHW rates in 9 of the 10 largest cities. In every study city, the NHW SUID rate was lower than the national NHW rate. Chicago had the highest NHB SUID rate (2.878), and Philadelphia had the highest Hispanic SUID rate (0.891). New York had the lowest SUID rate for all three groups. In Chicago, NHB infants had a SUID rate 12.735 times that of NHW infants -the largest NHB:NHW disparity among study cities. **CONCLUSION:** With few exceptions, the 10 largest US cities had higher NHB and Hispanic SUID rates, but lower NHW SUID rates, compared to the corresponding rates at the national level. This pattern drove disparities by race and ethnicity in these cities. Unlike the national pattern, Hispanic SUID rates were higher than NHW rates in 9 of the 10 largest cities. Prevention is currently hampered by the lack of detailed, accurate and timely information regarding the circumstances of these tragic deaths. Building a national SUID surveillance system would allow a better understanding of the modifiable factors that lead to this huge public health burden with generally higher rates among these minority groups in large US cities.

Primary Presenting Author: Sheryl Cherian, MS

Role: Rush Student

RMC: M2

Factors Promoting Engagement in a Postpartum Home Visiting Service: Family Connects Chicago at Rush

Sheryl Cherian (Rush); Jetashree Kumaravel (Rush); and Dr. Gina Lowell (Rush)

Introduction: According to a 2019 report by Chicago Department of Public Health (CDPH), the maternal morbidity and mortality burden is carried disproportionately by people of color, of higher maternal age, who use public insurance, who had a preterm birth, and who live in areas of high economic hardship, including the service area for Rush University Medical Center (RUMC). To address this burden, CDPH partnered with Rush to implement a universal newborn support service called Family Connects Chicago (FCC) beginning in March 2020. FCC's goal is to equitably reduce negative peri- and post-partum outcomes for birthing parents. FCC offers nurse home visits to all Chicago families within the first 3-5 weeks after birth. The primary outcome of this project is identification of the variables that impact engagement of women in the FCC postpartum home-visiting program. Ultimately, we hope to use the results of this study to help FCC effectively reach high-risk groups. **Methods:** Qualitative study design: Open-ended interviews. **Participants:** Parents (n=16) who gave birth between March 2021-August 2021 who had indicated interest in FCC but did not complete an FCC visit. **Sites:** Interview parent at six-month well-child visit at Rush General Pediatrics. **Methods:** With consent, interview responses were recorded, transcribed, and coded for common themes identifying reasons women chose not to complete an FCC visit. **Results:** Chi-squared tests significant for race, maternal age, insurance payor, gestational age, birthweight, and zip code (n= 1969, p< .05). Post hoc analysis to be done to determine which groups were statistically significant. Chi-squared tests insignificant for mode of delivery, ethnicity, primary language, and gravidity. 16 qualitative interviews have been completed with patients. These interviews will be coded for common themes. **Conclusion:** Our results demonstrate that race, maternal age, insurance payor, gestational age, birthweight, and zip code impacted participants' engagement with FCC services, which is consistent with the variables identified by CDPH affecting maternal morbidity/mortality in Chicago. Our next steps are to use feedback from the qualitative interviews to address these gaps.

Primary Presenting Author: Joseph Dodson, Bachelor's of Science

Role: Rush Student

RMC: M3

STROKE AWARENESS AND IMPACT OF COVID-19 ON LIFESTYLE FACTORS IN THE HOMELESS POPULATION OF CHICAGO

Joe Dodson (Rush) Antonia Santos (Rush) Neli Vasquez (A Safe Haven) Annabelle Volgman, MD (Rush) Neelum Aggarwal, MD (Rush)

INTRODUCTION: Strokes occur every 40 seconds in the United States and are one of the leading causes of preventable death and debilitation for both men and women. Higher stroke mortality rates occur in neighborhoods with larger proportions of black residents and lower median incomes. Some physicians are concerned that risk factors such as physical inactivity and poor diet have worsened in the setting of the COVID-19 pandemic and have led to even higher risk stratification in these populations. This research aims to assess the effects that the COVID-19 pandemic and social isolation have on stroke risk factors. Additionally, we aim to characterize stroke awareness in homeless individuals of Chicago while guiding stroke recognition and response.

METHODS: Surveys and questionnaires were administered to 40 residents at A Safe Haven, a social enterprise serving the homeless. These tools consisted of a 53-item stroke questionnaire to assess stroke awareness, a 46-item COVID survey to assess lifestyle changes, and a 15-item diet screener. Participants were recruited at random from a booth on site.

RESULTS: The majority of those surveyed were black (n=36/40) with most being between the ages of 30-44 (n=33/40). Participants were identified as male (n=18) or female (n=22). Participants endorsed decreased physical activity levels ($m=2.2/5 \pm 1.0$) and increased screen time ($m=3.9/5 \pm 0.8$) since the pandemic. Subjectively worse dietary changes were reported in 78% of participants since the pandemic. Stroke symptom and risk factor awareness were poor in 29% of participants, fair in 40% of participants, and good in 31% of participants. Among those surveyed, 45% agreed they would not be able to recognize a stroke and 55% agreed they would not know what to do if they witnessed a stroke.

CONCLUSION: These data reflect a high prevalence of poor stroke awareness in the homeless population surveyed. Additionally, the results suggest that worsening dietary habits and decreased physical activity levels have become more prevalent among homeless populations in Chicago during the ongoing pandemic. Our goals of promoting healthy lifestyles and raising stroke awareness have become particularly important during this time.

Primary Presenting Author: Yumiko Gely, BS, BHS

Role: Rush Student

RMC: M3

STEPS TOWARDS EQUITABLE ACCESS TO KIDNEY TRANSPLANTS: HEALTHCARE PROVIDER OUTLOOKS AND POLICY CHANGES

Yumiko I Gely BS, BHS (Rush); Nancy Cortes (RT) R, CPhT (U of Chicago); Maritza Esqueda-Medina, BS (Rush); Tricia J. Johnson, Ph.D. (Rush); Elizabeth B Lynch, Ph.D. (Rush); Brittney Lange-Maia Ph.D., MPH (Rush)

INTRODUCTION: Non-citizens, particularly undocumented immigrants, in the United States comprise a large portion of the uninsured. This population faces poorer access to health care than citizens, especially in organ transplantation. Access to organ transplantation is especially inequitable because these patients qualify to be organ donors, however, have few pathways to be recipients without insurance. To address this inequity, several legislative changes and private nonprofit programs in Illinois have attempted to patch together coverage for these individuals. These gaps in coverage not only impact patients but those involved including family and healthcare providers. To address these gaps, the Illinois Transplant Fund (ITF) provides health insurance premium coverage to increase access to kidney transplants. We sought to understand the perspectives of providers/policy stakeholders about caring for transplant patients, including both ITF patients and other non-citizens in need of a transplant.

METHODS: Semi-structured qualitative interviews were conducted following informed consent with 13 medical providers/policy stakeholders involved in kidney transplant programs in the Chicago metropolitan area (n=5; physicians, n=4; community outreach stakeholders, n=4; transplant center professionals). Interviews were conducted virtually via WebEx, audio-recorded, transcribed, and analyzed to identify themes and subthemes. This study was IRB-approved. **RESULTS:** Provider/policy stakeholder participants described barriers that undocumented patients face (subthemes: communication, finances, fear, education/awareness, transportation, social support, current policy, end-stage kidney disease (ESKD) progression, geography), the effects of barriers on patients and their families (subthemes: patient well-being, interpersonal impacts), how these barriers impact their practice, and how those barriers can be overcome by policy change (subthemes: global policy changes and those specific to ITF). Further, participants expressed the benefit of transplantation over dialysis in treating ESKD (subthemes: improved quality of life, improved health outcomes, cost-effectiveness, and healthcare system burden relief). **CONCLUSIONS:** Though substantial efforts have been made to increase access for non-citizen patients in need of kidney transplants by reducing financial barriers, further coverage is needed to address other barriers that affect patient access and the ability of providers to deliver standard of care for patients with ESKD. ITF program expansion and comprehensive legislative policy changes to provide proper access to organ transplantation are recommended.

Primary Presenting Author: Karen Graham, MA, PhD (c)

Role: Rush Student

CON: PhD

CAN ADVERSE CHILDHOOD EXPERIENCES IMPACT COGNITION IN OLDER ADULTS? AN INTEGRATED REVIEW

Karen Lowe Graham, MA, PhD (c)^{1, 2}, Olimpia Paun, PhD, PMHCNS-BC, FGSA, ¹, Todd Ruppap, PhD, RN, GCNS-BC, FAHA, FAAN ¹ ¹ - Rush University College of Nursing ² - Rush Alzheimer's Disease Center

INTRODUCTION • In 1998, Adverse Childhood Experiences (ACEs) were defined as traumatic childhood events experienced between birth and age 18 that vary in severity and may regularly occur in a child's family or home. 1. Abuse (emotional, physical, and sexual), 2. Household challenges (domestic violence, substance abuse, mental illness, divorce, incarceration), and 3. Neglect (emotional and physical) • From 2000 to the present, the definition of ACEs was expanded to include community-related traumatic events (e.g. gun violence, poverty/low socio-economic status, bullying, community-level stressors, history of enslavement). • However, research has not been synthesized on the associations between ACEs and cognitive changes among the older Blacks.

METHODS Several databases were searched initially using the MESH terms "older Blacks", "African Americans" and "ACEs". The search was later expanded to "older African Americans", "adverse childhood experiences" and "Alzheimer's Disease". This approach garnered 256 articles with ten hand-searched studies added. Inclusion criteria for articles were a) Must focus on cognitive effects of ACEs on older adults, b) English language and peer-reviewed, c) published between 2008 and 2020, d) samples consisting entirely of Blacks or mixed samples including Blacks, e) samples consisting of adults only, and f) full-text articles. Articles focusing exclusively on biological and/or genetic concerns were excluded.

RESULTS Of the 266 articles identified, 11 were excluded as duplicates, 133 were excluded after title review, 7 articles were excluded because of child and adolescent samples, and 102 articles were excluded because they did not focus on cognitive effects of ACEs. 13 articles were identified and eligible for this review. Findings indicate that four ACEs, physical, sexual, and verbal abuse along with low socio-economic status, are associated with impaired cognition in older African Americans.

CONCLUSION There is a need for more studies to assess ACEs in racially and ethnically diverse older adults (and not just in children/young adults). Healthcare providers should regularly assess ACEs among older African Americans at annual check-up visits to identify those at the highest risk for impaired cognition. Findings from this study underscore the continued need for culturally-informed and historically-grounded approaches to support healthy aging research within African American communities.

Primary Presenting Author: Aden Hassan, BS

Role: Summer Research Program (2021)

Westside Walk for Wellness

Combatting Inequities in Chronic Disease with Support from Residents of West Garfield Park and an Emphasis on Modifiable Risk Factors

Aden Hassan (RMC), Sheila Dugan (RMC), Diana Weldegiorgis (RMC)

Introduction: Chronic conditions including diabetes, heart disease, and cancer have become increasingly prevalent in our society, making up ten out of the fifteen leading causes of death. It is estimated that around 50% of adults in the United States live with at least one chronic disease, while 26% have two or more. Further exacerbating the problem, is the state of health disparities in the US, where African Americans suffer from chronic disease and premature death at a higher rate than their white counterparts. In Chicago's West Garfield Park neighborhood, life expectancy is lower than the city's average. Chronic conditions such as diabetes, hypertension and obesity are also more prevalent in West Garfield Park. This study will examine the effectiveness of group walking, discussions on health, and community collaboration on self-efficacy in relation to regular exercise. Aims: 1) To assess the impact of collaborative initiatives with underserved communities on regular exercise 2) Facilitate a community experience where residents of West Garfield Park can establish a long-term exercise routine 3) Introduce the community to a group of physicians from underrepresented backgrounds Methods: The Westside Walk for Wellness ran every Saturday for 6 weeks in the Summer of 2020. Each week featured a discussion with a physician, covering a certain health topic. Participants walked around a public place of their choice via Zoom, while interacting as a group. The first week's walk had an initial duration of 30 minutes. Each consecutive walk's duration increased by 10 minutes. We obtained data before and after the 6-week program to measure participant's self-efficacy to continue regular exercise in the face of barriers as well as overall satisfaction with the program. Self-efficacy was measured using the 9-item Self-Efficacy for Exercise (SEE) scale (Resnick, 2000). Results: The average SEES score of all participants increased at the end of the 6-week program when compared to initial scores. Conclusion: Community initiatives with a strong emphasis on collaboration, such as the Westside Walk for Wellness, can positively impact self-efficacy in regards to motivation for physical activity.

Primary Presenting Author: Jetashree Kumaravel, MD

Role: Rush Student

RMC: M2

Exploring Factors Promoting Engagement in a Postpartum Home Visiting Service: Family Connects Chicago at Rush

Jetashree Kumaravel, Sheryl A. Cherian

INTRODUCTION: According to a 2019 report by Chicago Department of Public Health (CDPH), the maternal morbidity and mortality burden is carried disproportionately by people of color, higher maternal age, on public insurance, with a preterm birth, and living in areas of high economic hardship, including the service area for Rush University Medical Center (RUMC). To address this burden, CDPH partnered with Rush to implement a universal newborn support service called Family Connects Chicago (FCC) beginning in March 2020. FCC's goal is to equitably reduce negative peri- and post-partum outcomes for birthing parents. FCC offers nurse home visits to all Chicago families within the first 3-5 weeks after birth. The primary outcome of this project is identification of the variables that impact engagement of women in the FCC postpartum home-visiting program. Ultimately, we hope to use the results of this study to help FCC effectively reach high-risk groups. **METHODS:** This is a retrospective cohort study. **Participants:** Birthing parents who delivered at RUMC from March 2020 to June 2021 (n=1969). Participants who completed an FCC visit were compared with those who did not. The groups were assessed for differences based on race, ethnicity, zip code, maternal age, birth weight, gestational age, mode of delivery, primary language, gravidity, and insurance payor using chi-squared tests. **RESULTS:** Chi-squared tests significant for race, maternal age, insurance payor, gestational age, and zip code (n= 1969, $p < .05$). Post hoc analysis to be done to determine which groups were statistically significant. Chi-squared tests insignificant for mode of delivery, ethnicity, primary language, birthweight, gravidity. 16 qualitative interviews will be coded for common themes. **CONCLUSION:** Our results demonstrate that race, maternal age, insurance payor, gestational age, and zip code impacted participants' engagement with FCC services. Our next steps are to use feedback from qualitative interviews to address gaps.

Primary Presenting Author: Sonia Mehra, Bachelor's degree (BA) in Neurobiology and Behavior

Role: Rush Student

RMC: M3

ENHANCING SOUTH ASIANS' AWARENESS OF CVD, STROKE AND DEMENTIA: PREVENTION THROUGH A LIFESTYLE EDUCATION PROGRAM WITH THE SOUTH ASIAN COMMUNITY IN CHICAGO DURING THE COVID ERA

Sonia Mehra (Rush Medical College) Annabelle Santos Volgman, MD, FACC, FAHA (Department of Internal Medicine, Section of Cardiology, Rush Heart Center for Women) Neelum T Aggarwal, MD (Departments of Neurological Sciences, Rush Alzheimer's Disease Center, Rush Heart Center for Women)

INTRODUCTION There is a well-established relationship between cardiovascular disease (CVD) and cognitive decline. Recognizing the CVD risk factors has encouraged the use of lifestyle modification interventions, which have been very successful. This project aims to implement and assess the feasibility and acceptance of a cognitive health and wellness education program in a community- based setting, focusing on South Asians, a community with known high rates of CVD. **METHODS** This study was delivered during the COVID-19 pandemic and as such all delivery was by Zoom. Participants ages 55 and older took part in a virtual six-week educational and dance program based on research that supports a multimodal approach to lifestyle intervention. The weekly 1- hour meetings included topics such as physical exercise, nutritional counseling as well as cognitive and social stimulation. The discussions encouraged participants to self-manage their health and addressed barriers faced by the South Asian audience. The delivery of the programming including the dance instruction were by team members who were of South Asian descent. At the start and end of the program, participants filled surveys regarding their diets, the impact of COVID-19 on behavior as well as awareness of the risk factors of CVD, dementia and stroke. **RESULTS:** Five participants were included in this pilot study. Between 3-5 participants attended each session. At the completion of the program, participants had improved feelings of using the knowledge they learned to make lifestyle differences in the way of eating ($p=0.0516$) and physical activity level ($p= 0.0294$) Two participants also agreed to further screening for a national non-pharmacological lifestyle clinical trial known as the U.S. POINTER. **CONCLUSION:** Preliminary data from this small pilot suggests that community members who attended presentations focusing on South Asian health, gained a greater understanding of CVD risk factors, stroke and risk for cognitive impairment and dementia. Despite the high prevalence of such illnesses in South Asians, current research has not examined the feasibility of a combined educational - physical activity (dance) program like ours. By offering culturally sensitive programs in widely accessible formats, increased representation of these groups may be included in nationally based studies.

Primary Presenting Author: Chelsea O'Malley, DNP

Role: Rush Student

CON: DNP

Community-Based Initiative to Improve Medication Adherence In a Bilingual Senior Center

Pamela Semanik, PhD, APN

Nature/Scope of the project: Approximately 50% of medications prescribed in the US are not taken as ordered. Medication non-adherence is complex and threatens overall health. Older adults at the Southwest Regional Senior Center (SRSC), an urban bilingual senior center in Chicago, are particularly vulnerable due to polypharmacy and comorbidity. The SRSC promotes evidence-based healthy living through wellness programs, but there is no program addressing medication adherence. Synthesis and analysis of supporting literature: Medication nonadherence costs the U.S. healthcare system \$100-\$300 billion annually. Nonadherence costs are especially high for older adults, often burdened by multiple comorbidities, poor health literacy, and low income. In a community setting, curriculum-based modular interventions have been shown to improve medication adherence, especially in bilingual individuals. Project Implementation: SRSC Seniors were recruited for an evidence-based modular intervention through poster advertisements and announcements by the project leader on-site. Modules on chronic disease, barriers to adherence, side effects, resource utilization, and habit-based/written reminders were presented in both English and Spanish during each of six 1-hour sessions. Evaluation Criteria: The Iowa Model for Evidence-Based Practice guided assessment of community needs, problem identification for literature synthesis, and allowed for stakeholder collaboration. Medication adherence was measured pre- and post-intervention using the Hill-Bone Compliance Scale, a Likert-type assessment adapted to an 8-item subscale for this project. Medication compliance knowledge was assessed pre- and post-intervention using the CardioSmart quiz (American College of Cardiology). Measures were translated to Spanish. Demographics were assessed via AHRQ survey and attendance logs tracked participation during the intervention. Outcomes: Sixteen participants enrolled (mean age =64 years, 56% male, 46% Spanish-speaking, mean class size = 7). Hill Bone Compliance Scale mean scores improved from 25.8 to 11.2 by reverse scoring (SD =10.3). A dependent sample t-test showed this difference in means to be significant [t (9.504) p <0.05]. Mean scores in Cardiosmart knowledge assessment increased from 3.88 to 7, a 58% improvement (SD=2.2). Recommendations: This evidence-based community intervention for bilingual participants produced noted improvements in medication adherence/knowledge. In addition, participants showed an increased ability to collaborate with care providers, comply with medication regimens, and identify side effects. Due to

Primary Presenting Author: Ayesan Rewane, MD

Role: Rush Student

CON: Masters

DISABILITY-FREE SURVIVAL IN COMMUNITY-DWELLING OLDER AFRICAN AMERICANS BY SEX

Ayesan Rewane, MD (Rush, BH-UAMS); Raj C. Shah, MD (Rush); Bryan D. James, PhD (Rush); Crystal M. Glover, PhD (Rush); Ana W. Capuano, MPS, MS, PhD (Rush); Lisa L. Barnes, PhD (Rush); and Jennifer Naylor, PhD (BH-UAMS)

INTRODUCTION: The disability-free survival (DFS) of older African Americans (AA) by sex is currently unknown. This study examined the relationship between the sex and DFS (survival without dementia and persistent disability of activities of daily living (ADL)) of older community-dwelling AA adults.

METHOD: DFS was computed by combining three indicators; dementia, death and persistent disability of ADL using data from the Rush IRB approved Minority Aging Research Study (MARS). The MARS participants are 65 years and older and were dementia-free at the time of enrolment. All participant self-reported their race as AA and sex using male (man) or female (woman) respectively. A discrete-time proportional hazard modeling was used to assess the relationship between sex and survival time for DFS, that is, time until either an event of disability, dementia or death occurs.

RESULT: The total sample included 771 participants, comprising 595 women and 176 men. The average age of the participants was 72.9 (SD=5.9) years. Forty-one percent (41.9%) did not have DFS (that is had an event) after a mean follow-up period of 4 years. There were significantly more men with an event compared to women (48.7% vs. 37.9%, $p < 0.0001$). Furthermore, older AA women had a greater likelihood of disability-free survival compared to men. AA women have an excess median disability-free survival of one year compared to AA men (log rank $p < 0.001$). Also, higher income, more years of education, a non-smoking lifestyle, and life space utilization were independently associated with higher DFS. This study is limited due to the small sample size, a larger number of females than males, short duration of follow-up. The lack of other variables such as access to care or health insurance and living situation (e.g., alone, with family, etc.) may also play a role in DFS.

CONCLUSION: This study fills a gap in minority aging research by examining the sex differences in factors associated with dementia and disability and death in older AA. Future research should carefully explicate other factors such as the severity of the disability that may confound or modify the relationship between sex and DFS among older AA adults.

Primary Presenting Author: Yiqi (Anabelle) Lin, BA in Neuroscience and BS in Health Promotion and Disease Prevention

Role: Rush Student

RMC: M3

EXTERNAL VALIDATION OF A MACHINE LEARNING CLASSIFIER TO IDENTIFY UNHEALTHY ALCOHOL USE IN HOSPITALIZED PATIENTS

This research was supported, in part, by the following: National Institute on Alcohol Abuse and Alcoholism (K23-AA024503 to Majid Afshar); National Institute on Drug Abuse (R01-DA04171 to Niranjana S. Karnik, UG1-DA049467 to Majid Afshar and Niranjana S. Karnik, and R01-DA051464 to Majid Afshar and Niranjana S. Karnik); National Center for Advancing Translational Sciences (UL1-TR002389 to Majid Afshar and Niranjana S. Karnik and KL2-TR002387 to Niranjana S. Karnik); and Agency for Healthcare Research and Quality (K12-HS026385 to Hale Thompson). The authors have no other conflicts of interest to report.

BACKGROUND AND AIMS: Unhealthy alcohol use (UAU) is one of the leading causes of global morbidity. A machine learning approach to alcohol screening could accelerate best practices when integrated into electronic health record (EHR) systems. This study aims to externally validate a natural language processing (NLP) classifier developed at an independent medical center. **DESIGN:** Retrospective cohort. **SETTING:** The site for validation is a Midwest tertiary-care, urban medical center that has an inpatient structured universal screening model for substance misuse and an active Addiction Consult Service. **PARTICIPANTS/CASES:** Unplanned admissions of adult patients between October 23, 2017 and December 31, 2019, with EHR documentation of manual alcohol screening were included in the cohort (N=57,605). **MEASUREMENTS:** The Alcohol Use Disorders Identification Test (AUDIT) served as the reference standard. AUDIT scores ≥ 5 for females and ≥ 8 for males served as cases for UAU. To examine error in manual screening or underreporting, a post-hoc error analysis was conducted, reviewing discordance between the NLP classifier and AUDIT-derived reference. All clinical notes excluding the manual screening and AUDIT documentation from the EHR were included in the NLP analysis. **FINDINGS:** Using clinical notes from the first 24 hours of each encounter, the NLP classifier demonstrated an Area Under the Receiver Operating Characteristic Curve (AUCROC) and Precision-Recall Area Under the Curve (PRAUC) of 0.91 (95% CI, 0.89-0.92) and 0.56 (95% CI, 0.53-0.60), respectively. At the optimal cut point of 0.5, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) was 0.66 (95% CI, 0.62-0.69), 0.98 (95% CI, 0.98-0.98), 0.35 (95% CI, 0.33-0.38), and 1.0 (95% CI, 1.0-1.0), respectively. **CONCLUSIONS:** External validation of the alcohol misuse classifier demonstrated adequate sensitivity and specificity for routine clinical use as an automated screening tool. The trained classifier is publicly available and may assist hospital systems in identifying at-risk patients.

Primary Presenting Author: Atlas Pilchen, High School Student

Role: Summer Research Program (2021)

Whitney Young Senior Experience

BODIES AND BLUE-COLLAR OCCUPATIONS: BIDIRECTIONAL RELATIONSHIPS

Atlas Pilchen, Lillian Tan; Katerina Newman (Rush); Melissa M. Crane (Rush)

INTRODUCTION Men who work in blue-collar occupations, such as manufacturing and construction, are at high risk for obesity and comorbid conditions. However, this group often is not often represented in research focused on health promoting activities and little is known about how they view their health as it relates to their occupations. This study aims to understand the bidirectional relationship between bodies and work. **METHODS** Synchronous remote interviews with 20 men (age: 43 ± 13 years, $M \pm SD$) working in blue-collar occupations (50% construction, 25% transportation, 25% manufacturing) were transcribed and coded using content analysis focused on summary themes developed and discussed by the authors. **RESULTS** Most participants identified the effect of work on bodies by describing how fatigue ("By the time I get off work, I'm so exhausted, the last thing I think about is my diet"), food availability ("You're always eating out...just because of time or wherever you happen to be), and stress ("Maybe it's because the stress of work makes you...gain weight by eating or just not taking care of yourself") negatively impact their diet, physical activity, and weight control. Participants also noted that physical activity levels at work ("I never had to go to the gym. It was just normal working jobs that kept me thin") and scheduling ("I feel like there's not enough time in the day and I have to get myself ready [for] tomorrow") impact their consideration to exercise outside of work. Some men also acknowledged the effects of weight and image on their work both in a physical sense ("I know that if I was 50 pounds lighter, I would be able to move around better"), and regarding employment opportunities ("If a person is overweight, they don't give you the job"). The experiences of those working as truck drivers ($n= 5$) were significantly different from other professions and will be presented separately. **CONCLUSION** The results from this study indicate that men working in blue-collar occupations view work as adversely affecting their bodies. Future research should focus on how to target these perceptions to engage this group with health promotion messaging.

Primary Presenting Author: Kristen Raue, BS

Role: Rush Student

RMC: M3

BI-SPECIFIC NATURAL KILLER CELL ENGAGER (BIKE) AGAINST IL13RA2-POSITIVE GLIOMAS

Kristen Raue, BS (Rush University); Arushi Tiwari (Northwestern University); Markella Zannikou, PhD (Northwestern University); Joseph Duffy, MS (Northwestern University); Rebecca Levine, BS (Northwestern University); Yekaterina Galat, PhD (Lurie Children's Hospital); Vasil Galat, PhD (Lurie Children's Hospital); and Irina Balyasnikova, PhD (Northwestern University)

INTRODUCTION: Glioblastoma (GBM) is the most aggressive adult brain tumor with a dismal prognosis despite maximal surgical resection, radiation, and chemotherapy. The immune system can be harnessed to improve outcomes in GBM. Natural killer (NK) cells are innate lymphoid cells that possess a powerful ability to kill cancer cells through antibody-directed cell cytotoxicity. We, therefore, engineered a bi-specific natural killer cell engager (BiKE), a fusion protein comprising of a single-domain CD16 (sdCD16) binding FcγRIII (CD16) on NK cells, an interleukin-15 crosslinker, and an interleukin-13 receptor $\alpha 2$ (IL13R $\alpha 2$) expressed by glioma cells, to assess the molecule as a therapeutic option for GBM.

METHODS: The cDNA encoding for a codon-optimized BiKE protein was synthesized and subcloned in the pLVX-IRES-zsGreen1 vector. HEK293T cells were transduced with lentiviral particles to generate recombinant BiKE protein. We performed a screening of temperature (32 vs. 37°C) and serum conditions (10% vs. 1% FBS vs. serum-free media) to determine an optimal production of BiKE with 32°C and 10% FBS culture conditions found to be optimal. HisPure columns were utilized to purify BiKE protein from supernatants. Using ELISA, we demonstrated that BiKE binds to the target IL13R $\alpha 2$. Pluripotent stem cell (iPSC)-derived NK cells were co-cultured with either patient-derived GBM6 glioma cells, U87 neurospheres, or U87 organoids in the presence of BiKE or negative control (sdCD16). The Sartorius Incucyte System and flow cytometry were used to assess the cytotoxic effect of NK cells on cancer cells and surface activation markers on NK cells. **RESULTS:** The enhanced killing of GBM6 tumor cells and U87 spheroids by NK cells in the presence of BiKE was observed in comparison with NK cells alone ($n = 3$, $p < 0.01$) and negative control ($n = 3$, $p < 0.01$). BiKE activated NK cells as judged by an increase in NKp46+ and CD25+CD69+ in both U87 spheroids and U87 organoids co-culture systems ($n = 3$, $p < 0.05$). **CONCLUSIONS:** In conclusion, we demonstrated for the first time that BiKE successfully engages NK cells to destroy IL13R $\alpha 2$ -positive glioma cells. Future implementation of BiKE in a mouse model of GBM will provide valuable input on its therapeutic potential for GBM.

Primary Presenting Author: Johanna Balas, BS

Role: Rush Student

RMC: M3

CONSTRUCTING A VIRTUAL REALITY TRAINING CURRICULUM FOR CNAS PROVIDING CARE FOR PERSONS WITH DEMENTIA DURING THE COVID-19 PANDEMIC

Johanna S. Balas, BS (RU); Andrew Oreshkov, BS (RU); Emily Broman Phelps, MS (Mount Sinai Hospital); Ghausia A. Ludwig, M.A (Rush Alzheimer's Disease Research Center); Crystal M. Glover, Ph.D. (Rush Alzheimer's Disease Research Center); Carrie Shaw, MS (Embodied Labs); Erin Washington, MM (Embodied Labs); Annabelle Santos Volgman, MD (RU); Debra Fleischman, Ph.D. (Rush Alzheimer's Disease Research Center); Neelum T. Aggarwal, MD (RU)

INTRODUCTION: Certified nursing assistants (CNAs), the majority of whom are workers of color, immigrants, and women, provide most of the hands-on care in nursing homes. Despite providing the majority of care, CNAs are among the most under-resourced workers facing significant risk during the COVID-19 pandemic. Virtual reality (VR) provides a unique learning opportunity for CNAs to experience the conditions of their patients from a visceral first-person perspective. Given their essentiality, it is critical to support CNAs during the COVID-19 pandemic. The purpose of this pilot study is to provide CNAs with a multidimensional socially distanced space to strengthen their knowledge and confidence in caring for persons with dementia (PWD). **METHODS:** Chicago Methodist Senior Services (CMSS) CNAs were recruited (N=7; 86% female, 86% Black) for a seven-week online training program consisting of 1.5-hour classes per week. Each class included a didactic lecture and an Embodied Labs VR module depicting the first-person experience of dementia. Two focus groups were conducted and recorded via Zoom before (N=7) and after (N=5) the program. Qualitative content analysis of recordings and transcripts was reviewed and analyzed. Based on data limitations, high-level findings were reported. **RESULTS:** Results from the pilot qualitative focus groups suggest pairing the virtual reality experience with didactic lectures allowed CNAs to further their knowledge and understanding of dementia. Focus group respondents shared that the VR module allowed them to relate to patients in a more empathic manner and implement new strategies to engage with nursing home residents. As the CNAs' knowledge of dementia grew, they reported that they began to take a more holistic approach to care. **CONCLUSION:** Combining traditional didactic lectures with a VR-based curriculum provides the opportunity for socially-distanced multidimensional learning and peer support for CNAs, which is critical for frontline workers caring for PWD. The VR module gave CNAs an opportunity to strengthen their knowledge and change their perspectives on caring for a highly vulnerable population. Limitations of this study include the lack of a sampling plan and concentrated sampling. Future suggestions to allow for a more detailed qualitative report include sampling algorithms, consistent use of an interview guide, and formal qualitative training for interviewers.

Primary Presenting Author: Emma Brennan, BA

Role: Rush Student

RMC: M2

Identification of and Care for Victims of Human Trafficking: A Trauma-Informed Care Approach

Emma Brennan (RMC); Nupur Shah (RUMC)

INTRODUCTION: Human trafficking (HT), defined as the use of force, fraud, or coercion for the purpose of labor or sexual exploitation is a substantial public health problem. Up to 87% of rescued trafficking victims had encounter(s) with a health care provider while they were actively being exploited, making the healthcare system an invaluable point of intervention. Despite this, few medical schools offer education on this topic. The goal of this training was to raise medical students' confidence in recognizing HT red flags, empathetically responding to HT disclosures, and restoring patient autonomy while avoiding re-traumatization. **METHODS:** 127 fourth-year medical students at Rush Medical College attended a 2-hour session consisting of didactic lectures by two expert speakers, followed by a small- and large-group discussion guided by a patient vignette. Students completed anonymous pre- and post-surveys featuring eight Likert-scale questions that assessed confidence in detecting red flags and in providing trauma-informed care to trafficked patients. Paired t-test was used to compare pre- and post-survey responses. **RESULTS:** Of the 127 attendees, 85 pre/post surveys were matched with unique identifiers and used for analysis. The results demonstrated significant improvement in all the metrics we assessed for human trafficking red flags and trauma-informed care delivery. **CONCLUSION:** The training significantly improved medical student comfort in caring for HT victims across all collected metrics. This training can be easily reproduced at other institutions to address the important topic of HT in a trauma-informed context, which is frequently omitted from healthcare worker education. Training healthcare workers on identifying victims of HT and teaching trauma-informed care principles can improve our efforts in aiding this disadvantaged population. Table 1 can be provided for further consideration.

Primary Presenting Author: Stephanie Erickson, BA

Role: Rush Student

Dean's Summer Fellowship

ASSESSING COMMUNICATION QUALITY IN PROVIDER-DECISIONMAKER INTERACTIONS IN THE INTENSIVE CARE UNIT

Stephanie Erickson (RMC), Serafino LaGalbo (RMC), Nicole Siparsky (RMC - Surgery)

BACKGROUND: Achieving successful shared decision-making and bidirectional communication in the intensive care unit (ICU) can be challenging. Many providers do not achieve proficiency in communication during training. A study was designed to identify specific communication skill deficiencies through observation in the ICU. **METHODS:** Twenty-three providers were recruited from medical and surgical ICU services at Rush University Medical Center's Adult ICU. This observational study evaluated providers' communication skills across eight domains during encounters with decisionmakers: nonverbal communication, verbal communication, opening the discussion, gathering information, understanding the family's perspective, sharing information, reaching agreements on problems and plans, and providing closure. When a provider engaged with a decisionmaker, an observer assessed their communication skills using a Likert Scale observational tool. Providers were aware they were being observed but were unaware of the skills being assessed. **RESULTS:** Thirty-nine daytime conversations were observed across 6 attending physicians, 4 fellows, 8 residents, and 5 advanced practice providers. Training stage was not found to be a significant marker for communication skill. Of observed conversations, 19 took place with a dedicated critical care provider, and 20 took place with an individual rotating in the ICU (e.g. resident) or serving as a consult (e.g. cardiology). No significant difference was found in the communication skills displayed between these two populations. Factor analysis revealed two factors: unidirectional and bi-directional communication skills. A "proficient" communication skill was reflected as a 4 or 5 on the communication matrix. Less than half of conversations saw proficient levels of communication in domains associated with bi-directional communication. The percentage of conversations with observed proficiency: nonverbal communication (64.1%), verbal communication (69.23%), opening the conversation (33.34%), gathering information (46.16%), understanding the family's perspective (38.46%), sharing information (41.03%), reaching agreements (38.46%), and closing the encounter (38.46%). Scheduled goals-of-care conversations (n=14) had significantly higher average communication scores than unscheduled encounters (n=25). **CONCLUSION:** Providers commonly demonstrate superficial, unidirectional communication skill in communication with decisionmakers; they are less proficient at advanced communication skills. Providers should have more scheduled conversations focused on bidirectional communication at scheduled times, which was most productive. A targeted curriculum addressing these areas may dramatically improve patient/decisionmaker/provider satisfaction.

Primary Presenting Author: Karolina Gawron, Bachelors Degree of Psychology, OTD Student

Role: Rush Student

CHS: Clinical Doctorate

EMBRACING DIFFERENCE: A SCOPING REVIEW OF THE USE OF UNIVERSAL DESIGN FOR LEARNING IN GRADUATE ALLIED HEALTH & MEDICAL SCHOOLS

AUTHORS: Karolina Gawron, Madison Tomlinson, Nicole Mohan & Laura Vanpuymbrouck

PURPOSE: Scholarly sources have highlighted the need for universal design for learning (UDL) implementation in allied health and medical education however very few have actually implemented the framework into graduate curriculum to discover the benefits to student learning. The purpose of this study is to identify gaps in the research on UDL in higher education which might then be used to inform future researchers on the necessity of further evidence. **DESIGN:** This study conducted a scoping review on the use of UDL in allied health and medical programs. Inclusion criteria: articles that either implemented the UDL framework in medical or allied health education and demonstrated outcomes or identified and described the need for UDL in these programs. Exclusion criteria: (a) studies conducted outside of the United States, (b) lower-level education, (c) non-medical graduate level or non-allied health graduate programs, (d) omitted UDL implementation outcomes, and (e) non-peer-reviewed articles. **METHOD:** This study followed the Arksey and O'Malley (2005) methodological framework. We used the following search engines: PubMed, CINAHL Complete, ERIC, GoogleScholar, and Scopus. Data analysis involved using Covidence to organize the articles found and used in the study throughout the screening and full-text reviews. The articles that were accepted through the screening process based on their title and abstracts were then analyzed based on the full-text. An agreement between 2 out of the 3 researchers was needed to include the research article in the scoping review. **RESULTS:** Twelve studies were deemed eligible based on criteria. Findings identify a need for UDL in these programs but the research regarding the actual implementation of this framework into medical and allied health programs is lacking and requires additional research evidence. Findings provide a list of recommendations to further the reach of the UDL framework in these programs. **CONCLUSION:** Few articles have examined the impact of UDL implementation on supporting students in higher education. Much of the evidence found on the use of UDL in medical and allied health graduate-level programs is based on observations and professional perspectives. Future research is recommended to examine the acceptability, feasibility, and utility of UDL in higher education.

Primary Presenting Author: Jasmine Ginn, MD

Role: Clinical Fellow

Patient Perspective Taught Through Use of High-Fidelity Simulation and Embedded Learners

Jasmine S. Ginn, MD (Rush; Presenting Author) Jerome Martin, MD (Rush; Author) Leah Brodsky (Rush; Author) Mary H. Walcott (Rush; Author) Kendrick Brown (Rush; Author) Sara Hock, MD (Rush; Author)

INTRODUCTION Unlike many technical skills learned in medical training, empathy is not readily taught through memorization, but can be thought of as an inherent personal trait which can be strengthened and modified through repetition and practice. This study aims to demonstrate a method for the experiential learning of empathy and patient perspective by combining high-fidelity simulation with role play using medical students in their pre-clinical years of training as "embedded learners". **METHODS** This study was conducted as part of a pilot high-fidelity simulation program. During predetermined cases, students were given background information to play the role of the patient or the part of a caregiver, either as a family member, close friend, or member of the physician team. Students portraying the patient were also placed on a simulated monitor, provided simulated intravenous access, and administered mock medications and therapies. Participants were asked to complete both a pre- and post-survey. We included the Toronto Empathy Questionnaire (TEQ), a validated self-assessment tool to measure empathy, in both surveys. Questions targeting knowledge gained and overall satisfaction were included in the post-survey only. Descriptive statistics and t-test analysis were used to analyze the data. **RESULTS** A total of sixty-one participants were included in this study to date, with 56% completing at least one survey given the day of their participation. Data from the pre-survey revealed 85% of respondents scored higher than normal levels of empathy on the TEQ prior to participation in the simulated event, with this increasing to 88% following the scenarios. Of respondents, 97% felt they obtained practice changing information after participating. Common themes in post-survey feedback included those revolving around communication and how patient-centered awareness could significantly improve the physician-patient relationship for students as they proceed through training. **CONCLUSION** Based on the responses provided in this study, high-fidelity simulation and the employment of embedded learners can be implemented as a method of teaching patient perspective and improving the less easily taught emotion of empathy. Most students surveyed found the experiential learner experience useful, while the same number of respondents stated they would recommend this simulation program to others of similar levels of training.

Primary Presenting Author: Michelle High, MSN

Role: Rush Student

CON: PhD

PARENT EDUCATION PROGRAMS FOR CHILDREN WITH MEDICAL COMPLEXITY: AN INTEGRATIVE REVIEW

Michelle High, MSN, RN, CNL, CPN (Rush), Wrenetha A. Julion, PhD, MPH, RN, FAAN, CNL (Rush); Todd Ruppap, PhD, RN, GCNS-BC, FAHA, FAAN (Rush)

PROBLEM: Benefits of parent education programs have been widely established. However, there is limited research focused on how these programs can benefit parents of children with medical complexity (CMC) who have complex needs, chronic condition(s), functional limitations, and high health care utilization. **PURPOSE:** The purpose of this integrative review was to synthesize the evidence about the effectiveness of parent education programs for CMC. **SEARCH STRATEGY:** CINAHL Complete, PubMed, Scopus, and PsycInfo were searched for relevant literature. Studies were included if the following criteria were met: (i) described an intervention focused on providing education to parent and/or family caregivers; (ii) included children between 0-18 years of age; (iii) child population was documented to be medically complex or can be characterized this way; and (iv) measured a parent and/or child outcome. Studies were excluded if the full-text was unavailable electronically, not written in English, or not focused on a specific intervention. **RESULTS OF LITERATURE SEARCH:** The initial search yielded 374 studies. An additional 12 studies were added after ancestry searching. After removing duplicates, 320 unique studies were identified. Two reviewers independently screened titles and abstracts. Any disagreements were discussed and resolved by both reviewers. After excluding 261 studies, 59 full-text studies were assessed for eligibility by the primary author. A final sample of seven studies were included in this review. **SYNTHESIS OF EVIDENCE:** Inconsistencies in describing this population of children in the literature exist and few parent education programs directly target parents of CMC. Among those that do, the focus is on providing adequate caregiver education to support safe home care. The majority of existing parent education programs target parents of children with specific conditions or describe children who meet only some characteristics of medical complexity. **IMPLICATIONS FOR PRACTICE:** There is a need for continued development of evidence-based education programs to support parents of CMC. Parent education programs for families with less medically complex children demonstrate a positive impact on parent-child relationships, coping skills, and family functioning. Further research is necessary to determine if these outcomes can be replicated for parents of CMC.

Primary Presenting Author: Jane Lee, BA

Role: Rush Student

RMC: M2

IMPROVING QUALITY OF FAMILY MEETINGS IN THE MEDICAL INTENSIVE CARE UNIT

Gina Piscitello (Rush)

INTRODUCTION - Family meetings in the intensive care unit (ICU) influence the course of treatment for the patient and experience of the caregivers throughout the end-of-life process. These meetings are frequently mediated by medical trainees who often feel unprepared due to a lack of sufficient prior training on this topic. Currently, there is no standard of training across the US for residents prior to their ICU rotation or during medical school regarding the end-of-life decision-making process. Introduction to these topics at an early stage of medical training may help better prepare trainees to conduct these meetings. This study aims to establish a baseline understanding of medical trainee attitudes and self-reported skill about leading ICU family meetings and assess for improvement in these measures with the implementation of a structured curriculum. **METHODS** - This is a prospective interventional study. Medical trainees attended a structured one-hour workshop encompassing topics such as decision-maker determination, decision-making capacity, and the use of substituted judgment. Pre- and post-intervention surveys were used to assess changes in knowledge and attitudes about leading ICU family meetings. The data was collected and analyzed using RedCap, and statistical analysis was performed using Excel. **RESULTS** - 21 medical students, 2 undergraduate premedical students, and 4 other medical trainees were surveyed (N=27/35). There was an improvement in knowledge regarding decision-maker determination ($p=0.019$) and decision-making capacity ($p=0.0015$) with the number of correct responses increasing from 11% to 59% and 22% to 67%, respectively. Confidence in ability to lead a family meeting ($p=0.00233$) increased from 0% to 25.9% of trainees, and 96% indicated they would utilize the information from this workshop in future conversations. However, despite improvements in knowledge, 37% of trainees still did not feel they had received adequate training to lead family meetings on their own. **CONCLUSION** - Medical trainees generally have a limited baseline understanding of the determination of a legal decision maker and the determination of a patient's decision-making capacity. The use of a formal curriculum is effective at improving trainee knowledge of these measures and confidence in its application, but additional supplementation is necessary to fully prepare trainees to lead these important conversations.

Primary Presenting Author: Olivia Negris, MA

Role: Rush Student

RMC: M2

A MEDICAL SCHOOL CURRICULUM FOCUSED ON DEMENTIA AND END-OF-LIFE AND BASED UPON VIRTUAL REALITY IN THE COVID ERA

Olivia R. Negris, MA (1), Johanna S. Balas, BS (1), Emily Broman Phelps, MD (1), Erin Washington, MM (2), Ann Brennan (3), Annabelle Santos Volgman, MD (1), Debra Fleischman, PhD (1,3), Neelum T. Aggarwal, MD (1,4) (1) Rush University Medical Center, Chicago, IL, USA (2) Embodied Labs, Los Angeles, CA, USA (3) Chicago Methodist Senior Services, Chicago IL, USA (4) Rush Alzheimer's Disease Center, Chicago IL, USA

INTRODUCTION: The COVID pandemic has brought death and dying to the forefront. Yet, dementia remains the most common cause of death in men and women over age 80. Worldwide, there are 50 million persons with dementia, with nearly 10 million new cases annually. Due to time constraints of clinical rotations in traditional medical education, there are often shortcomings in students' understanding of those with chronic or terminal conditions. This study implements a distributive model of a virtual reality (VR)-based curriculum, utilizing vignettes that portray a Latinx woman, Beatriz, with Alzheimer's disease, and a veteran, Clay, with cancer transitioning to hospice from a first-person perspective. **METHODS:** Medical and premedical students in Chicago were recruited (N=12, 75% female, 58% White, 58% M2) and engaged in a self-directed VR-based curriculum, including Embodied Labs modules and corresponding lectures from expert physicians. Lecture content time was 2 hours 40 minutes and VR module time was 35 minutes, which students completed at their own pace prior to a group discussion. Participants completed pre- and post-surveys, including Student Dementia Questionnaire, Dementia Knowledge Assessment Scale, Dementia Attitudes Scale, Frommelt Attitude Toward Care of the Dying Scale, Interpersonal Reactivity Index, and Reflective Essays. **RESULTS:** Preliminary qualitative analysis reveals participant-perceived increased competencies in the following themes: medical knowledge and preparedness (100%), compassion and empathy (67%), communication and patience (50%), and emotional connection and advocacy (50%) after program completion. Moreover, 11/12 participant reflections either directly stated the value of this experience for their professional development or explicitly highlighted its utility within medical school curricula. Additional qualitative content analyses and quantitative statistics on the changes in pre- and post-survey measures are forthcoming. **CONCLUSION:** Harnessing the unique and immersive experiences allowed by VR to develop a medical curriculum fosters greater knowledge of dementia and end-of-life care. This multi-dimensional curriculum can be scaled and implemented virtually to medical trainees caring for patients during the COVID pandemic. Students reported an improved ability to communicate effectively and advocate for their patients' needs. Future aims include formally integrating this model into a medical curriculum and broadening content to include additional medical conditions utilizing diverse real-world cases.

Primary Presenting Author: NUPUR SHAH, DO

Role: Clinical Fellow

TRAFFICKED AND TRAUMATIZED: THE EFFECTIVENESS OF A HUMAN TRAFFICKING SEMINAR IN BUILDING CONFIDENCE IN TRAUMA-INFORMED CARE

Nupur Shah, DO (Presenting Author); Vinodinee Dissanayake, MD, MPH; Kaitlynn Tracy, MD; Shivali Patel, MD

INTRODUCTION Human trafficking is labor or sexual exploitation through the means of fraud or coercion. It is estimated that 87% of trafficked victims encounter a health care provider during captivity, however, out of nearly 6,000 total hospitals in the US, only an estimated 1% have policies for treating patients who are being trafficked. This study's objective was to determine the effectiveness of an educational seminar on trauma-informed care principles by evaluating pre-and post-surveys that assessed confidence in identifying victims of human trafficking and delivering patient-centered care in the Emergency Department. **METHODS** Hospital staff at Rush University Medical Center were given the option to participate in a 2.5 hour training on red flags of human trafficking led by physicians, social workers, members of local non-profit agency STOP-IT, members of local law enforcement including FBI. Following this segment, participants were taught the principles of trauma-Informed care by a Psychiatry attending and a medical student for 1.5 hours. Pre- and post-surveys were conducted to assess confidence, measured on 5-point Likert scale, in detecting red flags and in providing trauma-informed care for victims and survivors of human trafficking. **RESULTS** We received a total of 135 pre-survey responses and 82 post-survey responses. The respondents consisted of registered nurses (40.0%), attending physicians (17.0%), mental health counselors, social workers and case managers (10.3%), resident physicians (8.9%), students (7.4%), patient care technicians (4.4%), clerical or finance coordinators (3.7%), administration (3.0%) and others (5.2%). Comparison of pre- and post-survey Likert scores indicated a statistically significant difference in (a) confidence in discussing human trafficking with patients, (b) confidence in identifying trafficked patients, and (c) confidence in the ability to provide trauma-informed care. **CONCLUSION** Our results show that dedicated training on red flags and trauma-informed care resulted in a statistically significant difference in confidence level in providing patient-centered care to trafficked patients. Seminar participants made survey suggestions such as making the training accessible to all hospital employees and considering a universal password that would discreetly alert hospital employees about a suspicious situation. Participants mentioned that they would look at institutional protocols proactively and ensure safe dispositions for patients.

Primary Presenting Author: Morgan Sturgis, BS

Role: Rush Student

RMC:M4

CREATING MICRO-ADVOCATES IN MODERN MEDICINE: UTILIZING SIMULATION TO ADDRESS MICRO-AGGRESSIONS

Morgan Sturgis (Rush); Alice Burgess (Rush); Ihuoma Erundu (Rush); Michelle Sergel (County); David Ansell (Rush); Marsha Yelen (Rush); Paul Kent (Rush); Ritika Dhawan (Rush); Denise Valero (Rush)

INTRODUCTION: Micro-aggressions are unconscious, additive obstacles that impact the patient-physician relationship and patient outcomes. Medical students undoubtedly witness micro-aggressions during their clinical experiences, yet few curriculums teach students how to navigate them. **METHODS:** Our innovative solution is designed to provide medical students with strategies to identify barriers and address micro-aggressions. The classroom in this case is the simulation center, where trained standardized patients role-play with learners in a safe space that parallels clinical interactions. Our ultimate goal is to use powerful individual stories to promote conversations about structural humility. Our three patient scenarios include a non-native English speaker who was recently hospitalized and is seeking help understanding his hospital course - "How will you address his traumatic experience and the communication barriers he faced?" A patient with uncontrolled diabetes returns to the clinic for the first time in months - "What are your goals, what are their's, and how will you work together to address social barriers to care?" Finally, a patient is due for a colonoscopy and flu vaccine - "How do you validate past experiences and address mistrust/hesitancy?" **RESULTS:** The official pilot simulation occurred in August 2021. Participants included Rush medical students (pre-clerkship and clerkship level), Standardized Patients, and faculty experts. Results were notable for 29% of learners feeling confident overcoming communication barriers (both individually & institutionally) before the activity, increasing to 100% after. At the start, less than 1/3 of learners understood the difference between cultural competency and structural humility; >2/3 of learners left the simulation feeling proficient in this knowledge objective. Before the simulation, 42.9% of learners expressed they were unsure of how to address social barriers to medical care during an initial visit; 83% felt competent in this area by the end of the activity. **CONCLUSION:** In leaning into some of the inevitably uncomfortable situations experienced in medicine, we hope students can begin to address their own biases, become aware of their communication styles, and advocate for holistic patient care through a health equity lens. This activity will be permanently incorporated into the MS3 clerkship orientation in May 2022.

Primary Presenting Author: John Toms, B.S. in Biomedical Engineering; M.S. in Medical Sciences; M.D. (expected 2024)

Role: Rush Student

RMC: M2

ADDRESSING MEDICAL EDUCATION CURRICULUM GAP TO FOSTER HEALTHCARE INNOVATION

John A. Toms III, Rush Medical College of Rush University (first/presenting author); Carter N. Do, Rush Medical College of Rush University; Neelum T. Aggarwal, Department of Neurological Sciences-Rush University Medical Center; Dima Elissa, Coleman Entrepreneurship Center-DePaul University.

INTRODUCTION: Medical students gain unique exposure to the limitations of the United States healthcare system through their education, clinical rotations, and surrounding communities. Yet the traditional medical curriculum focuses on topics related to the basic sciences, clinical medicine, and patient care with few opportunities to develop the knowledge and skills necessary to develop and implement innovative solutions that address these encountered barriers. To address this curriculum gap, the course, "Innovation in Medicine for Medical Professionals," was created to provide students with the strategies and skills necessary to analyze healthcare challenges and develop possible solutions. Through didactic lectures and guest lecturers representing startup companies and health organizations, students are introduced to elements of human-centered design, healthcare inequities and disparities, clinical gap analysis and idea implementation strategies. This study aims to qualitatively analyze this identified gap in medical education and its impact on medical students through self-reported surveys.

METHODS: First year medical students from Rush Medical College who are taking the elective starting September 1st, 2021 will comprise the study population. Student interest in curriculum topics, course activities and coordination, and generation of future curriculum learning objectives will be evaluated through pre- and post-course curriculum knowledge assessment surveys, post-lecture and post-guest lecture surveys, and curriculum-focused surveys. Results of the surveys will be analyzed and released following the graduation of the participating students to avoid survey bias and protect the participants' anonymity.

RESULTS: To date, survey responses indicate a limited knowledge of topics related to healthcare innovation generation among medical students. Yet the responses additionally revealed the students' interest in developing their knowledge of these topics, in particular, idea implementation strategies. Successful recruitment rates of guest lecturers from outside healthcare-related industries have demonstrated a strong enthusiasm among these entities to share their expertise and support the students' education; highlighting the potential of and interest in future collaboration.

CONCLUSION: Study participants show a demonstrated interest in supplementing their traditional medical education with curriculum focused on the fundamentals of novel health solution development and implementation. While initial feedback from students has been positive, further course data through surveys continues to be collected and analyzed to establish the course's overall efficacy.

Primary Presenting Author: Janel Draxler, MSN

Role: Rush Student

CON: PhD

Treatment Adherence in Adolescents with Adverse Childhood Experiences (ACEs)

Janel Draxler (Rush); Todd Ruppap (Rush)

INTRODUCTION: Adverse childhood experiences (ACEs) are associated with poor treatment adherence and worse health outcomes among adults, but evidence among adolescents is less clear. This systematic review identified and synthesized results from studies examining associations between ACEs and treatment adherence in adolescents. **METHODS:** An expert medical librarian conducted searches in seven databases. Results were analyzed using a narrative synthesis framework. **RESULTS:** A total of six studies were eligible for the review. Assessment strategies for ACEs and treatment adherence varied across the studies. Nearly all assessed for histories of maltreatment and neglect. Treatment adherence was most often defined as some form of attendance in a treatment program. **CONCLUSIONS:** Results support a relationship between ACEs and treatment nonadherence in adolescents. ACEs related to maltreatment, particularly emotional abuse, may be more predictive of treatment nonadherence than other ACE types. Specific qualities of ACEs (e.g. timing, intensity, frequency) may influence the relationship between ACEs and treatment nonadherence. **NOTE:** This work was recently published in the Journal of Psychosocial Nursing and Mental Health Services.

Primary Presenting Author: Katherine Iannuzzelli, BS

Role: Rush Student

RMC: M2

Patient Preferences for Lifestyle Management in a Multi-Site Randomized Lifestyle Trial for Remission of the Metabolic Syndrome

Katherine Iannuzzelli (RMC), Lynda Powell, PhD, MEd (RMC), Sumihiro Suzuki, PhD (RMC), Kelly Karavolos, MA (RMC)

INTRODUCTION Randomized controlled trials are considered the gold standard for evidence-based practice, but strong preference for a particular treatment can undercut a trial's ability to produce unbiased estimates of effectiveness. It is important to understand and address patient preference to optimize the strength of behavioral treatments and minimize bias. The purpose of this paper was to describe the prevalence and correlates of patient preference at the baseline evaluation of a multi-site behavioral clinical trial of the impact of 2 lifestyle treatments on remission of the metabolic syndrome (MetS). **METHODS** During the baseline evaluation and prior to randomization, participants were asked about their preference for treatment (group-based, self-directed, or indifferent). We used t-test for continuous data, and chi-square or Fisher's Exact Test for categorical data to compare those who had a preference to those without preference and for those who preferred group-based treatment to those who preferred self-directed treatment. Binary logistic regression models evaluated the association between the hypothesized correlates of patient preference and patient preference and type of treatment preference. **RESULTS** Of 331 participants, 200 (60.4%) preferred a particular treatment and 131 (39.6%) had no preference. Predictors of no preference were lower education (OR:0.88; 95%CI: 0.78-0.99), greater family support for eating a healthy diet (OR: 1.07; 95%CI:1.01-1.14), and a stronger habit of eating vegetables in the daily routine (OR: 1.64; 95%CI: 1.15-2.34). Among the 200 participants with a preference, 144 (72.0%) preferred a group-based program and 56 (28.0%) preferred a self-directed program. Predictors of preference for a self-directed program were a higher level of friend support for a healthy diet (OR:1.07; 95%CI:1.01-1.13) and a stronger habit of eating vegetables in the daily routine (OR: 1.34; 95%CI: 1.06-1.69). Randomization produced approximately equal numbers of participants who were concordant (93 (46.5%)) or discordant (107 (53.5%)) with their preferred treatment. **CONCLUSION** Pre-existing healthy habits, and support for them, are associated with having no preference for how a lifestyle treatment is offered. When a preference does exist, healthy habits and support for them is associated with a preference for a self-directed approach to lifestyle change and less need for more structured group-based support.

Primary Presenting Author: Molly Kokenge, MSN, RN, CEN, CNL

Role: Rush Student

CON: PhD

PHYSICAL ACTIVITY INTERVENTIONS AMONG AMERICAN INDIAN AND ALASKA NATIVES: A SYSTEMATIC REVIEW

Molly C. Kokenge (Rush University College of Nursing) Todd Ruppap (Rush University College of Nursing) Susan Weber Buchholz (Michigan State University)

PROBLEM American Indian and Alaska Natives (AIAN) have suffered long-standing health inequities stemming from a built environment that contributes to physical inactivity and associated negative sequelae. Effective, evidence-based, culturally relevant physical activity (PA) interventions are needed. The most recent systematic review of PA interventions among AIAN included studies from 1988-2006. New trends are emerging in PA intervention research with AIAN, which must be critiqued for efficacy and impact. **PURPOSE** The purpose of this review was to identify and describe PA interventions that have been implemented with AIAN in the U.S. and Canada since 2006. **METHODS** Searches were conducted in eight databases plus grey literature sources. The inclusion criteria were: (a) description of a primary PA intervention or a broader intervention with PA component; (b) target population listed as AIAN residing in the U.S. or Canada, or if a multiethnic population, contained an AIAN subanalysis; (c) published in 2006 or later; and (d) reported a PA outcome. Articles published in a language other than English were included if an English translation was available. **RESULTS** The search strategy identified 25 eligible studies (15 non-randomized experimental designs and 10 randomized controlled trials). Most interventions were implemented in the Northern Plains region of the U.S. Interventions most frequently targeted children and youth. Intergenerational, environmental policy, cultural adaptation, and curriculum-based approaches were used. Self-report measures were more widely used than objective measures. PA outcomes and evaluation methods varied greatly across studies. Twenty studies utilized PA self-report measures, though bias is a persistent concern. 80% of studies used an element of cultural adaptation, though most considered cultural needs in design, not program or outcome evaluation. Sedentary behavior and leisure-time PA were rarely assessed. Significant improvement in PA outcomes were achieved post-intervention in 52% of the sample (n=13). Non-significant but clinically important changes in participants' PA were reported in 13 studies (e.g. time spent in MVPA, increased frequency of PA). **CONCLUSION** Future interventions should target AIAN adults to evaluate sedentary behavior and leisure-time PA. Interventions should incorporate psychometrically tested objective measures and include the Native perspective from intervention design through project evaluation.

Primary Presenting Author: Sudaba Mansuri, Master of science

Role: Rush Student

CON: PhD

PHYSICAL ACTIVITY AMONG ARAB AMERICAN WOMEN: AN INTEGRATIVE REVIEW

Sudaba Mansuri MSc; Manju Daniel PhD FNP-BC; Susan W. Buchholz PhD RN FAANP FAAN; Jennifer Westrick

INTRODUCTION: Arab American women, a visible minority group, experience unique barriers to engaging in the recommended amount of physical activity. The purpose of this review was to analyze quantitative physical activity studies that were conducted with Arab American women to explore physical activity behavior, physical activity interventions and measurement of physical activity.

METHODS: An integrative review of quantitative evidence was conducted. Inclusion criteria were as follows: Arab American women (> 18 years); descriptive, quasi-experimental, or experimental studies; reporting on physical activity measurement (self-report, objective measures) and physical activity outcomes (steps, moderate to vigorous physical activity, and other physical activity outcomes. Subject Heading keywords were combined with free-text keywords and Boolean operators to search databases. An extensive list of search terms was used for this review. Databases searched included PubMed, Scopus, The Cumulative Index to Nursing and Allied Health Literature, Google Scholar and ProQuest. Literature was initially searched on April 30, 2020, without a start date since research in this field is still relatively new. An updated search was conducted on April 13, 2021. **RESULTS:** A total of 736 records were originally identified through searching of five electronic databases. A total of 19 data sources, resulting in 12 unique studies, remained in the final review. Participants were 18 to 74 years of age with majority between ages 35-60 years. Sample sizes ranged between n=27 and n=536 participants. Only two studies included women-only samples. Leisure-time physical activity was examined in 3 studies. Lifestyle physical activity was measured in 3 studies. Level of physical activity (low, moderate, moderate to vigorous) was examined in 2 studies (<50% engagement in moderate intensity physical activity). Only one study (men and women) used an objective physical activity measure (pedometer) but there was no gender-based subset analysis in this study. There were no published randomized-controlled trials with Arab American women. **CONCLUSION:** While studies on physical activity in Arab American women were found, there are areas that need to be further explored. This includes using instruments translated in Arabic, objective physical activity measures, and randomized controlled trial designs.

Primary Presenting Author: Bryant Yu, BA

Role: Rush Student

RMC: M4

CHILD PSYCHIATRY: MENTAL HEALTH DURING COVID-19

Bryant Yu (Rush); Sarah Abdel-Hadi (Rush);

INTRODUCTION: Suicide is the second leading cause of adolescent death in the United States. The COVID-19 pandemic has been shown to have significant impact psychiatric emergency service volume and hospitalization. However, studies have also shown mixed results between the pandemic and suicidal thoughts and behaviors. Further characterization of pediatric mental health is necessary in multiple settings to better elucidate and prevent suicide in high-risk populations. This study would be most beneficial in diverse urban cities including, but not limited to Chicago. **METHODS:** This retrospective chart review study of patients equal to or under the age of 18 with Patient Health Questionnaire-9's (PHQ-9) Question #9 greater than 0 was collected from the Rush electronic medical record database between the dates of 1/01/2019-12/01/2019 and 1/01/2020-12/01/2020. This research was approved with the appropriate institutional review board. **RESULTS:** In the 2019 cohort, there were 98 total patients included. These patients had a mean age of 14.7 years ($SD = 1.8$) at the time of their encounter. These patients sexually identified as 65.3% female, 2% transgender male, 31.6% male, and 1% not identifying. These patients ethnically identified as 23.5% Hispanic and/or Latinx, 72.% not Hispanic, and 4.1% not identifying. These patients racially identified as 38.9% white, 38.9% black, and 14.7% other. These patients were insured mostly by County Care (26.6%). These patients had a mean PHQ-9 score of 13.8 ($SD = 5.2$). In the 2020 cohort, there were 96 total patients included. These patients had a mean age of 14.1 years ($SD = 2.3$) at the time of their encounter. These patients sexually identified as 72.9% female and 27.1% male. These patients ethnically identified as 39.6% Hispanic and/or Latinx, 59.4% not Hispanic, and 1.0% not identifying. These patients racially identified as 49.0% white, 18.8% black, and 24% other. These patients were insured mostly by Blue Cross Blue Shield PPO (25%). These patients had a mean PHQ-9 score of 14.2 ($SD = 4.3$). **CONCLUSION:** Within the Rush database, pediatric patients did not have statistically significant changes to their PHQ-9 score. Future studies investigating other changes are warranted to understand the full impact of the pandemic.

Primary Presenting Author: Delia Alkhatib, M.Sc. IBS

Role: Rush Student

GC: Masters

Preparation, characterization and stability of silver sulfadiazine nanoliposomes

Delia Alkhatib (Rush), Dr. Noha Zelai (KAU)

Purpose: To prepare, characterize and investigate the stability and drug release profile of silver sulfadiazine (AgSD) nanoliposomes as functions of pH, UV exposure, and/or heat. **Methods:** Silver sulfadiazine (AgSD) nanoliposomes were prepared. The stability and release properties of the free drug and nanoliposomal formulations of AgSD as functions of pH, UV exposure, and/or heat were analyzed. The analyses were performed at different time points. **Results:** The results of characterization showed that acidic, basic and neutral silver sulfadiazine nanoliposomal suspensions (AgSD NLSs) were produced as stable homogenous formulations, as indicated by low polydispersity index (PDI) and high zeta potential. The three AgSD NLSs and AgSD were unstable under different heat and/or UV conditions. The pH tended to shift towards neutrality, starting from day 1. Silver sulfadiazine nanoliposomal suspensions (AgSD NLSs) and free drug (AgSD) exhibited similar release properties (100 % of the drug was released at day 12). **Conclusion:** Incorporation of AgSD into nanoliposomes has no significant effect on the stability and in vitro release properties of the drug. This indicates that NLS did not change the physical characteristics of the drug. Studies that focus only on improving the lipophilicity of silver sulfadiazine may benefit from these results.

Primary Presenting Author: Michelle Ash, BS

Role: Rush Student

GC: PhD

CHARACTERIZING SIV RESERVOIRS IN THE CNS UTILIZING A CART CESSATION RHESUS MACAQUE MODEL

Dr. Jeffrey Schneider, Rush University

INTRODUCTION HIV is a global health crisis affecting millions of people each year. While advances in antiretroviral therapy have prolonged the lives of people living with HIV (PLWH), sites where virus persists despite cART treatment, known as HIV reservoirs, prevent total viral clearance from occurring. One reservoir site includes the central nervous system (CNS), which compartmentalizes HIV within anatomical regions of the brain, and further by cell type. We hypothesize that CNS tissues with increased cART penetrance will show lower numbers of SIV infected cells, and lower neuroinflammation associated with infection. **METHODS** We utilize an SIV-infected rhesus macaque cART cessation model including cART treated and two weeks post-cART cessation animals, with primary brain regions including the frontal, occipital, and temporal lobes. cART levels are quantified via LC/MS from flash frozen brain tissue. Traditional immunofluorescence microscopy in combination with RNA and DNAscope are used to determine the cellular nature of SIV within the CNS. **RESULTS** RNAscope experiments investigating overall expression of viral RNA revealed a small number of cells in the CNS directly expressing SIV RNA, which correlate with lower cART drug levels. We expanded this quantification and found brain regions including the frontal and occipital lobes harboring more SIV RNA+ cells correlating to less cART penetrance in the respective tissue. Initial results of microglial analysis reveal an increased number of microglia/macrophages (Iba1) positive for SIV RNA compared to astrocytes. **CONCLUSIONS** We have observed astrocytes at a low level, and microglia to a larger extent, harboring HIV RNA within the CNS, which is in-line with current literature showing that astrocytes are infected at lower levels than microglia. We are currently investigating neuroinflammation in regions of high virus and low cART penetrance compared to regions of low virus and high cART penetrance, as well as quantifying viral load via ddPCR. These findings, especially the discovery of differential cell types expressing viral RNA, have implications for therapies that can block viral egress from specific CNS cell types.

Primary Presenting Author: Stefanie Cassoday, PhD candidate

Role: Rush Student

GC: PhD

SARS-COV-2 INDUCES HYPERACTIVITY IN MEDIAL PREFRONTAL CORTEX PYRAMIDAL NEURONS IN THE CONTEXT OF NEUROHIV AND COCAINE ABUSE

Stefanie L. Cassoday, Lihua Chen, Anita Donner, Mia DeMarco, Lena Al-Harhi, Xiu-Ti Hu

INTRODUCTION: The COVID-19 pandemic resulting from infection with severe acute respiratory disease coronavirus 2 (SARS-CoV-2) induces widespread complications including CNS manifestations. Neurological and neuropsychiatric deficits affect ~60% of COVID-19 patients, which are also commonly seen in people living with HIV (PLWH, a.k.a. neuroAIDS/neuroHIV) and substance use disorders (SUD), including Cocaine Use Disorders (CUD). Further, PLWH and CUD are more likely to engage in risky behaviors, leaving them at increased risks for becoming infected with SARS-CoV-2. Many of these neurological complications associated with SARS-CoV-2, neuroHIV and cocaine (Coc) abuse are related or attributed to hyperexcitability and neurotoxicity in brain regions that are key regulators of neurocognition and addiction, including the medial prefrontal cortex (mPFC). Even though numerous neurological deficits are often found in COVID-19 patients, there is still a controversy regarding whether and how SARS-CoV-2 invades the brain; and whether, how, and to what extent SARS-CoV-2 affects activity of living neurons in the brain, especially in neurocognitive regulating brain regions. It is also unknown if SARS-CoV-2 worsens neuroHIV and/or Coc-induced neuronal dysfunction in the brain. This exploratory study will determine the effects of SARS-CoV-2 on live mPFC pyramidal neurons in the context of neuroHIV and CUD (modeled by HIV-1 transgenic, Tg, and Coc self-administration, Coc-SA, rats, respectively). We hypothesize that SARS-CoV-2 induces hyperactivity of mPFC pyramidal neurons, which exacerbates Coc and HIV-induced neuronal overactivation and excitotoxicity. **METHODS:** We used HIV-1 Tg and non-Tg rats that underwent Coc-SA for two weeks followed by evaluation of drug-seeking behavior 3- and 21-day after the last infusion, and then assessed the effects of SARS-CoV-2 (spike protein subunit 1; 5, 10, 20nM, ex vivo) on mPFC neurons using whole-cell patch-clamp electrophysiology. **RESULTS:** We found SARS-CoV-2 elicited a trend towards increasing evoked firing. We expect future studies to reveal a similar but exacerbated neuronal hyperactivity in Coc-treated and/or HIV-1 Tg rats in response to the spike protein (S1+S2, in nM: 5,10, 20). **CONCLUSION:** These novel findings suggest that SARS-CoV-2 induces hyperactivity of mPFC pyramidal neurons, which potentially contribute to the neurocognitive deficits found in COVID-19 patients and could worsen neurocognitive deficits seen with neuroHIV and CUD.

Primary Presenting Author: Rachel Geroux, BS

Role: Rush Student

Rush Dean's Fellowship

ABSOLUTE CHANGE IN NEUTROPHIL-TO-LYMPHOCYTE RATION IS ASSOCIATED WITH 90 MORTALITY IN COVID-19 PATIENTS

Rachel Geroux¹, Connor J. Wakefield², Arinze Ekowa¹, Christopher W. Seder¹ Rush University Medical Center, Department of Cardiovascular and Thoracic Surgery¹ Brooke Army Medical Center, Department of Internal Medicine²

INTRODUCTION: Coronavirus disease 2019 (COVID-19) requiring intensive care unit (ICU) admission, carries a mortality rate of approximately 26%. Although older age, male gender, and certain comorbidities have been associated with worse outcomes, there is a need to better risk stratify newly admitted ICU patients for disease progression. We investigated the utility of neutrophil-to-lymphocyte ratio (NLR) as a prognosticator of outcomes of in patients admitted to the ICU for COVID-19. **METHODS:** A retrospective study was conducted of a prospectively maintained database at a single, tertiary care medical center with IRB approval. All patients who were admitted to Rush Medical Center with COVID-19 between March 2020 and December 2020 were included. Patients were excluded if they presented as transfer from an outside hospital, underwent major surgery, were pregnant, < 18 years of age, severely immunocompromised, or lacked laboratory data on day of admission. The absolute and change over time NLR was compared for analysis between patients grouped by highest quartile NLR vs non-highest quartile NLR via the Fisher's Exact test, Wilcoxon rank-sum test, and logistic regression. **RESULTS:** Overall, 2170 patients met inclusion criteria with a median BMI 33.1 (IQR 26.7-39.5), age of years (IQR 58-74), and 59% were male. Overall 27% (35/2132) expired during hospitalization. On univariate analysis, elevated ICU admission NLR ($p=0.042$), increased age ($p=0.02$), and reduced admission platelet count ($p=0.0152$) were associated with in-hospital mortality. There was no significant difference in mortality when comparing gender, medical comorbidities. The highest quartile admission NLR was determined to be 9.88 with 40 patients (31%) comprising this group. On multivariate logistic regression, highest quartile NLR upon ICU admission was associated with in-hospital mortality when adjusting for age and admission platelet count (OR 2.9, 95% CI 1.2-6.9, $p=0.02$). **CONCLUSION:** NLR upon admission to an ICU is associated with in-patient mortality in patients with COVID-19. Knowledge that NLR may be a good prognosticator of mortality in newly admitted COVID-19 patients can help guide treatment initiation and utilization of resources to improve short and long-term outcomes.

Primary Presenting Author: Lauren Grimm, BS, MA

Role: Rush Student

Dean's Summer Research Program

EVALUATION OF IN VITRO T CELL RESPONSES TO SARS-COV-2 PROTEINS IN INDIVIDUALS WHO HAVE RECOVERED FROM COVID-19

Lauren Grimm (Rush University College of Medicine); Chinyere Onyeukwu (Rush University College of Medicine); Jeffrey Martinson (Rush University College of Medicine); James Moy MD (Rush University College of Medicine); Alan Landay PhD (Rush University College of Medicine)

INTRODUCTION: Since the start of the COVID-19 global pandemic, much of the focus on the immune response following SARS-COV-2 infection has centered on the antibody response. However, less is known about the concomitant T cell response and its relationship with long-term humoral immunity. We hypothesize that the development of adaptive cell mediated immunity (CMI) against the SARS-CoV-2 virus is more robust compared to the humoral response, where antibody production wanes overtime.

METHODS: Following IRB approval, we identified and consented 24 individuals based on history of SARS-CoV-2 infection and quantified anti-nucleocapsid (N) IgG: those with sustained antibody response (Group 1), those who rapidly lost antibodies (Group 2), those with no antibody response (Group 3), and negative controls. We identified antigen-specific CD4 and CD8 T cells following stimulation with Spike (Pro_S, Prot_S1) or Nucleocapsid (Prot_N) peptide pools (Miltenyi Biotech). Briefly, ficoll hypaque isolated mononuclear cells were stimulated with the peptide pools, followed by staining for surface (CD3, CD4, CD8, CD45RA, CCR7, CD134, CD137, and CD69) and intracellular (IFN γ , TNF α , and Granzyme B) markers to identify functional CD4 and CD8 T cell subsets. Analysis was performed by polychromatic flow cytometry.

RESULTS: We demonstrated the greatest nucleocapsid specific CD4 T cell (Ox40+CD137+) responses in groups 2 (2.4% +/-0.4) and 3 (2.17% +/-0.09) compared to group 1 (0.3% +/-0.09) (p=0.044). Similar results were seen when evaluating spike specific CD4 T cell responses (data not shown). Conversely, analysis of intracellular cytokines showed total IFN γ production to be highest in group 1 (0.046% +/-0.019) compared to group 2 (0.02% +/-0.02) (p=0.14) or group 3 (0.0%) (p=0.002).

CONCLUSION: Our study demonstrates that individuals who do not make nucleocapsid or spike antibodies or who lose them following COVID-19 infection still produce a robust antigen-specific CD4 T cell response. However, individuals who produce the greatest nucleocapsid and spike antibody responses elicit a significantly diminished CD4 antigen-specific T cell response. The results of this preliminary study require further follow up, especially in subjects who have received COVID 19 vaccines, to determine the clinical relevance of these discordant antibody and T cell functional outcomes.

Primary Presenting Author: Erin Keizur, BS

Role: Rush Student

RMC: M3

Effectiveness of an Electronic Health Record Model for HIV Pre-Exposure Prophylaxis

Erin Keizur (Rush, presenting/first author); Eileen Robinson (Rush); Beverly E. Sha (Rush), Mariam Aziz (Rush); Shivanjali Shankaran (Rush)

INTRODUCTION: Pre-exposure prophylaxis (PrEP) to prevent human immunodeficiency virus (HIV) is extremely effective when taken correctly, though grossly under-prescribed for at-risk patients. Automated models using electronic medical records (EMR) have accurately identified men for PrEP use, however they have been less successful at identifying cisgender women. **METHODS:** We launched a best practice advisory (BPA) in the Rush EMR in 7 clinics (infectious disease, gynecologic, pediatric, and internal medicine) to identify patients who met criteria for PrEP use. The criteria for PrEP use for our model included any patient who identified as men who have sex with men (MSM), had a positive test for a STI in the past 2 years, or had ≥ 3 urine chlamydia or gonorrhea tests in the previous 12 months. We evaluated this model to determine its effectiveness in identifying patients and its use by providers for increasing prescription of PrEP. **RESULTS:** The BPA fired 145 times with five total new PrEP prescriptions. Over half of the patients identified were cisgender women and nearly half identified as African American, groups at risk for HIV yet grossly under prescribed PrEP. Overall, the BPA was acknowledged for only 16% of patients flagged in our study. One patient identified by the BPA, who was not started on PrEP, became HIV positive 359 days after the initial BPA response. **CONCLUSION:** Our model was successful in identifying patients at risk for HIV infection who could benefit from PrEP use. By including recent STI infections in our criteria for PrEP, we allowed for the identification of a wide range of patients, including women. However, provider acknowledgement of the BPA and initiation of PrEP remained low. Educating providers on how to navigate conversations about sexual practices and PrEP with all patients may be an important step for increasing PrEP use. Our model did result in the initiation of PrEP in five patients, which may be life-changing in preventing HIV acquisition. Greater efforts must be made to educate providers and increase their use of these electronic models in patients' charts to increase PrEP initiations.

Primary Presenting Author: K A Foyez Mahmud, PhD

Role: Post-Doctoral Research Fellow

Therapeutic Evaluation of Immunomodulators in Reducing Surgical Wound Infection

Foyez Mahmud (Rush), Ruchi Roy (Rush), Mohamed F. Mohamed (Rush), Sasha H. Shafikhani (Rush)

Introduction: Despite many advances in infection control practices, surgical site infections (SSIs) remain a significant cause of morbidity, prolonged hospitalization, and death worldwide. Our innate immune system possesses a multitude of powerful antimicrobial strategies which make it highly effective in combating infections. We hypothesized that immunomodulators that can jumpstart and direct innate immune responses at surgical sites, would enhance infection control at surgical sites. We used three immunomodulators; fMLP (formyl-Methionine-Lysine-Proline), CCL3, and LPS (Lipopolysaccharide), based on their documented ability to illicit strong inflammatory responses in a surgical wound infection model with *Pseudomonas aeruginosa* to evaluate our hypothesis. **Methods:** Wounding and wound infection were carried out in 6-7-week-old C57BL/6 and TLR4^{-/-} knockout mice using sterile biopsy punches (5-mm diameter). We used 10³ or 10⁶ cells of *Pseudomonas aeruginosa* PA103 for this study. Immunomodulators were added at indicated levels right after wounding and prior to infection. Wound tissues from wound edges (~1 mm) were collected and infection levels in wounds were evaluated by determining the number of bacteria, colony forming unit (CFU) per gram of wound tissues. Tobramycin solution (0.35 mg/mL) or saline control were administered intraperitoneally, 1h before starting surgery. **Results:** Our data indicate that all 3 immunomodulators were able to significantly boost the production of IL-1 β and TNF- α pro-inflammatory cytokines in PA103-infected wounds, particularly when applied at higher concentrations in the case of fMLP and LPS. Moreover, immunomodulators significantly not only increased leukocyte migration but also activated myeloperoxidase (MPO) neutrophils in infected wounds. Our data indicate that one-time topical treatment with these immunomodulators at low doses significantly increased pro-inflammatory responses in infected and uninfected surgical wounds and were as effective, (or even better), than a potent prophylactic antibiotic (Tobramycin) in reducing *P. aeruginosa* infection in wounds. Our data further show that immunomodulators did not have adverse effects on tissue repair and wound healing processes. Collectively, our data demonstrate that harnessing the power of innate immune system by immunomodulators can significantly boost infection control and potentially stimulate healing. **Conclusion:** We propose that topical treatment with these immunomodulators at the time of surgery may have therapeutic potential in combating SSI, alone or in combination with systemic antibiotics.

Primary Presenting Author: Charia McKee, B.S. in Biology

Role: Rush Student

GC: PhD

DETAILING THE INNATE IMMUNE SENSING RESPONSE TO THE PROGRESSION OF HIV INFECTION.

Charia McKee (Rush); Joao Mamede (Rush)

An estimated 37.7 million people globally, and 1.2 million people in the United States live with HIV/AIDS. Despite the use of cART in treatment of HIV/AIDS, there exists persistent inflammation and infection that may contribute to the resurgence of viral reservoirs, greatly impacting the quality of life of individuals living with HIV/AIDS. Therefore, it is imperative that the mechanisms contributing to this persistence be explored and studied. Cyclic GMP-AMP Synthase (cGAS) is a sensor of cytosolic double stranded DNA. Upon binding to foreign or self DNA, it synthesizes cyclic GMP-AMP (cGAMP), a second messenger that binds Stimulator of Interferon Genes (STING) and subsequently initiates an inflammatory innate immune response. Interferon-mediated transcription of interferon stimulated genes prompts widespread inflammation in primary tissues of HIV-1 infection, which accounts for 95% of total HIV infections, by mechanisms not fully understood. We are currently performing cell culture experiments using THP1 cells, a human monocytic cell line, with Biosensor STING (BioSTING), a murine STING gene flanked with fluorophores mTFP and mKO2, which report binding of cyclic dinucleotides including cGAMP by FRET. I aim to measure the kinetics of cGAMP signaling in the context of the early steps of HIV-1 infection, and detail the interaction of cGAS with the HIV-1 capsid. I also aim to determine the interaction of HIV-1 particles with varying proteins involved in the antiviral response using multiplex immunofluorescence microscopy. This will give insight into the progression of HIV infection including capsid disintegration, reverse transcription, and translocation.

Primary Presenting Author: Evan Patel, B.S.

Role: Rush Student

GC: Masters

Nanoscale Peptide Assemblies and Formulations for Multifunctional Otological Drug Delivery

Evan Patel (Rush), Swapnil Shah (Creighton), H. Christopher Fry (Argonne National Laboratory), and Ashok Jagasia (Rush)

INTRODUCTION: Otitis media is a condition associated with inflammation of the middle ear, with approximately 20 million annual physician visits. For patients that remain refractory to conservative measures such as antibiotic therapy, surgical intervention is sought. A non-invasive and simple method of treating OM remains an ambitious goal that would not only alleviate the immediate symptoms but also prevent future complications. Here, we propose the deployment of a dynamic nanoscale peptide assembly that potentially serves these two roles in delivering the antibiotic ciprofloxacin across the tympanic membrane through a dynamic transition mechanism converting between fibers and micelles.

METHODS: The peptide c16-AHL3K3-CO2H (PA) was synthesized for this study as it is able to form a hydrogel and can transition from fibers to micelles. In addition, cationic peptides are known CPEs, and amphiphilic peptides have been employed in drug delivery previously. In vitro studies utilized multi-well micropore plates to determine the rate of drug delivery across the micropore membrane when compared to Ciprofloxacin alone or Ciprofloxacin in the presence of a known CPE. Further studies employed Human Epidermal Keratinocytes to test the efficacy of cell permeation. **RESULTS:** The peptide-amphiphile, c16-AHL3K3-CO2H was demonstrated to act as an all in one material in which the peptide serves as a drug delivery matrix when assembled into a hydrogel and facilitates drug-delivery while serving as a chemical permeating enhancer as the peptide dissociates from the hydrogel assembly. Transfer of the peptide across a synthetic membrane was demonstrably slower in fibers than in micelles. Drug delivery across the same membrane was desirably slower in fibers than micelles showcasing the potential application in temporally controlled drug-delivery. The CPE ability was highlighted when the peptide was interfaced with epidermal keratinocytes highlighting the initial interaction and subsequent integration of the peptide into the lipid bilayer membrane. **CONCLUSION:** Future investigations will look into treating animal models with the peptide hydrogel/ciprofloxacin mixture to determine how deep the peptide penetrates into the tympanic membrane as well as the efficacy of trans-tympanic drug-delivery. In addition, tuning the rates of peptide disassembly through sequence variation marks an avenue to customize rates of drug delivery from a self-assembled peptide matrix.

Primary Presenting Author: Eric Azua, BA

Role: Rush Student

RMC: M3

Patient Reported Outcomes and Complications Associated with Arthroscopic Biceps Tenodesis Fixation Techniques at a Minimum of Two Years Follow Up: A Systematic Review

Eric Azua (Rush), Suhas Desari (Rush), Matthew Greydanus (Rush), Luc Fortier (Rush), Mario Hevesi (Rush), Kevin Parvaresh (Orthopedic Specialty Institute), Nikhil Verma (Rush), Jorge Chahla (Rush)

INTRODUCTION: There are several described modes of fixation for arthroscopic tenodesis including interference screws, suture anchors, and soft tissue tenodesis techniques, though optimal construct configuration remains controversial. Thus, the purpose of this systematic review was to review the patient reported outcomes (PROs) and complication rates associated with various available arthroscopic biceps tenodesis techniques and materials such as type of interference screw. **METHODS:** A systematic search for articles involving arthroscopic biceps tenodesis techniques that reported patient reported outcomes (PROs) including (Visual Analogue Scale (VAS), American Shoulder and Elbow Surgeons Score (ASES), and the Constant-Murley Score) from 2011 to 2021 was conducted. PubMed, Embase and the Cochrane Library were searched. PROs were compared as the change from baseline and compared to the minimal clinically important difference (MCID). PROs were then compared between techniques and a clinically relevant/significant difference was defined as a difference that was greater than the MCID for the given PRO. Complication rates of each technique were also evaluated. **RESULTS:** Thirty reviewed studies met inclusion criteria. Clinically significant differences between the VAS outcomes for patients treated with an interference screw without tie over (-5.3%), single suture anchor (-5.3%), and knotless suture anchor (-5.7%) were observed. The interference screw without tie over and knotless suture anchor techniques demonstrated a larger improvement in Constant Murley and ASES scores relative to the other techniques. When examining bioabsorbable and non-bioabsorbable interference screws, the non-bioabsorbable screw had a clinically significant improvement for VAS (-3.9 vs -5.3, $P < 0.001$) and Constant Murley (41.2 vs 29.8, $P < 0.001$) scores compared to the bioabsorbable screw respectively. However, major complication rate was significantly lower in the bioabsorbable group (4.3% vs 6.7%). **CONCLUSION:** The interference screw without tie over, the knotless suture anchor, and the one suture anchor tended to perform better across the VAS, Constant-Murley, and ASES clinical outcome scores relative to the soft tissue tenodesis and interference screw with tie over screw. Non-bioabsorbable interference screws led to a clinically relevant improvement in VAS scores and Constant Murley scores relative to bioabsorbable interference screws.

Primary Presenting Author: Christopher Ephron, BS

Role: Post-Doctoral Research Fellow

GREATER ACETABULAR COVERAGE IN HIPS WITH RADIOGRAPHIC COXA PROFUNDA

Authors: Christopher Ephron [1], Morgan Rice [1], Shane J. Nho [1] Affiliations: Section of Young Adult Hip Surgery, Division of Sports Medicine, Department of Orthopaedic Surgery, Rush University Medical Center, Chicago, IL

INTRODUCTION: Coxa profunda is defined using two-dimensional radiographs when the acetabular fossa is seen medial to or touching the ilioischial line. Current literature remains conflicted as to whether or not radiographic coxa profunda represents a deep acetabulum or acetabular overcoverage. **PURPOSE:** To compare acetabular coverage by quadrant measured on three-dimensional (3D) CT-based bone models between hips with and without two-dimensional (2D) radiographic coxa profunda. **METHODS:** A retrospective review of patients who underwent hip arthroscopy for femoroacetabular impingement from 03/2015 to 05/2017 was conducted to identify patients with coxa profunda on 2D plain radiographs. These patients were matched 1:1 by age and gender to patients without radiographic evidence of coxa profunda on preoperative anteroposterior radiographs of the pelvis. Patients were excluded if computed tomography (CT) imaging was unavailable for review. CT-based bone models were analyzed for acetabular coverage of the femur in four quadrants: anteromedial (AM), anterolateral (AL), posteromedial (PM) and posterolateral (PL). (3Matics) Continuous variables were compared between patients with and without coxa profunda using a two-tailed, independent t-test and categorical variables were compared using Fisher exact testing. **RESULTS:** A total of 78 hips including 39 hips with coxa profunda and 39 hips without coxa profunda were included in the final analysis. A majority of hips were female (84.6%), with a mean age of 32.6 years (SD; 12.3). Hips with coxa profunda had significantly lower mean BMI of 23.9 kg/m² (SD; 3.7) than controls 26.9 kg/m² (SD; 6.6; p=0.02). There were no statistically significant differences in 2D measures of acetabular coverage including lateral center edge angle (p=0.07), anterior center edge angle (p=0.68), and Tonnis angle (p=0.38). Hips with coxa profunda demonstrated greater acetabular coverage anteromedially (78.1% vs 75.6%, p=0.18), anterolaterally (18.7% vs 16.3%, p=0.14), posteromedially (99.7% vs 99.5%, p=0.28), and posterolaterally (33.5% vs 31.1%, p=0.35). **CONCLUSION:** Patients with coxa profunda had greater acetabular coverage anteromedially, anterolaterally, posteromedially, and posterolaterally compared to control hips without coxa profunda although the findings were not statistically significant.

Primary Presenting Author: Daniel Farivar, MD Candidate. Bachelor of Science

Role: Rush Student

RMC: M3

Comparing Tensile Strength and Meniscal Extrusion Following Meniscal Root Repair Using Two Simple Suture and Horizontal Mattress Suture Configurations

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INTRODUCTION: Meniscal root tears are debilitating injuries that when left untreated may result in accelerated progression to osteoarthritis with conversion to total knee arthroplasty. Meniscal root repair is a proven treatment option, but it is still unclear which suture configurations yield the best results. This is an important factor because the meniscus-suture interface has been shown to be the weakest link within the repair construct. **METHODS:** Ultrasonography was used to measure meniscal extrusion (ME) of fresh-frozen human cadaveric knees (medial meniscus, n=9; lateral meniscus, n=9) following (1) posterior medial or lateral meniscal root sectioning and (2) subsequent transtibial pullout repair randomized to either using a two simple suture (TSS) (n=9) or a horizontal mattress suture (HMS) (n=9) technique. Ultrasound images were obtained in three sites: anterior to the MCL/LCL (anterior), at the site of the MCL/LCL (middle), and posterior to the MCL/LCL (posterior), both with and without axial loading (1000N) at 0° and 30° of flexion. Specimens were then subjected to cyclic loading followed by load-to-failure testing. **RESULTS:** Meniscal root repair with both the TSS and HMS suture techniques always significantly reduced ME compared to the root tear state when measured from the middle and posterior images regardless of the degree of knee flexion. The HMS technique resulted in significantly greater ME when compared to the TSS technique when measured at the middle image at 30° of knee flexion (p=0.049). No other significant differences in ME were detected when comparing these two suture configurations. During cyclic loading, no significant differences were found between the TSS and HMS groups when comparing displacement at 1000 cycles (p=0.609), stiffness (p=0.7860), and ultimate failure load (p=0.628). Mechanisms of construct failure included suture cut-out through meniscus (n=13), failure at the suture-anchor interface (n=3), and meniscal tissue failure (n=2). **CONCLUSION:** The HMS and TSS repair groups both demonstrated the ability to successfully reduce ME following root tears with comparable efficacy and performed similarly when comparing tensile properties. Our data suggests that operating surgeons can use either suture technique with no functional difference in the strength of the repair.

Primary Presenting Author: Ashlyn Fitch, BS

Role: Rush Student

RMC: M3

PERIPROSTHETIC TIBIAL PLATEAU FRACTURES FOLLOWING UNICOMPARTMENTAL KNEE ARTHROPLASTY ARE SUCCESSFULLY TREATED WITH OPEN REDUCTION INTERNAL FIXATION

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INTRODUCTION: Periprosthetic tibial fractures after unicompartmental knee arthroplasty (UKA) are rare but devastating post-operative events. Given the relative infrequency of these injuries, treatment strategies are not well-defined. The purpose of this retrospective case series is to report the results of a series of patients who underwent open reduction internal fixation (ORIF) of a periprosthetic fracture following UKA, including radiographic alignment, Knee Society Score (KSS), and failure rate. **METHODS:** Patients were identified by ICD code for periprosthetic tibial plateau fractures. IRB approval and informed consent from patients was received. Electronic medical records and radiographs were retrospectively reviewed. Fracture patterns and coronal and sagittal alignment of UKA components were measured on radiographs. Clinical outcomes including range of motion assessment, visual analog scale (VAS) pain scores, and Knee Society Scores (KSS) were collected at final follow up. **RESULTS:** Eight patients satisfied the inclusion criteria for this study. Fractures occurred at a median of 14 days (range: 5-52) after UKA and all exhibited vertical shear pattern that exited at the metadiaphyseal junction. Seven of eight (87.5%) fractures healed to radiographic and clinical union following the initial ORIF. One patient required reoperation for hardware failure. Mean VAS pain score and KSS score at final follow up were 3 and 85 ± 14 , respectively. **CONCLUSION:** Periprosthetic tibial plateau fractures following UKA commonly occur as a vertical shear fracture exiting at the metadiaphyseal junction. ORIF with a 3.5mm plate in buttress mode is a reliable method for treatment for these fractures. Restoration of alignment and motion is achievable, but residual pain may affect patient reported outcome scores.

Primary Presenting Author: Michael Godoy, BS

Role: Rush Student

GC: PhD

CHARACTERIZATION AND EFFECT OF WAVINESS ON TOTAL HIP REPLACEMENT STEM TAPER CONTACT MECHANICS

Michael Godoy (Rush); Jonathan A. Gustafson (Rush); Alfons Fischer (Rush, Max-Planck-Institute); Dennis Ovoshchnikov (Rush); Brett Levine (Rush); Robin Pourzal (Rush); Hannah J. Lundberg (Rush)

INTRODUCTION: Head-neck modularity has become the standard for total hip replacements (THRs), but in some cases, modularity has been linked to adverse local tissue reactions, and implant failure due to metal debris shed from the surfaces of modular junctions. One factor that may influence the risk for metal debris release is the modular junction surfaces' geometry (or surface topography). Surface topography on modular hip stem tapers can be split into two groups: roughness and waviness. Previous studies have not characterized waviness and the potential influence on modular taper assembly. This study aims to characterize waviness across a group of well-functioning stem tapers and use a validated finite element analysis (FEA) model to determine the effect of waviness on contact mechanics under multiple surgeon-applied implant assembly loads. **METHODS:** Thirty postmortem retrieved hip stems were chosen from an IRB-approved repository to characterize the taper waviness of well-functioning THRs. Three-dimensional models of the surfaces of each stem taper were generated using an optical coordinate measuring machine (CMM). The measured profile was filtered (Gaussian filter, 0.8mm cut-off frequency), and the mean amplitude and period of the resulting waviness profile were quantified. A validated FEA model was used to investigate the effect of surface waviness on stem taper contact mechanics during implant assembly. **RESULTS:** The median value of waviness height was 0.8 (range 0.50 - 1.23) μm . FEA found that for the case of no surface waviness, full contact is present throughout the length of the stem taper. In contrast, models with waviness exhibited less total contact for surgeon-applied assembly loads less than 6kN. There was a linear relationship between mean contact pressure and area as maximum assembly load increased. **CONCLUSION:** We investigated how waviness affects the contact mechanics at the head-stem interface. Due to waviness, surgeons must apply forces at or over 6kN when assembling the head onto the neck to obtain maximum contact between the modular junction surfaces.

Primary Presenting Author: Alexander Hornung, BS

Role: Rush Student

RMC: M3

DO TOTAL SHOULDER ARTHROPLASTY IMPLANTS CORRODE?

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BACKGROUND: Total shoulder arthroplasty (TSA) has become the gold standard treatment to relieve joint pain and disability in patients with glenohumeral osteoarthritis (OA) who do not respond to conservative treatments. To date, it is unclear if implant corrosion occurs in TSA, and if it is a cause for implant failure. This study aimed to characterize and quantify corrosion and fretting damage in a single anatomic TSA design and to compare the outcomes to what is known in THA. **METHODS:** Twenty-one surgical retrieved anatomical TSAs of the same design (Aequalis Pressfit, Tornier) were included in this study. The retrieved components were visually examined for taper corrosion under a microscope and taper damage was scored. Head and stem taper damage were measured with a non-contact optical coordinate measuring machine. In selected cases, the damage was further characterized at high magnifications using scanning electron microscopy. Energy-dispersive X-ray spectroscopy and metallographic evaluations were employed to determine underlying alloy microstructure and composition. Statistical significance for all tests was established at $p < 0.05$. **RESULTS:** The average material loss for head and stem taper was 0.007 mm^3 and 0.001 mm^3 , respectively. Material loss was not correlated with sex, age, history of prior implant, or time in situ ($p > 0.05$). There was greater volume loss in head tapers compared to stem tapers ($p = 0.002$). Implants with evidence of column damage had a larger volumetric material loss compared to those without ($p = 0.003$). The average angular mismatch was $0.03 (\pm 0.067)^\circ$ with negative and positive values indicating distal engagement and proximal engagement, respectively. Implants with proximal engagement were more likely to have column damage compared to those with distal engagement ($p = 0.030$). **CONCLUSIONS:** Corrosion within modular junctions has been of great clinical concern in THA. This is the first study to describe this phenomenon in TSA. This study has not only shown that the metal components of TSA implants can corrode, but also suggests that the risk of corrosion can be reduced by 1) eliminating preferential corrosion sites such as segregation bands and 2) ensuring distal engagement to prevent fluid infiltration into the modular junction crevice.

Primary Presenting Author: Sadiyya Ingawa, BSPH

Role: Rush Student

RMC: M2

COMPARING OUTCOMES OF COMPETITIVE ATHLETES VERSUS NONATHLETES UNDERGOING HIP ARTHROSCOPY FOR TREATMENT OF FEMOROACETABULAR IMPINGEMENT SYNDROME: A CASE-CONTROL STUDY WITH A MINIMUM OF 5-YEAR FOLLOW-UP

Halimatu S. Ingawa (Rush); Morgan Rice (Rush); Dhanur Damodar (Rush); Shane J. Nho (Rush)

INTRODUCTION Femoroacetabular impingement syndrome (FAIS), as defined by the 2016 Warwick Agreement, is characterized by symptoms of motion-related hip pain, clinical signs including restricted range of hip motion, and diagnostic imaging demonstrating abnormal hip morphology.¹ Seen in patients with varying levels of physical activity, FAIS can be treated surgically with hip arthroscopy if non-operative management options are not indicated or have been exhausted.² This study aims to compare outcomes of competitive athletes (professional, semiprofessional, or collegiate level) to nonathletes undergoing hip arthroscopy for treatment of FAIS at 5-year follow-up. **METHODS** The study was a retrospective analysis of all consecutive patients who identified as either a competitive athlete or a nonathlete and had undergone hip arthroscopy for FAIS by a single fellowship-trained surgeon between January 2012 and December 2015. Patients in the 2 groups were matched 1:2 by age, sex, and body mass index (BMI). Baseline and patient-reported outcomes (PROs), including the Hip Outcome Score (HOS)-Activities of Daily Living, HOS-Sports Subscale, modified Harris Hip Score, and international Hip Outcome Tool-12, were collected preoperatively and at 5 years postoperatively and compared between the groups. PROs were compared between the two groups using an independent sample t-test. **RESULTS** A total of 41 competitive athletes with average age and BMI of 23.4 + 6.1 and 23.8 + 3.0, respectively, were matched to 82 nonathletes and were included in the final analysis. Both groups had significant improvement in all PROs at minimum 5-year follow-up. A higher percentage of competitive athletes achieved any MCID (90.9% vs 75.0%, $p=0.086$) and any PASS (70.7% vs 61.7%, $p=0.399$) when compared to nonathletes. **CONCLUSION** While hip arthroscopy for the treatment of FAIS leads to significant improvement in PROs in athletes and nonathletes, a higher percentage of competitive athletes achieve a clinically significant outcome at 5-years postoperatively when compared to nonathletes.

Primary Presenting Author: Luke Kasson, BS

Role: Rush Student

RMC: M1

AN UNUSUAL CASE OF CLEAR CELL CHONDROSARCOMA WITH EARLY METASTATIC RECURRENCE

Luke Kasson, BS (Rush), Linus Lee, BE (Rush), Charles Gusho, BS (Rush), Matthew W. Colman, MD (Rush), Steven Gitelis, MD (Rush), Alan T. Blank, MD, MS (Rush)

case report, cannot include methods/results **INTRODUCTION (BACKGROUND):** Clear Cell Chondrosarcoma (CCC) has traditionally been regarded as a rare, low-grade subtype of conventional chondrosarcoma. The lesions are slow growing and generally respond well to surgical resection. Previous reports have demonstrated a very late time to metastasis following resection. **CASE PRESENTATION (IN LIEU OF METHODS/RESULTS):** We present a case of a 58 year old male that presented to the clinic following four months of progressively worsening right upper extremity pain, exacerbated by movement and occasionally radiating distally. Initial radiographs demonstrated a lytic lesion in the medial proximal humeral metaphysis with periosteal reaction over the medial cortex. Bone scan excluded metastatic disease. Following biopsy confirmation, the patient underwent en bloc resection with reverse total shoulder arthroplasty and proximal humerus replacement. Final pathology demonstrated grade II, moderately differentiated CCC with negative margins. At the fourteen month postoperative follow-up, a cervical spine lesion was identified on surveillance magnetic resonance imaging (MRI). Biopsy of the lesion confirmed a metastatic recurrence of CCC. The patient received an en-bloc spondylectomy and laminectomy of C7 with C4-T2 posterolateral arthrodesis. Following resection, the patient received radiation of 2.7 Gy in three fractions of the tumor bed. Within eleven months of this metastatic resection, additional spinal metastasis was identified and the patient received a T10 resection. **CONCLUSION (DISCUSSION):** Our case originally presented as an intermediate-grade Clear Cell Chondrosarcoma of the proximal humerus. Following surgical resection, the primary lesion demonstrated aggressive behavior and early metastasis to the cervical and thoracic spine. The aggressive nature of the primary tumor represents a divergence from historically defined behavior of Clear Cell Chondrosarcoma. A recently published meta-analysis has suggested a greater propensity for these lesions to exhibit aggressive characteristics, contrary to what has been previously understood. Additionally, this literature has indicated a strong correlation with tumor grade and tendency for aggressive disease. The propensity for CCC to follow an aggressive course has recently been identified, but even these cases typically follow a protracted clinical course. We believe that this case, in conjunction with this literature, highlights the need to raise awareness for the aggressive potential of Clear Cell Chondrosarcomas.

Primary Presenting Author: Jeffrey Lee, BS

Role: Rush Student

RMC: M2

Inconsistencies in Reporting for Preoperative Risk Factors for Anterior Cruciate Ligament Reconstruction Failure: A Systematic Review

Jeffrey Lee BS (Rush), Navya Dandu BS (Rush), Kevin Credille BSE MS (Rush), Nicholas A Trasolini MD (Rush), Reem Y Darwish BS (Rush), Adam B. Yanke MD PhD (Rush)

INTRODUCTION: Anterior cruciate ligament reconstruction (ACLR) failure is highly common with studies reporting ranges of 3.2-27%. Previous studies have studied the predictive preoperative factors for risk of failure, but many fail to account for the effect of confounding risk factors. This systematic review aims to identify the most significant factors for failure in order to assist clinicians in better evaluating patient candidates for ACLR. **METHODS:** Preferred Reporting Items for Systemic Reviews and Meta-analysis (PRISMA) guidelines were used to conduct a systematic review of scientific literature. Initial title and abstract screening yielded 561 studies, from which 76 full-title studies were assessed for eligibility. Thirty two full-text studies met the following inclusion criteria: (1) clinical studies regarding ACL injuries, (2) surgical procedures involving ACLR, (3) reported clinical outcome data including failure rate, (4) studies assessing pre-operative risk factors for failure, and (5) publication year within the past six years. These 32 studies were further subdivided into studies that defined ACLR failure as either revision surgery or graft failure. **RESULTS:** Ten risk factors were identified and included in the review for 22 studies defining ACLR failure as revision surgery and 8 risk factors were identified and included in the review for 10 studies defining ACLR failure as graft failure. Posterior tibial slope (PTS) (80%, 4/5 studies), age (79%, 11/14 studies) and graft characteristics (71%, 5/7 studies) were the most significant risk factors in studies defining ACLR as revision surgery. PTS (100%, 2/2 studies) and activity level (67%, 2/3 studies) were the most significant risk factors in studies defining ACLR as graft failure. **CONCLUSION:** Studies that investigate risk factors associated with ACLR failure often fail to control for the multitude of confounding variables that can influence outcomes. This often makes it difficult for clinicians to evaluate good candidates for ACLR. Based on our review, age, PTS, graft characteristics and activity level are significant preoperative risk factors that should be considered when determining candidates for ACLR. Further reviews and studies that can also control for the effect of confounding variables should be pursued.

Primary Presenting Author: Stephanie McCarthy, BS

Role: Rush Student

GC: PhD

MATERIAL LOSS AND ALLOY MICROSTRUCTURE: DO SEVERLY DAMAGED AND WELL-FUNCTIONING TOTAL HIP ARTHROPLASTY FEMORAL HEAD TAPERS DIFFER?

Stephanie M. McCarthy (Rush), Deborah J. Hall (Rush), Jennifer L. Wright (Rush), Brett R. Levine (Rush), Joshua J. Jacobs (Rush), Hannah J. Lundberg (Rush), Robin Pourzal (Rush)

INTRODUCTION: Damage to total hip arthroplasty (THA) implants releases debris into surrounding tissues, resulting in painful adverse local tissue reactions. Micromotion between modular components can lead to severe damage known as column damage, which is associated with greater material loss. Column damage was seen in 48% of severely damaged femoral heads made from CoCrMo alloy removed for cause and was linked to banding of the alloy microstructure, but well-functioning heads remain unstudied. **OBJECTIVE:** Determine if well-functioning THA femoral heads experience similar prevalence of microstructural banding and column damage as surgically revised heads. **METHODS:** 50 femoral heads were scored and two groups defined: A) damaged, B) undamaged. A coordinate-measuring-machine was used to determine volumetric material loss. Implant time in situ was determined, and metallographic head alloy samples were produced. Microstructural banding was identified using light microscopy. Groups were compared using Kruskal-Wallis and Mann-Whitney tests. **RESULTS:** Group selection was defined by damage score (n=9); A) damaged (scores 3-4), B) undamaged (scores 1-2, time matched to damaged group). Average time in situ was A) 92.2 (95%CI:48.3,136.2) and B) 112.0 (95%CI:79.4,144.7) months, (p=0.24). Median material loss was 0.09mm³(IQ range: 0.26) and 0.00mm³(IQ range: 0.01) for Groups A and B, respectively (p=0.001). 78% and 75% of heads in Groups A and B had banding, respectively. Column damage was seen in three Group A heads, all three of which exhibited banded microstructure. Banding was independent of manufacturer and material loss but was more likely to occur in larger heads (p=0.045). **CONCLUSION:** The presence of banding did not differ across groups of PMR femoral heads. Overall presence of banding (76%) was comparable to values observed in damaged surgically retrieved heads (81%). While banding is a precursor to column damage, banding is not related to micromotion onset. Other factors (i.e. -surface topography) are more likely to determine damage onset. Material loss of damaged PMR heads was lower than damaged surgically retrieved heads (1.2mm³), underscoring that severe head damage may not always result in high corrosion product burden. **SIGNIFICANCE:** Microstructural banding is prevalent in femoral heads. Eliminating banding could reduce the risk of detrimental column damage. However, fretting onset must be mitigated by other measures.

Primary Presenting Author: Pranav Mishra, MBBS

Role: Post-Doctoral Research Fellow

A 24-year review of degenerative changes in human articular cartilage

Pranav Mishra (Rush), Arnavaz Hakimiyan (Rush), Susan Chubinskaya (Rush)

INTRODUCTION Osteoarthritis is a disease of the joint, leading to degenerative morphological changes (DMC) in the articular cartilage. Examination and experimentation based on human articular cartilage is frequently limited by its availability. Nevertheless, the use of human tissue in ex vivo and in vitro experimentation is critical in translational experiments, bridging the gap between animal models and therapeutic trials in humans. **METHODS** From our ongoing collaboration with the Gift of Hope Organ and Tissue Donor Network, our lab's tissue repository has received 7543 human cadaveric. Donors with clinical histories which include gout, inflammatory arthropathies, prolonged non-ambulatory status, or surgical hardware in situ are excluded. Degenerative morphological changes are graded between 0 and 4, using a modification of Collin's grading by Muehleman et. al. **RESULTS** Across the 24-year span of our repository data, donors were normally distributed by age, with mean 62.6 (SD 14.6) years. 59.6% were categorized as 'normal' by weight (BMI 18.5-24.9 kg/m²), whereas 33.5% were 'overweight' (BMI > 25) and 6.9% were underweight (BMI < 18.5). Modified Collin's grade of articular cartilage noted right talus as 1.03 (SD 0.86), left talus 1.00 (SD 0.85), right femur 1.80 (SD 1.23), and left femur 1.74 (SD 1.25). Next, lateral differences were observed by subtracting the modified Collin's grade of the left side from the right side. 77.9% donors exhibited the same grading bilaterally in the talus and 75.9% in the femur. After selecting for donors with advanced morphological changes (Collin's grade 2+ in either side), 85.3% of talus and 74.5% of femur were symmetric bilaterally. If considering an error of +/- 1 when assigning a Collin's grade, 94.7% were symmetric. **CONCLUSION** Our lab's tissue availability and data represents one of the largest datasets and tissue biorepositories accessible for human articular cartilage. While normal age-related OA is expected with DMC of the knee, ankles are classically considered to be affected unilaterally with trauma. Our data not only finds bilateral progression of DMC about the knee, but also suggests that ankle joints symmetrically advance with DMC, as well. Such findings require further biochemical, histological, and biophysical analysis to determine root cause.

Primary Presenting Author: Parker Rea, Bachelor of Science

Role: Rush Student

RMC: M2

Machine Learning Clustering Analysis to Identify High Achievers after Anterior Cruciate Ligament Reconstruction: Meniscal Debridement Strongly Predicts Negative Clinically Significant Outcomes

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INTRODUCTION: Anterior cruciate ligament reconstruction (ACLR) is a clinically successful and safe procedure. However, patients may present with varying levels of preoperative activity, symptom duration, and concomitant injuries among other factors, and achieving clinically significant outcomes (CSOs) may be less predictable in certain patients. Analysis of postoperative CSO achievement have previously been limited to single patient reported outcome measures (PROMs). The purpose of this study is to determine significant global predictors of CSO achievements utilizing unsupervised machine learning. **METHODS:** A retrospective review of a prospectively collected patient-reported outcomes database was performed to identify patients who underwent elective ACLR from 2015-2018. CSO achievements on the IKDC and KOOS subscales as well as patient satisfaction at 1-year were determined. Patients were stratified into relative high-achievers and average-achievers utilizing unsupervised k-means clustering optimized on four internal validation metrics. A total of 30 demographic factors, clinical factors, and preoperative PROMs were assessed for prognostic value through a multivariate stepwise logistic regression. **RESULTS:** Overall, 196 patients were included in the initial analysis. Following initial clustering and outlier removal, 179 patients were included in the final two clusters. Among these, 60 patients were clustered based on CSO achievement into the high-achievement group, while 119 were in the average-achievement group. There were significant differences between the two-groups on likelihood of achievement of all CSOs as well as satisfaction ($P \leq 0.001$). Stepwise multivariate logistic regression identified lower preoperative score on the KOOS sport and recreational subscale (OR: 0.98, 95% CI: 0.96-1) and the KOOS symptoms subscale (OR: 0.98, 95% CI: 0.96-1.01), and older age (OR: 1.05, 95% CI: 1.01-1.1) to predict higher likelihood of achievement while concurrent meniscectomy at the time of surgery predicted reduced likelihood of high achievement (OR: 0.25, 95% CI: 0.07-0.76). **CONCLUSION:** Significant intergroup differences in rate of CSO achievement and satisfaction are present in patients following ACLR. Lower preoperative demand, greater preoperative symptomology, and absence of concurrent meniscal injury are predictors of postoperative CSO achievement and satisfaction. Patient's undergoing concurrent meniscectomy are 4-times less likely to achieve CSOs. This information can be utilized to counsel patient expectations during surgical decision-making.

Primary Presenting Author: Morgan Rice, Bachelor of Science in Finance

Role: Post-Doctoral Research Fellow

THE INFLUENCE OF SEX ON OUTCOMES AFTER HIP ARTHROSCOPY IN PATIENTS WITH COXA PROFUNDA: A COMPARATIVE COHORT ANALYSIS

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INTRODUCTION: Coxa profunda is a common finding in patients with femoroacetabular impingement (FAI) syndrome with pathomorphological considerations for pincer-type FAI and acetabular overcoverage. However, despite being more common in females current literature suggests coxa profunda may only be significant in males. **METHODS:** A retrospective review of patients who underwent primary hip arthroscopy for the treatment of FAI from January 2012 to December 2018 was conducted. Patients were separated into four groups by sex, and the presence or absence of coxa profunda. Patient reported outcome (PRO) scores were obtained preoperatively and at 2-years and assessed for significant improvements and achievement of clinically significant outcomes (CSO) defined by a Minimal Clinically Important Difference (MCID) or Patient Acceptable Symptom State (PASS) threshold score. A multivariable logistic regression was done to identify significant predictors of achievement of MCID. A subgroup analysis of males and females with coxa profunda matched 1:1 by age and BMI was conducted to further assess outcomes by sex. **RESULTS:** Coxa profunda was present in 52.5% of patients, though it was more common in females (62.8%) than males (31.1%). All four groups demonstrated statistically significant improvements in all PROs from preoperative to 2-years postoperative ($p < 0.05$). Males with coxa profunda demonstrated significantly inferior clinical outcomes with the lowest rate of achievement of MCID for any PRO (82.2%; $p = 0.007$). Male sex, coxa profunda, psychiatric history, and Tonnis grade 1 were significant negative predictors of achievement of MCID for any PRO. On matched subgroup analysis, males demonstrated inferior outcomes and male sex remained a significant negative predictor for achievement of any MCID on logistic regression analysis. **CONCLUSION:** Both male and female patients with and without coxa profunda were able to reach statistically significant improvement in patient reported outcomes at a minimum two-years postoperative. However, males with coxa profunda achieved clinically significant outcomes at a lower rate compared to both females with coxa profunda and male and female controls without coxa profunda. In the total cohort, male sex, coxa profunda, psychiatric history, and Tonnis grade 1 were negative predictors of achievement of MCID. Coxa profunda, particularly in males, should be considered by surgeons during preoperative planning and prognostication.

Primary Presenting Author: Samuel Rudisill, BS

Role: Rush Student

RMC: M3

OBESITY AND LOW BACK PAIN IN CHILDREN: ASSOCIATIONS WITH LUMBAR SPINE DEGENERATION, ALIGNMENT, AND PAIN MANAGEMENT

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INTRODUCTION: Low back pain (LBP) is common in children and adolescents, carrying substantial risk for recurrence and continuation into adulthood. Studies have linked obesity to development of pediatric LBP, however its role in lumbar spine degeneration remains debated. Considering the increasing prevalence of pediatric obesity and LBP, this study sought to characterize relationships between obesity, lumbar spine degeneration, alignment, and pain management. **METHODS:** Prospective data from pediatric patients presenting to a single institute with LBP and no history of spine deformity, tumor, or infection were reviewed. Demographic and clinical information was recorded, including use of physical therapy, nonsteroidal anti-inflammatory drugs (NSAIDs), paraspinal injections, and opioids. MRI and plain radiographic imaging were assessed for vertebral alignment (pelvic tilt [PT], pelvic incidence [PI], sacral slope [SS], lumbar lordosis [LL], PI-LL mismatch) and degenerative phenotypes (disc bulge, disc herniation, high-intensity zones [HIZ], disc degeneration [DD], disc narrowing, Schmorl's nodes and endplate phenotypes, Modic changes, spondylolisthesis, osteophytes). Univariate and multivariate regression analyses were performed. **RESULTS:** 194 patients (mean age: 16.7±2.3 years, 45.3% male) were included, of which 30 (15.5%) were obese (BMI >30). Obesity was associated with the presence of DD ($p=0.004$), HIZ ($p=0.011$), and Schmorl's nodes ($p=0.019$), as well as greater PT ($p=0.025$) and PI-LL mismatch ($p=0.044$). Controlling for age and sex, associations with DD (OR: 5.82, 95% CI: 1.56-21.77) and HIZ (OR: 4.79, 95% CI: 1.45-15.82) remained significant. Moreover, injection ($p=0.028$) and opioid use ($p<0.001$) were more common amongst obese patients, though only the relationship with opioid use (OR: 8.30, 95% CI: 2.51-28.00, $p<0.001$) persisted after accounting for age, sex, and degenerative phenotypes. **CONCLUSION:** While the cause of LBP is multifactorial, encompassing environmental, hormonal, biomechanical, and genetic contributions, obesity was found to be associated with DD, HIZ, Schmorl's nodes, PT, and PI-LL mismatch within the lumbar spine, shedding greater light on LBP etiology. Injection and opioid use was also more common amongst obese patients regardless of the presence of degenerative phenotypes. Our study underscores that pediatric obesity is related to various spinal changes and management, emphasizing maintaining healthy body weight as a promising method of promoting lumbar spine health.

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RMC: M4

Wearable Feedback Technology to Enhance Partial Weight-Bearing After Lower Extremity Fracture: a Proof-of-Concept Study with Surgical and Healthy Individuals

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INTRODUCTION: Excessive loading following lower extremity fracture (LEF) surgery disrupts the internal healing process often resulting in complications such as mal-union, delayed union, and non-union, causing unnecessary pain, prolonged treatment course, and functional impairment. Traditionally, partial weight-bearing (PWB) is subjectively estimated and can result in over-loading. **OBJECTIVE:** Utilize a novel pressure-detecting shoe insole capable of providing real-time pressure-based feedback (PBF) through wireless communication with a smartphone to instruct proper loading in healthy individuals and two surgical patients following fracture repair. **METHODS:** For all participants, a loading threshold was calculated by taking 30% of their total body weight (TBW) on a force plate which was applied to the PBF insole training system. Healthy subjects without history of trauma completed PBF training in the Rush Human Motion Lab. Accuracy of PWB was assessed via force plate prior to and immediately after real-time in-lab PBF training. Two surgical patients completed the same PBF training and also practiced at home with the insole for 3 days before returning for a final PWB evaluation. Average differences from the subjects' force plate thresholds were calculated as a percentage of TBW to compare baseline testing and post-PBF training trials, with the goal percentage being equal to their 30% threshold. **RESULTS:** After PBF training, healthy subjects loaded their limb at an average of 13.0% 7.5% off their 30% of TBW threshold compared with 20.4% 4.6% before training ($p=0.18$). Of the 7 healthy subjects (4M/3F), 5 saw their post-feedback average percentage of TBW come closer to their 30% target when compared to baseline. The average percentages off 30% of TBW threshold at baseline, post-feedback, and post-home training for the first surgical subject were 33.5% 9.8%, 21.7% 19.9%, and 6.0% 3.9%, respectively, and for the second surgical subject were 9.8% 5.1%, 8.6% 5.3%, and 2.7% 2.2%, respectively. **CONCLUSION:** These data suggest that healthy individuals and those with fracture can hone their loading skills with PBF. In alignment with previous literature, healthy subjects tend to overload when PWB without proper training. PBF training, both in the clinic and at home, is a promising treatment modality that could alleviate the over-loading issues consistently seen in patients following LEF surgery.

Primary Presenting Author: Justin Walsh, BS

Role: Rush Student

Dean's Summer Research Fellowship

THE MINIMAL CLINICALLY IMPORTANT DIFFERENCE, SUBSTANTIAL CLINICAL BENEFIT, PATIENT ACCEPTABLE SYMPTOMATIC STATE AFTER MEDIAL PATELLOFEMORAL LIGAMENT RECONSTRUCTION

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INTRODUCTION: Medial patellofemoral ligament reconstruction (MPFLR) has become an increasingly popular treatment for recurrent patellofemoral instability. Despite a growing body of research assessing clinical outcomes, the thresholds for the minimal clinically important difference (MCID), substantial clinical benefit (SCB), and patient acceptable symptomatic state (PASS) have yet to be defined for MPFLR. The goal of this study was to define these thresholds for patient-reported outcome measures (PROMs) after MPFLR and to investigate the role of preoperative, demographic and intraoperative variables for predicting achievement of these thresholds. **METHODS:** Retrospective cohort study using a prospectively-maintained database of patients undergoing primary MPFLR between August 2015 and December 2019. IRB approval with corresponding waiver of consent was obtained. PROMs included the International Knee Documentation Committee (IKDC), Knee Injury and Osteoarthritis Outcome Score (KOOS), KOOS Joint Replacement (JR) and Kujala. Anchor-based and distribution-based methods were used to calculate the MCID, SCB and PASS. Regression analyses were performed to identify prognosticators for achievement of clinically-significant thresholds. **RESULTS:** 139 patients met inclusion criteria (mean age: 21.7±8.2 years). At 6-months, the MCID values were 8.3 (KOOS-Pain) and 8.5/13.5 (Kujala); SCB were 1.4 (KOOS-Pain) and 43.7 (KOOS-Quality of Life (QOL)); and PASS were 64.9 (IKDC), 83.3 (KOOS-Symptom), 76.8 (KOOS-Pain), 91.2 (KOOS-Activities of Daily Living (ADL)), 47.5 (KOOS-Sport), 40.6 (KOOS-QOL), and 78.1 (KOOS-JR). At 1-year, the MCID values were 4.2 (KOOS-Pain), 7.2 (KOOS-ADL), 12.4 (KOOS-QOL) and 25.2 (KOOS-JR); SCB were 23.6 (IKDC), 4.2 (KOOS-Symptom), 19.7 (KOOS-Pain), 6.5 (KOOS-ADL), 55.0 (KOOS-Sport), 6.3 (KOOS-QOL), and 19.6/25.2 (KOOS-JR); and PASS were 65.5 (IKDC), 80.4 (KOOS-Symptom), 84.7 (KOOS-Pain), 99.3 (KOOS-ADL), 57.5 (KOOS-Sport), 53.1 (KOOS-QOL), and 76.3 (KOOS-JR). In regression analysis, greater age, BMI and preoperative PROMs were negative prognosticators for achieving clinically-significant thresholds. Conversely, male gender increased the likelihood of achieving PASS for Kujala at 6-months and KOOS-ADL at 1-year. **CONCLUSION:** This study established thresholds for the MCID, SCB and PASS at 6-months and 1-year after MPFLR, providing physicians an evidence-based method to advise patients and assess outcomes with this surgery. Older patients and those with higher preoperative outcome scores are less likely to report improvement and satisfaction with MPFLR, while male patients are more likely to report satisfaction.

Primary Presenting Author: Daniel Wichman, B.S.

Role: Rush Student

RMC: M1

DOUBLE-LEG SQUAT DEPTH AND VELOCITY ARE IMPAIRED IN PATIENTS WITH FEMOROACETABULAR IMPINGEMENT SYNDROME: A MOTION CAPTURE STUDY

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INTRODUCTION Patients with Femoroacetabular Impingement Syndrome (FAIS) have demonstrated altered movement mechanics which are thought to be a result of abnormal bone and soft tissue pathology. The tasks previously analyzed include gait, step-down tasks, and single-leg squat. However, there is a paucity of literature detailing the movement patterns of FAIS patients during a double-leg squat (DLS) task. The purpose of this study, therefore, was to compare double-leg squat (DLS) depth, DLS ascent velocity, and DLS descent velocity between patients with FAIS and healthy controls.

METHODS Three-dimensional kinematic data during three double-leg squat trials were acquired in 34 patients with FAIS and 26 age and sex matched healthy controls. The squat cycle was defined as the difference between the highest and lowest points of center of mass (COM) during the squat cycle. Squat depth was normalized to patient height by dividing the patient's height in meters. Squat velocity was calculated as the depth in meters divided by time of ascent and descent, respectively. Independent sample t-tests were used for between group measures comparing FAIS patients to controls. All statistical analysis was performed using SPSS (v. 26, IBM, Armonk, NY). An alpha level of 0.05 was used to determine statistical significance. **RESULTS** In the FAIS group (n=34), there were 22 females (64.7%) with a mean BMI of 23.1 ± 2.8 kg/m² and a mean age of 29.6 ± 6.9 years. The control group (n=26) consisted of 17 females (65.3%) with a mean BMI of 22.6 ± 3.2 kg/m² and mean age of 27.3 ± 7.0 years. There were no statistical differences between groups. Normalized squat depth in the FAIS group was 0.232 ± 0.06 m compared to 0.289 ± 0.05 m in the healthy control group ($p < 0.001$). Squat descent velocity was 0.605 ± 0.22 m/s for the FAIS group compared to 0.770 ± 0.19 m/s for the healthy control group ($p = 0.002$) and squat ascent velocity was 0.693 ± 0.22 m/s for the FAIS group compared to 0.843 ± 0.17 m/s for the healthy control group ($p = 0.003$). **CONCLUSION** During a double leg squat, patients with FAIS demonstrate reduced squat depth and velocity during ascent and descent compared to healthy controls. These findings demonstrate an altered movement strategy employed during a DLS task.

Primary Presenting Author: Daehan J. Yi, BA

Role: Rush Student

RMC: M2

CORROSION BEHAVIOR OF IMPLANT ALLOYS USED IN TOTAL SHOULDER ARTHROPLASTIES

Daehan J. Yi, Mozart Queiroz Neto, Deborah J. Hall, Bianca Romay, Jennifer L. Wright, Simona Radice, Gregory Nicholson, Grant E. Garrigues, Robin Pourzal

INTRODUCTION: Ti6Al4V and Co-base alloys are two essential implant alloys used in total shoulder arthroplasty (TSA) components. We have recently shown that TSA components can undergo fretting corrosion similar to that observed in total hip arthroplasties (THA). We have also shown that the microstructure of both alloy types can vary broadly within the specified constraints of their respective ASTM standards with implications on the corrosion behaviour. Thus, we investigated Ti6Al4V and Co-base alloys from three different manufacturers to characterize microstructure and corrosion behaviour. We hypothesized that despite identical or similar chemical composition, differences in microstructural features can dictate the corrosion behavior of TSA alloys. **METHODS:** We selected 3 TSA designs from three manufacturers referred to as Type A, B, and C. All types had a humeral stem made from Ti6Al4V. Types A and B had a humeral head made from CoCrMo alloy, while type C had a CoCrNiFeMo alloy. Each type was tested with N=5. Microstructure was assessed using electron backscatter diffraction (EBSD) and metallographic etching. For the electrochemical investigation, we conducted potentiodynamic-polarization tests in a three-electrode cell within simulated joint fluid (pH 7.6/37°C). Corrosion potential (E_{corr}) and corrosion current density (I_{corr}) were assessed for Ti6Al4V by Tafel's method. For Co-base alloys, pitting potential (E_{pit}) was also determined. Increasing values of I_{corr} (corrosion rate) and decreasing values of E_{corr} (corrosion tendency) and E_{pit} indicate poor corrosion behaviour. Each sample was tested 3 times. Differences between groups were determined using One-way-ANOVA and Kruskal-Wallis tests. **RESULTS AND CONCLUSION:** All Ti6Al4V components were made from wrought alloys. However, the microstructure differed slightly between types. Corrosion tests did not reveal any meaningful difference between the 3 types for either E_{corr} ($p=0.2$), or I_{corr} ($p=0.25$). The three cobalt base alloys were fundamentally different from one another. Differences in microstructure were also reflected in the electrochemical behaviour. The CoCrFeNiMo alloy exhibited a lower E_{corr} compared to the CoCrMo alloys but had the highest I_{corr} . The two CoCrMo alloys exhibited the same corrosion tendency, but the cast alloy had a higher corrosion rate. Type A had a slightly better pitting behavior compared to B and C.

Primary Presenting Author: Catherine Yuh, MS, PhD

Role: Post-Doctoral Research Fellow

FTIR-I CHEMICAL MAPPING OF ARTICULAR CARTILAGE AS A FUNCTION OF TISSUE DEGENERATION

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INTRODUCTION: Over the past decade, there have been increasing interests in Fourier Transform Infrared Spectroscopy (FTIR) to analyze biological specimens, including articular cartilage. FTIR is capable of simultaneously measuring multiple constituents and structural features, including proteoglycans, collagens, collagen integrity, and collagen orientation, and can be combined with imaging (FTIR-I) to measure spatial variations in biochemical composition. Here, we evaluated changes in biochemical composition and structure of human articular cartilage with varying states of degeneration using FTIR-I.

METHODS: Fourteen articular cartilage explants were obtained from twelve human donor tali (Gift of Hope Organ & Tissue Donor Network). Specimens were scored with the Collins Grade (G0, n=4; G1, n=2; G2, n=5; G3, n=1; G4, n=2). Explants were fixed in 10% formalin, embedded in paraffin, and sectioned at 6 μm using a microtome. Safranin-O/fast green staining was performed for all specimens and scored using a Modified Mankin Score. FTIR-I was performed using an Agilent Cary 670/620 system with a 128-by-128 MCT focal array detector (transmission mode using a 2 cm^{-1} spectral resolution at a spectral range of 3750-950 cm^{-1}). Univariate analyses were performed to assess proteoglycan and collagen content, as well as collagen orientation and integrity. K-means clustering (KMC) analysis was further applied to reveal distinct areas with differences in biochemical structure for each image.

RESULTS: Proteoglycan content measured using FTIR-I correlated with Safranin-O staining, where both demonstrated a loss of hierarchical layered structure with increasing cartilage degeneration severity. FTIR-I revealed that collagen was highly abundant across all samples. Cartilage assigned with a low Mankin score exhibited relatively uniform collagen content throughout the tissue. With increasing degeneration, the chemical map for collagen was less structured. KMC revealed three distinct areas with different biochemical structure, correlating to areas of high proteoglycan, collagen, and cellular content.

CONCLUSION: Our data indicates that FTIR-I is sensitive enough to detect subtle changes in tissue constituents that may be less identifiable with Safranin-O staining. In future work, we will implement additional analyses such as dimensionality reduction to determine meaningful patterns within each cluster, especially in tissues exhibiting severe degeneration.

Primary Presenting Author: Natalie Adamczyk, B.S.

Role: Rush Student

GC: PhD

RELIABILITY OF SPONTANEOUS PAIN BEHAVIOR ASSAYS IN AN ACUTE INFLAMMATORY MODEL

Co-authors: Victoria Eaton (University of New England), Robin Vroman (Ghent University), Jun Li (Rush University Medical Center), Anne-Marie Malfait (Rush University Medical Center), Tamara King (University of New England), Rachel E. Miller (Rush University Medical Center)

INTRODUCTION: Worldwide it is estimated that 240 million individuals have symptomatic osteoarthritis, OA. The ability to replicate spontaneous pain in a laboratory model of osteoarthritis is imperative to further the understanding of the disease and to better assess drug candidate's efficacy. The purpose of the study is to use an intra-articular Complete Freund's Adjuvant, CFA, model as a standard match for two behavioral tasks of spontaneous pain, conditioned place preference and weight-bearing, between two labs. **METHODS:** Animal studies conducted at the University of New England and at Rush University Medical Center were approved by their respective IACUC. On day one male C57BL/6 mice were injected in the right knee with CFA (5ul, .001mg/ul) or vehicle control and their baseline knee width was recorded. Conditioned place preference, CPP, consisted of a three-day protocol of a pre phase, habituation, and posttest, and was implemented on week one and week four post CFA injection. During the habituation day the animals were given an intra-articular injection of lidocaine (4%, 10ul) to develop a chamber preference. Prior to injection animals were habituated to the weight bearing task then assessed on weeks one and four using a static incapacitance device. **RESULTS:** A sample size of 30 mice (n=16 CFA; n=14 saline) was used to assess the effectiveness of both behavior tests. Animals that were injected with CFA had a significant difference in knee swelling from baseline values on day one and day three post injection ($p < 0.0001$, $p = 0.003$). Saline injection had no effect on knee swelling. CFA mice spent more time in the reward chamber at their posttest ($p = 0.05$) for both laboratories 24 hours after CFA induction but not at the four-week time point; saline mice had no effect at either time point. Similarly, CFA mice developed weight-bearing asymmetry compared to the saline group at the early time point but not at the late time point ($p < 0.0001$). **CONCLUSION:** Two different laboratories independently demonstrated that weight-bearing asymmetry and CPP can effectively discriminate pain behavior in an acute inflammatory model of joint pain. Future work will use these methods to study chronic osteoarthritis pain.

Primary Presenting Author: Sara Alotaishan, Bachelor of Science

Role: Rush Student

CHS: Masters

Correlation between Muscle Cross-Sectional Area at Third Lumbar and Twelfth Thoracic Regions among Intensive Care Unit Patients

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INTRODUCTION: Muscle mass is an important marker of nutritional status and clinical outcomes for critically ill patient. Computed tomography (CT) is a reliable method to quantify cross-sectional muscle area (CSA) at the third lumbar (L3) region, a surrogate for total body muscle mass. Yet, this limits the ability to assess muscle mass in patients with abdominal CT scans that include the L3 region. The cross-sectional muscle area at the twelfth thoracic (T12) is visible in chest CT images and includes similar muscle groups to the L3 region. Thus, the purpose of this study is to determine the correlation of CSA at L3 and T12 among ICU patients. **METHODS:** From March to December 2020, patients admitted to medical ICU who had a chest and abdominal CT scan within 7 days were included. Demographics and admission diagnoses were documented. Cross-sectional muscle area (cm²) and skeletal muscle index (cm²/height in m²) were calculated using Image J software at T12 and L3 regions. The correlation between muscle CSA was determined using Pearson correlation coefficient. **RESULTS:** A total of 31 patients were eligible. All subjects were admitted for COVID-19. More than half of the sample were male (58%), with a mean age of 65 years and a body mass index (BMI) of 28.7 kg/m². The mean T12 and L3 CSA were 111.1 (± 34.5) cm² and 132.5 (± 40.1) cm², respectively. A strong significant correlation was found between L3 and T12 CSA regions for all patients (r=0.880, p<0.001). The correlation was slightly stronger in males than females (r=0.886, p<0.001 versus r=0.851, p<0.001). Based on BMI, a stronger significant correlation was observed among overweight category BMI 25-29.9 kg/m² (r=0.978, p<0.001), followed by normal BMI 18.5-24.9 kg/m² (r=0.838, p=0.005), then obese BMI ≥ 30 kg/m² (r=0.825, p=0.001). **CONCLUSION:** Cross-sectional muscle area at the T12 and L3 regions showed a significant strong relationship. Hence, a diagnostic chest CT scan could be utilized to quantify muscle mass. Future research is needed to confirm these findings in a large sample of ICU patients.

Primary Presenting Author: Abhiroop Ganguly, MS3

Role: Rush Student

RMC: M3

VALIDATION OF THE MOTICON SCIENCE INSOLE3 IN MEASUREMENT OF SPATIOTEMPORAL VARIABLES

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INTRODUCTION Gait analysis can be used to assess patients with neurologic, musculoskeletal, or other diseases. One of the primary domains examined is spatiotemporal variables, such as speed and stride length. Current methods for measuring STP variables such as optoelectronic motion capture systems are expensive, require a dedicated laboratory space, and trained personnel to use them. Thus, we investigate the Moticon SCIENCE Insole3, a wireless insole device that can be worn inside a shoe, and its utility in measuring various spatiotemporal variables. **METHODS** This study was approved by the Rush IRB (ORA-12021506). Eleven healthy pain-free subjects were recruited for the study and informed consent was obtained. Reflective markers were placed on subjects and they performed walking trials at a slow walk (0.8-1.0 m/s) and regular walk (1.2-1.4 m/s) speeds across 20 meters. Data was simultaneously recorded using the Moticon insole and twelve Qualisys optoelectronic cameras. Data was processed utilizing Visual 3D and the Moticon desktop software and compared using intraclass coefficient (ICC) and Bland-Altman plots for six variables: speed, cadence, cycle time, stride length, swing time, and stance time. **RESULTS** When compared to the Qualisys camera system, the insole demonstrated the highest agreement in temporal parameters including gait cycle time, cadence, and stance time, with ICCs ranging from 0.817 to 0.961. Swing time and stride length for slow-walking had moderate agreement, with ICCs ranging from 0.510 to 0.654. Walking speed and stride length for moderate-paced walking demonstrated poor agreement, with ICCs from 0.036 to 0.334. **CONCLUSION** The Moticon SCIENCE Insole3 is a wireless portable device that has shown to have utility in measuring spatiotemporal variables when compared to an optoelectronic camera system, with ICCs similar to previous studies examining wireless insoles. The highest ICCs values were seen for cadence (steps per minute), gait cycle time (time to complete one gait cycle), and stance time (duration of double limb stance). Therefore, the device can be used in clinical scenarios such as measuring cadence as a metric of one's exercise capabilities. Additional studies could test the insole within clinical populations with pathologic gaits or investigate other movements such as running, jumping, or squatting.

Primary Presenting Author: Terese Geraghty, PhD

Role: Post-Doctoral Research Fellow

AGE-ASSOCIATED MURINE OSTEOARTHRITIS IS ACCOMPANIED BY PAIN AND DORSAL ROOT GANGLION PLASTICITY

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INTRODUCTION: There is an urgent unmet medical need for chronic pain caused by osteoarthritis (OA). To develop better analgesics for OA pain we need to understand the molecular mechanisms driving it. Immune cells play a role in modifying pain sensitization, but less is known in the context of age-associated OA. Multiple experimental models of OA exist, but are usually chemically- or injury-induced in male mice. Here, we aimed to characterize joint damage, DRG inflammation, and mechanical sensitization in aged male and female mice. **METHODS:** WT C57BL/6 male and female mice were aged to either +6 months or +20 months old. Mice were sacrificed to collect knees for histology, and blood and dorsal root ganglia (DRG) for flow cytometry analysis, which was completed with FlowJo software. Statistical analysis by student's t test was used for pairwise comparisons, and ordinary one-way ANOVA for comparison of multiple groups. All animal experiments were approved by Institutional Animal Care and Use Committees (IACUC). **RESULTS:** Knee histology (n=6-12) showed that older male mice had worse cartilage degeneration (on both medial and lateral sides) compared to younger mice, consistent with previous literature. Joint histology for female mice showed worse cartilage degeneration in 20 month old mice compared to 6 month old mice, but to a much lesser degree than in males. Pain behavior testing revealed that older mice had worse mechanical allodynia, knee hyperalgesia, and grip strength compared to younger mice. For both male and female mice, older DRGs showed decreased total frequency of CD45+ leukocytes, a significant increase in F4/80+ macrophages and CD11c+ dendritic cells compared to younger DRGs (n=6-12). We evaluated macrophage subtypes within the DRG and found changes between older and younger mice in CX3CR1, MHCII, CD163, and CD206 co-expression on F4/80+ DRG macrophages. **CONCLUSIONS:** Aging is a major risk factor for OA, and this study demonstrates DRG immune cells may contribute to mechanical sensitization associated with age-induced spontaneous OA. Only 12% of clinical osteoarthritis has been linked to post-traumatic injury, thus, studying spontaneous OA in aging mice may provide valuable insights that will lead to drug development of better analgesics for OA pain.

Primary Presenting Author: Mozart Neto, PhD

Role: Post-Doctoral Research Fellow

Microstructure and electrochemical behavior of conventional and additively manufactured Ti6Al4V alloy implant components.

Presenting author: Mozart Queiroz Neto (Rush University). Coauthors: Deborah J. Hall (Rush University), Robin Pourzal (Rush University).

INTRODUCTION: Ti6Al4V is the most used alloy in orthopedic implants, made from cast or wrought alloys, but additive manufacturing (AM) is increasing due to the affordable production of custom-made implants to fit specific patient needs and thereby reduce the revision surgery risk. AM has already entered the market, however, with little requirements to alloy microstructure. Therefore, this study aims to compare the microstructure of Ti6Al4V alloy of AM and the conventional retrieved implants and their electrochemical behavior. Our hypothesis is that, despite identical chemical composition, both conventional and AM implants have varied microstructure, that leads to dissimilar corrosion behavior.

MATERIALS AND METHODS: 24 orthopedic implants made of Ti6Al4V were selected: 17 were retrieved conventional implants, 6 additive manufactured devices, and 1 control alloy, all supplied by 7 different manufacturers. Implant alloy microstructure was assessed by electron-backscatter-diffraction (EBSD) and categorized in groups of alloys with similar features. Three implants from each group were selected for the corrosion study: 1) Electrochemical impedance spectroscopy (EIS), and 2) potentiodynamic polarization. Each sample was tested 5 times.

RESULTS: The samples were categorized according to their microstructure: A) fine equiaxed, B) bimodal, C) coarse equiaxed, D) with lamellar, E) lath-type and F) needle-like. While A-E exhibited β phase within an α matrix, F exhibited a α' martensitic structure. We observed differences in all corrosion metrics: corrosion current (I_{corr}), polarization resistance (R_p), capacitance (Q) and corrosion potential (E_{corr}). Group F had the worst corrosion behavior attributed to the metastable nature α' and the presence of built defects (local crevice corrosion), followed by equiaxed coarse and lath-type groups attributed to the galvanic coupling between α and β phase.

CONCLUSION: Confirming our hypothesis, Ti6Al4V alloys with the same chemical distributions exhibited different microstructural features that dictate their electrochemical behaviour. Especially, the higher i_{corr} is of concern, as it correlates directly with the corrosion rate. The findings also indicate the role of corrosion mechanisms, such as galvanic corrosion, crevice corrosion and uniform corrosion and their relationship with implant microstructure. It is imperative to understand the role of the Ti6Al4V microstructure on in vivo corrosion processes, to ensure implant longevity.

Primary Presenting Author: Alia Obeidat, PhD

Role: Post-Doctoral Research Fellow

SYNOVIAL AND SUBCHONDRAL BONE NEUROPLASTICITY IN FOUR MOUSE MODELS OF KNEE OSTEOARTHRITIS.

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INTRODUCTION Knee osteoarthritis is characterized by progressive joint damage. We previously reported that the nociceptive innervation of the medial compartment of the murine knee joint displays profound neuroplasticity 16 weeks after destabilization of the medial meniscus (DMM). In this study, we sought to describe the nociceptive neuronal remodeling in 4 distinct mouse models of OA, including age-associated OA and both surgical and nonsurgical/noninvasive models. **METHODS:** Sham, DMM, partial meniscectomy (PMX) or anterior cruciate ligament rupture (ACLR) was performed in the right knee of 10-12-week-old male C57BL/6 NaV1.8-tdTomato mice, which express a bright red fluorescent reporter in >90% of nociceptors. Mice were euthanized at (1) week 4, 8 and 16 after DMM or sham surgery (n=3-5/group); (2) week 12 after PMX (n=5); (3) day 28 after ACLR injury (n=2). In addition, wildtype (WT) male C57BL/6 mice were evaluated at age-24 months (n=3). Twenty- μ m-thick frozen sections were collected at mid-joint level. WT mice were PGP9.5-immunostained. Consecutive sections were H&E stained and assessed using OARSI score. **RESULTS:** In the DMM model, analysis of the NaV1.8+signal showed an increase in NaV1.8 innervation of the medial synovium as early as 4 weeks after DMM, and no further increase by weeks 8 and 16. NaV1.8+nerve fibers sprouted into SCB channels at 4 and 8 weeks after DMM, and this further increased by week 16 weeks. Twelve-weeks after PMX, the medial compartment showed marked joint damage. We observed increased NaV1.8+ innervation across different layers in the medial synovium and in osteophytes. Nociceptors were also detected within SCB channels. Twenty-eight-days after ACLR injury, joints exhibited full-thickness cartilage erosion, SCB sclerosis, and marked osteophyte formation in both compartments. We observed increased innervation within SCB channels in both the medial and the lateral compartment. The medial synovium showed thick NaV1.8+fibers in the deep layers. Lastly, knees from 2-year-old male C57BL/6 mice showed moderate cartilage damage. Interestingly, both the medial and the lateral compartments showed damage and NaV1.8+fibers in SCB channels. **CONCLUSIONS** Anatomical neuroplasticity was observed in association with joint damage in 4 distinct OA mouse models which suggests that neuroplasticity may well be intrinsic to the disease.

Primary Presenting Author: Robin Vroman, Master of Science Biochemistry & Biotechnology

Role: Rush Student

GC: PhD

MATRISOME EXPRESSION IN THE DORSAL ROOT GANGLION

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INTRODUCTION The extracellular matrix (ECM) is a dynamic three-dimensional network of macromolecules forming a structurally stable composite that provides mechanical support to cells and tissues. In addition, the ECM plays a critical role in cell signaling and morphology. The ECM comprises a wide variety of proteins which are collectively called the matrisome. It consists of a core matrisome including structural proteins and matrisome-associated proteins. Recently, a genetic pathway analysis identified the ECM as being the most regulated pathway in animal pain models. However, mechanistic insights into the role of ECM in pain are lacking. Therefore, we decided to investigate matrisome gene expression in the peripheral nervous system, in particular in murine dorsal root ganglia (DRG), which contains the cell bodies of sensory neurons. The goal of this study is to investigate the cellular distribution for matrisome gene expression in the DRG. **METHODS** Single-cell RNA sequencing (scRNAseq) was performed on 11 pooled 18-week-old male wild-type mice L3-L5 DRGs to analyze matrisome gene expression. Samples were sequenced by 10X Genomics and analyzed with the Seurat 4.0 package in Rstudio. **RESULTS** The DRG consist of different cell types from various neuronal cells, supporting cells, vascular cells, pericytes and immunological cells. We found that the core matrisome (glycoproteins (83% expressed), collagens (98%) and proteoglycans (92%)) is highly expressed in the DRG. Collagens and proteoglycans are mainly expressed by vascular cell types, Schwann, and satellite glial cells, while glycoproteins are expressed by neuronal, vascular cell types and pericytes. Matrisome associated proteins had a lower coverage compared to the core matrisome but were still widely expressed by DRG cells: secreted factors (68%), ECM-affiliated proteins (75%), and ECM-regulators (62%). Neuronal cell types are the dominant cell type for expression of the matrisome-associated proteins. **CONCLUSION** Our data show that the majority of matrisome genes are expressed in the DRG. DRG neurons express both core matrisome as well as matrisome-associated genes, supporting the idea that the matrisome may contribute to pain signaling. Identifying the cellular distribution of the matrisome genes provides a framework to study the role of the ECM in peripheral neuronal tissue and its influence on pain.

Primary Presenting Author: Brittany Wilson, PhD

Role: Post-Doctoral Research Fellow

Glucagon-like protein-1 receptor (GLP-1R) is expressed by periosteal cells and Exendin-3, a GLP-1R antagonist, affects osteogenic differentiation

Brittany M. Wilson, Katrien Corbeels, Alessandra Esposito, Sai Meka, Michael Kluppel, Pranav Mishra, Vidyani Suryadevara, Lily Yu, Alfonso Torquati, and Anna Spagnoli (AllRUMC)

INTRODUCTION: Bariatric surgery improves glucose control, and full remission of type 2 diabetes (T2D) is found in 40-50% of patients. However, the mechanisms by which insulin sensitivity is improved, while having detrimental effects on bone quality, are largely unknown. GLP-1, an incretin that stimulates insulin release, is considered an important mechanism for the improvement in insulin sensitivity after bariatric surgery. However, GLP-1 has also been found to affect bone quality. Meanwhile, sclerostin, a potent inhibitor of bone formation, is increased with T2D and correlates with markers for glucose control. Both GLP-1R and sclerostin are expressed by osteocytes, suggesting GLP-1 can affect sclerostin's production. Therefore, the purpose of this study was to determine if GLP-1R is expressed by periosteal cells and whether inhibition of GLP-1R leads to alteration in osteogenic differentiation through sclerostin in vitro. **METHODS:** Primary periosteal cells were isolated from the tibiae of 9-week-old female C57BL/6J mice (n=3) and passage 2 cells were grown in conditions supporting osteogenic differentiation. Periosteal cells were treated with 0, 10, and 100 nM Exendin-3, a GLP-1R antagonist, and mRNA was collected on day 0, 7, 14, 21, and 28 of osteogenic differentiation. Expression of GLP-1R, sclerostin, and other markers of osteogenic differentiation were quantified. Mineralization was determined by Alizarin Red staining at each time-point. **RESULTS:** GLP-1R was found to be expressed by periosteal cells undergoing osteogenic differentiation. However, Exendin-3 did not alter the expression of GLP-1R during differentiation. Alizarin Red staining showed a slightly higher mineralization with Exendin-3 treatment at day 14. **CONCLUSIONS:** GLP-1R is expressed by periosteal cells suggesting it could be a therapeutic target for improvement of bone health after bariatric surgery. Mechanistically, GLP-1R antagonism might lead to increased early mineralization. These results suggest that GLP-1 might regulate osteogenic differentiation. We have on-going studies aimed at assessing the effects of GLP-1R agonists on osteogenic differentiation and whether these effects are mediated through a regulation of sclerostin's expression and function.

Primary Presenting Author: Matthew Wood, BSc, PhD

Role: Post-Doctoral Research Fellow

DORSAL ROOT GANGLIA MACROPHAGE EXPRESSION OF THE DRUGGABLE RECEPTOR, GPR34, IS INCREASED IN MURINE OSTEOARTHRITIS.

Matthew J. Wood (Rush), Terese Geraghty (Rush), David Thomas (UMN), Alia M. Obeidat (Rush), Jun Li (Rush), Richard J. Miller (Northwestern), Rachel E. Miller (Rush), Anne-Marie Malfait (Rush).

INTRODUCTION: Currently available pain-alleviating therapies for Osteoarthritis (OA) are often inadequate and associated with serious adverse effects. Through single cell RNA-sequencing of mouse dorsal root ganglia (DRG) in experimental OA, we identified several putative molecular targets, including G-protein coupled receptor (GPCR) genes. We investigated the expression of the rhodopsin class GPCR, Gpr34, which is expressed by macrophages and microglia and has been implicated in neuropathic pain.

METHODS: PMX or sham surgery was performed on 10-week-old male and female mice. Ipsilateral L4 DRG were collected 12 weeks following surgery. Macrophage quantity was assessed by immunofluorescent staining for F4/80. Gpr34 expression was assessed by RNA in situ hybridization (ISH). For mouse DRG, Adgre1 and Gpr34 probes were used. Human DRG were removed postmortem from a male (age 82) and female (age 86) donor and RNA ISH was performed using GPR34 and CD14 probes. For macrophage quantity, regions of interest (ROIs) were generated from intensity thresholds and cell size parameters, and number of positive cells in 30X image were counted by a blinded observer. For Gpr34 expression, dots corresponding to RNA ISH positive Gpr34 signal were counted in Adgre1+ cells, taking an average across 3 tissue sections per mouse.

RESULTS: Both male and female mice developed joint damage by 12 weeks post PMX surgery. We observed an increase in the quantity of F4/80+ cells in the DRGs of PMX compared to sham controls. We confirmed the expression of Gpr34 specifically by Adgre1+ (F4/80) cells in the DRG by RNA ISH in both sham and PMX female mouse DRG. When assessing the expression level of Gpr34 by Adgre1+ cells, there was a significant increase in expression in the DRG macrophages of PMX compared to sham controls. Finally, we confirmed that macrophages (CD14+) in both male and female human DRGs express GPR34.

CONCLUSIONS: Here we have shown that the number of DRG macrophages increases in an experimental model of OA (PMX), and that Gpr34 is specifically expressed by macrophages in both mice and human. Since Gpr34 is a druggable target, future work will investigate the effect of targeting this receptor for chronic OA pain.

Primary Presenting Author: Lihua Chen, Ph.D.

Role: Post-Doctoral Research Fellow

CHRONIC EXPOSURE TO METHAMPHETAMINE INDUCES NEURONAL DYSFUNCTION IN RAT MEDIAL PREFRONTAL CORTEX IN A SEX-SPECIFIC AND WITHDRAWAL TIME-DEPENDENT MANNER

Lihua Chen (RUMC); Stefanie L Cassoday (RUMC); Anita Donner (RUMC); Lena Al-Harhi (RUMC); and Xiu-Ti Hu (RUMC)

Introduction: Methamphetamine (Meth) is a highly addictive and widely abused psychostimulant. There is no FDA-approved medicine for treating people with Meth Use Disorders (MUD). Although female and male Meth users are reportedly taking similar quantity of Meth, woman users appear to suffer greater consequential dependence, and experience more frequent relapse during the abstinence. People with MUD also show sex difference in the severity of Meth-caused cognitive deficits/structural changes in their brain. The mechanism underlying such sex difference is unknown; and understudied. The medial prefrontal cortex (mPFC), one of the key regulators of cognition and addiction, is profoundly altered by Meth; but the mechanism by which Meth causes dysfunction of mPFC pyramidal neurons is not fully understood. **Objective:** To determine the impact of chronic Meth exposure on mPFC pyramidal neurons in male and female adult rats. **Methods:** Male and female F344 rats (4~5-month-old) were trained to self-administer (SA) Meth (0.01mg/kg/infusion) for 1 week, and then SA (0.05mg/kg/infusion) for another 2 weeks. A subset of rats was tested for drug-seeking behavior on withdrawal day (d) 2, 3, 9, 16, 23 and 30, respectively. Age-matched saline (SAL)-yoked rats were used as control. Brain slices containing the mPFC were prepared for whole-cell patch-clamp recording after 1-5d (short-term) or 31-38d (long-term) withdrawal following the last Meth-SA. **Result:** (1) Both males and females showed similar drug-taking, total Meth intake and persisting drug-seeking behaviors during Meth-SA and a long-term withdrawal period. (2) Following a short-term withdrawal, Meth induced a significant decrease in firing of mPFC neurons from male rats, but not female rats. Meanwhile, Meth-SA also induced a significantly decrease in Ca²⁺ influx via voltage-gated Ca²⁺ channels (VGCCs) in mPFC neurons of male rats, but an increased Ca²⁺ influx in female rats. (3) After a long-term withdrawal, Meth-SA significantly increased neuronal firing and Ca²⁺ influx in both female and male. **Conclusion:** Our novel findings demonstrate that chronic Meth-induced mPFC neuron dysfunction is sex-specific and withdrawal time-dependent. They also suggest that a delayed onset of Meth-induced mPFC neuronal dysfunction could render females abusing Meth for longer period of time (or larger dose), which could cause more severe consequences.

Primary Presenting Author: Anita Donner, BS

Role: Rush Student

GC: PhD

HIV-1 INDUCES REGION-SPECIFIC DYSFUNCTION IN HIV+ POST-MORTEM HUMAN BRAINS

Anita Donner, Lihua Chen, Michelle Ash, Jeffrey Schneider, Lena Al-Harhi, and Xiu-Ti Hu

INTRODUCTION: Combined antiretroviral therapy (cART) has improved life expectancy for people living with HIV/AIDS (PLWH); but there is association with HIV-1 associated neurocognitive disorders (HAND). HIV induces neurotoxicity, causing dysregulation, injury, and in severe cases, death of neurons in the brain, which could be worsened by astrocyte dysfunction, potentially contributing to the mechanism underlying HAND. Among astrocytes, HIV not only causes immunological changes to dysregulate cytokines/chemokines, but also disturbs K⁺ buffering (mediated by inwardly rectifying Kir4.1 channels), glutamate uptake (mediated by excitatory amino acid transporters, GluT-1), and cell-to-cell communication (mediated by gap-junction protein connexin, Cx43); all could promote/induce neurotoxicity. Very little is known if, how and to what extent HIV actually alters astrocyte function in the brain of PLWH. **METHODS:** Here we assessed HIV-induced changes in the protein/mRNA levels of Kir4.1 channels, GluT-1s and Cx43 in the prefrontal cortex (PFC), caudate nucleus (CN; two key regulators of neurocognition), and cerebellum (a non-regulator of cognition) from post-mortem HIV+ human brains (at age of 44~97; HIV+ n=6 vs. HIV- n=4). **RESULTS:** We found that the protein levels of Kir4.1 channels and GluT-1s were significantly decreased ($p < 0.01$ and $p < 0.05$, respectively); while Kir4.1 channel mRNA levels were significantly increased ($p < 0.05$), along with a trend of increase in GluT-1 and decrease in Cx43 mRNA (likely a compensatory response to the reduced protein levels), in HIV+ human PFC compared to HIV- controls. We also found that, differing from that found in PFC, the protein levels of Kir4.1 channels and GluT-1 ($p < 0.05$) were significantly increased in HIV+ human CN compared to HIV- controls; and there was no significant change in their mRNA levels. In contrast, there was no significant change in the expression of these proteins/mRNAs in HIV+ human cerebellum. **CONCLUSIONS:** Our novel findings suggest that HIV induces astrocyte dysfunction in the human brain by altering expression/function of Kir4.1 channels, GluT-1s and Cx43, while such changes are region-specific, mainly affecting key brain regions that regulate neurocognition. Further investigation with larger sample size is needed to confirm such changes in PLWH on cART with the comorbidity of drug abuse and aging, and determine their potential contribution to the mechanism underlying HAND.

Primary Presenting Author: Amanda Narkis, BA

Role: Rush Student

RMC: M4

Alcoholic Polyneuropathies Initially Misdiagnosed as Guillain-Barré Syndrome and CIDP

Amanda Narkis, BA (Rush), Ryan Jacobson, MD (Rush), and Philippe Daniel, MD (Emory, Rush)

INTRODUCTION: Alcohol is a common cause of distal, symmetric polyneuropathy. Rarely, the time course may be surprisingly acute or the phenotype especially severe, raising concern for an inflammatory neuropathy such as Guillain-Barré Syndrome (GBS) or chronic inflammatory demyelinating neuropathy (CIDP). We encountered seven such patients, were referred or transferred to our medical center for evaluation of suspected GBS or CIDP, and ultimately diagnosed with a complication of alcohol abuse instead. **METHODS:** These patients were identified through a retrospective chart review at Rush University Medical Center from the period between 01/01/2014-08/05/2020. Patients were compared to a control group of seven patients with confirmed GBS or CIDP. **RESULTS:** We found several laboratory parameters that were significantly different between the groups. Alcoholic neuropathy patients had higher Mean Corpuscular Volume (MCV) (103.7 vs 90.5 fL, $p=0.0003$), higher Aspartate Aminotransferase (AST) (143 vs 26 U/L, $p=0.03$), lower Albumin (2.81 vs 3.93 g/dL, $p=0.01$) and higher International Normalized Ratio (INR) (1.89 vs 1, $p=0.01$). In the alcoholic group, none of the patients had demyelination on EMG. Four of the seven patients with alcoholic neuropathy that were misdiagnosed with GBS or CIDP had received immunotherapy before their evaluation at our center. **CONCLUSION:** Our series shows that patients with an acute alcohol-related polyneuropathy may be frequently misdiagnosed as having an inflammatory neuropathy. Several basic features can differentiate severe alcoholic or polynutritional syndromes from GBS or CIDP. The presence of elevated protein in a lumbar puncture, EMGs with features of acquired demyelination, and severe muscle weakness are more common in GBS. Our experience demonstrates that other basic lab parameters can likely differentiate alcoholic patients from those with immune neuropathies such as elevated MCV, elevated AST, low albumin, and elevated INR. Of note, many of these labs are routinely obtained and are readily available at the time of neurology consultation. Therefore, it remains key to review straightforward laboratory parameters when providing subspecialty consultation. Correct, timely diagnosis will ensure that patients receive the correct treatment. In addition, an accurate initial diagnosis of an alcoholic complication will lead to more timely attention to treating underlying nutritional deficiencies, as well as addressing ongoing alcohol dependence.

Primary Presenting Author: Nicollette Purcell, MS

Role: Rush Student

GC: PhD

Cortical Control of Cognition, Balance, and Gait in Huntington's Disease

Nicollette L. Purcell, MS (Rush University) and Joan A. O'Keefe PhD, PT (Rush University)

INTRODUCTION: Huntington's disease (HD) is characterized by significant cognitive and motor deficits which increase fall risk and negatively impact quality of life. The ability to multitask allows individuals to safely respond to environmental stimuli while navigating their environment. However, as HD progresses, it becomes difficult to divide attention between multiple tasks. Although previous studies investigated the negative relationship between impaired cognition and balance and gait in HD, our understanding of the neural mechanisms underlying these relationships is minimal. Furthermore, due to the constraints of fMRI, brain imaging during ecologically valid conditions is not possible. However, advancements in portable functional near-infrared spectroscopy (fNIRS) have provided a noninvasive means to functionally image the brain under a variety of conditions. fNIRS monitors cortical activity in real-time by measuring alterations in oxygenated (HbO₂) hemoglobin in the cortex. The objective of this study is to examine the cortical control of cognition, balance, and gait in HD under single-task (ST) and dual-task (DT) conditions compared to healthy controls. **METHODS:** Ten participants with HD and 10 healthy controls (HC) completed ST and DT balance and gait testing wearing an fNIRS cap to measure hemodynamic alterations in the prefrontal cortex (PFC), supplementary motor area (SMA)/premotor cortex (PMC), and posterior parietal cortex (PPC). Preliminary comparisons were done using a two-sample t-test or Mann-Whitney U test. This study was IRB approved and informed consent was obtained from all participants. **RESULTS:** Our preliminary data suggest that individuals with HD have significantly greater activation of the PFC during ST gait ($p = 0.03$). In addition, there is increased activation of the PPC during a dual-task balance condition compared to HC ($p = 0.01$). **CONCLUSIONS:** We hypothesize that due to decreased motor automaticity, individuals with HD require greater attentional resources from the PFC than HC to safely ambulate under ST conditions. Additionally, regions such as the PPC are recruited to compensate for PFC impairment and safely dual-task while balancing. To our knowledge, this is the first fNIRS study performed in HD and we aim to use information gathered from this study to inform future rehabilitation and preventive therapies in HD.

Primary Presenting Author: Kristina Stefanini, BA

Role: Rush Student

EXAMINING THE ASSOCIATION BETWEEN ANTICHOLINERGIC MEDICATION USE AND COGNITIVE DECLINE IN OLDER AFRICAN AMERICANS IN AN URBAN AREA

Kristina Stefanini (Rush), Kennedy Campbell (Rush), Raj C. Shah, MD (Rush)

INTRODUCTION: There is limited research on the risk factors for cognitive decline using African American populations. Anticholinergic medication use is common in older adults and are a potential target to mitigate cognitive decline. This study will examine the association between anti-cholinergic medication use and cognitive decline in an older African American population in the Chicagoland area. We hypothesized that there would be a greater decrease in global cognition among anti-cholinergic medication users compared to non-anti-cholinergic medication users. **METHODS:** The Minority Aging Research Study (MARS) is a longitudinal cohort study observing the cognitive decline in over 700 older African Americans for the last fifteen years. Using this data, a prospective cohort study was designed using a cohort over the age of 65, assigned to exposure group based on their baseline use of anticholinergic medications. Participants were excluded at baseline for having a history of Parkinson's Disease, history of dementia, history of stroke, or less than one year of follow-up. The primary outcome was global cognitive function, which was measured by averaging 19 cognitive tests, with secondary analyses observing five domains of global cognition (episodic memory, working memory, semantic memory, perceptual orientation, perceptual speed). **RESULTS:** Among all the study participants, the average age was approximately 73, 76.5% were female, and the average baseline global cognition Z-score was 0.0596. At baseline, there were 38 users of anticholinergic medications and 627 non-users of anticholinergic medications. The average global cognition score among users of anticholinergic medications was -0.00374 ($p=0.54$) compared to non-users. There was no significant difference between cognitive decline among exposure groups for the five domains of global cognition. **CONCLUSION:** Unlike prior studies on anti-cholinergic medication use and cognitive decline, this study did not observe a difference in cognitive decline between exposure groups. Further confirmation of results will be needed to explore what drove these differences. Within this study, there were low use of anti-cholinergic medications, which may not be generalizable to other populations.

Primary Presenting Author: Daniel Zhang, BA

Role: Rush Student

Dean's Fellowship

MINIMIZING PNEUMOCEPHALUS DURING DEEP BRAIN STIMULATION SURGERY

Daniel Y. Zhang (RUSH); John Pearce (RUSH); Edgar Petrosyan (RUSH); Ali Borghei (RUSH); Sepehr B. Sani (RUSH)

INTRODUCTION: Brain shift due to pneumocephalus during deep brain stimulation (DBS) surgery can result in targeting inaccuracy and suboptimal outcomes. We evaluate a new method to minimize pneumocephalus during DBS surgery. **METHODS:** Pneumocephalus volume was determined by segmenting post-operative 3D computerized tomography (CT) scans through a semi-automated protocol using ITK-SNAP software. Post-operative CT scans and surgical records were obtained for patients who underwent DBS surgery using a pneumocephalus minimization technique (PMT, n=20) and control patients who underwent DBS surgery with standard dural opening (n=30). To reduce selection bias, control patients were selected using propensity score matching by age, gender, DBS target, awake or asleep surgery, disease duration and comorbidities from a database of DBS patients who were treated at a single institution from 2014-2020. **RESULTS:** PMT significantly reduced pneumocephalus volume by 99.5% ($22.2 \pm 1.5 \text{ cm}^3$ to $0.11 \pm 0.26 \text{ cm}^3$, $P < 0.005$) in patients undergoing awake DBS surgery and by 97.8% ($11.8 \pm 12.1 \text{ cm}^3$ to $0.26 \pm 0.82 \text{ cm}^3$, $P < 0.002$) in patients undergoing asleep DBS surgery. There were no increased post-operative adverse events or increase surgery duration associated with PMT. **CONCLUSION:** We present a simple technique to reduce pneumocephalus during DBS surgery. This technique does not appear to be associated with post-operative adverse events.

Primary Presenting Author: Charlene Gamboa, PhD, MPH

Role: Rush Student

CON: PhD

GETTING TO THE YES! CARING RECRUITMENT OF OLDER AFRICAN AMERICANS ADULTS INTO HEALTH-RELATED RESEARCH STUDIES

Charlene J. Gamboa, PhD, MPH, Rush University Office of Research Affairs; Wrenetha A. Julion, PhD, MPH, R.N., FAAN, CNL, Rush University College of Nursing; Louis Fogg, PhD, Rush University College of Nursing; Dawn T. Bounds, PhD, PMHNP-BC, The University of California, Irvine, Sue, and Bill Gross School of Nursing; Jen'nea Sumo, PhD, RN, Rush University College of Nursing; Lisa L. Barnes, PhD, Rush Alzheimer's Disease Center

BACKGROUND Representative samples are essential to generalize outcomes of health-related research studies. However, little is known about optimal recruitment approaches, particularly for older African Americans (AA). The underrepresentation of AAs in health-related research is, in part, due to the skepticism caused by past research atrocities. There is a considerable gap in the literature focused on empirical investigations of successful recruitment strategies in this population. **PURPOSE** This study aimed to test whether caring behaviors exhibited by research recruiters contribute to AA and non-Latinx White (NLW) older adults' decision to enroll in a research study with a high commitment.

THEORETICAL FRAMEWORK This study was guided by Kristen Swanson's Middle-Range Theory of Caring, a situation-specific theory predicated on five interpersonal behaviors (knowing, doing for, being with, enabling, maintaining belief). **METHODS** Participants were 120 (60 AA; 60 NLW) adults ≥ 65 years of age who previously participated in a longitudinal Alzheimer's-related research study. Participants were randomly assigned to one of two written vignettes that manipulated the concept of caring (more versus less caring) of the recruiter in a hypothetical recruitment situation for research that included postmortem brain donation. **RESULTS** Participants assigned to the caring condition were more than twice as likely to agree to participate in the high commitment study regardless of race ($P < .001$). AA and NLW participants did not differ in their likelihood to agree to participate. Participants in the caring condition rated that recruiter as significantly more caring ($P < .001$). Among those who perceived the recruiter as uncaring, AA (21%) participants were more than twice as likely to agree to take part in the study with a high commitment compared to their NLW counterparts (9.5%), although this difference was not statistically significant. **IMPLICATIONS** Interpersonal relationship skills must be thoughtfully developed in recruiters. These findings were garnered in an artificial setting and may not fully reflect what may occur in real-world settings. **CONCLUSIONS** To employ appropriate recruitment approaches that target specific populations, a more nuanced understanding of uncaring and uncaring behaviors may be warranted.

Primary Presenting Author: Madeline Epsten, BA

Role: Rush Student

RMC: M4

Bladder Hotline: The Impact of Covid-19 and Telemedicine on Empiric UTI Treatment in Women

Madeline J. Epsten, Jennifer Ferraro, Fareesa Khan MD, Cynthia Brincat MD, PhD, Kristin M. Jacobs MD (Rush)
Presenting Author: Madeline Epsten

INTRODUCTION: Urinary tract infection (UTI), one of the most common reasons women seek acute care, is responsible for 15% of all community-prescribed antibiotics. The effects of the pandemic and telemedicine on UTI treatment are largely unknown. In this study, we evaluated the impact of Covid-19 and telemedicine on empiric UTI treatment in women, Hypothesizing that increased use of telemedicine during the pandemic would increase the rate of empiric UTI treatment. **METHODS:** This is a retrospective cohort study of treatment patterns of female patients aged 18-65. We queried ICD-10 codes for acute cystitis without hematuria (N30.00) and with hematuria (N30.01) during the first 6 months of the pandemic (March 2020 - August 2020) versus the 6 months preceding the pandemic (September 2019 - February 2020). Our primary outcome was presence of empiric antibiotic treatment, defined by treatment based on clinical picture with or without pending urine testing. Secondary analysis included determining which antibiotics were most commonly prescribed and treatment adjustment following initial encounter. In order to have 80% power to detect 10% difference with $p \leq 0.05$, we included 222 patients. Exclusion criteria included inpatient encounter, long-term care facility residence, urinary procedure in last 2 weeks, previously treated for UTI within 30 days. **RESULTS:** The average age of participants was 42 years. Fifty-two percent were white, 23% Black, and 23% Hispanic. No demographic differences existed between cohorts. During the pandemic, 36.6% of UTI encounters were conducted via telemedicine, compared to 1.5% pre-pandemic ($p < .0001$). The rate of empiric treatment increased from 58.2% pre-pandemic to 70.5% during the pandemic ($p = .055$). The rate of treatment based on clinical picture with no pending urine testing was significantly higher during the pandemic versus pre-pandemic ($p < .0001$). Nitrofurantoin or trimethoprim/sulfamethoxazole was used in 79% of patients prescribed an antibiotic. The overall rate of treatment adjustment was 17.1%, and there was no significant difference pre-pandemic compared to the pandemic. **CONCLUSION:** Covid-19 dramatically increased telemedicine utilization by women with UTI symptoms. Empiric treatment for UTI approached significance and confirmatory urine testing was done significantly less during the pandemic. Given the importance of antibiotic stewardship, it is important to further characterize and monitor telemedicine's impact of this condition.

Primary Presenting Author: William Langbo, BS

Role: Rush Student

RMC: M3

Peyronie's Disease Does Not Significantly Impact Patient-Reported Outcomes After Penile Prosthesis Implantation

William Langbo (Rush University Medical Center), Matthew Ziegelmann (Mayo Clinic), Petar Bajic (Cleveland Clinic), Laurence Levine (Rush University Medical Center)

INTRODUCTION Penile Prosthesis (PP) implantation is the gold standard therapy for men with Peyronie's Disease (PD) and concurrent Erectile Dysfunction (ED). Current literature reports PP satisfaction rates in patients with ED exceeding 80-90%. PD is characterized by deleterious effects on penile morphology, often involving penile shortening. We hypothesize PP satisfaction rates will be lower in patients with ED and concurrent PD, rather than ED alone. **METHODS** A retrospective chart review of pre-operative, perioperative, and post-operative factors was performed on all patients undergoing IPP implantation by a single surgeon between May 2012 and August 2019. A survey was mailed out in July 2019, containing validated ED Questionnaires (IIEF, EDITS, and QOLSP) and clinician-derived questions to evaluate patient satisfaction. Statistical analysis, including Student's T-test and Chi-Square, was performed to compare outcomes between patients with ED and patients with concurrent PD and ED. A p-value <0.05 was considered statistically significant. The study was IRB approved and patient consent was obtained. **RESULTS** 354 patients were identified, including 137 (39%) patients with concurrent PD and ED. 79 patients completed the survey (response rate of 22%). Of survey respondents, 38 (48%) had concurrent PD and ED. The mean follow-up duration was 45.5 (SD=19.5) months. There were no significant differences in demographics between patients who did and did not complete the survey. Among all survey respondents with and without concurrent PD, there was no significant difference in subjective numbness (8% vs 7%, p=0.12), prolonged pain (18% vs 24%, p=0.67), penile shortening (16% vs 15%, p=0.58), infection (5% vs 5%, p=0.58), or mechanical malfunction (5% vs 2%, p=0.51) There were no significant differences in IIEF, EDITS, and QOLSP scores between patients with and without concurrent PD. Among survey respondents, 87% described their ED as "much" or "very much" improved. 77% of patients would undergo PP again and/or recommend PP to a friend with a similar condition. **CONCLUSION** Within our study cohort, the presence of concurrent PD and ED did not impact subjective or objective patient-reported outcomes with PP implantation. PP implantation results in high rates of patient satisfaction, providing an effective and reliable option for those with ED and concurrent PD.

Primary Presenting Author: Katherine Sinchek, B.A.

Role: Rush Student

RMC: M3

PREVALENCE OF PELVIC FLOOR DISORDERS IN WOMEN WITH HIP DYSFUNCTION AND THE IMPACT OF SURGICAL TREATMENT OF THE HIP ON THE PELVIC FLOOR

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INTRODUCTION: Pelvic floor disorder (PFD) is a common issue affecting up to 30% of female patients. While stability of the pelvic floor has long been understood to be connected to the integrity of surrounding anatomical structures, there exists a lack of quantitative data on this correlation. Furthermore, no such investigations have looked into the relationship of pelvic floor disorder and stabilization of discrete structural components. For this reason, our team of multidisciplinary physicians inclusive of Urogynecologists, Female Pelvic Floor Medicine and Reconstructive Surgeons and Orthopaedic Surgeons plan to investigate PFD in female patients presenting for hip arthroscopic procedures. Through execution of this study, we intend to further elucidate the relationship between pelvic floor disorder (PFD) in women with known hip dysfunction by: 1) measuring the prevalence of PFD in women presenting for surgical hip procedures; 2) comparing pre-procedural to post-procedural symptomatic and quality of life scores with scales standard to urogynecology: Pelvic Floor Disability Index Short Form (PFDI-20), Pelvic Floor Impact Questionnaire (PFIQ-7), and Medical, Epidemiologic, and Social Aspects of Aging (MESA); and 3) evaluating the impact of surgical approach on patient's pelvic floor symptoms, as reported on said standard scales. By determining the prevalence of pelvic floor disorder in women with hip dysfunction and the effects of orthopedic hip procedures on symptomology and severity of pelvic floor disorder, we hope to gain a better understanding of the influence that surrounding musculoskeletal structures have on PFD. This gained knowledge may then be used to optimize treatments for women with comorbidities of pelvic floor disorder and hip dysfunction.

METHODS: A total of 65 female patients scheduled for hip arthroscopic procedures at Rush Medical Center will be enrolled into this prospective cohort study. Consenting participants will answer a preliminary demographic data questionnaire and three surveys (standard tools of assessment in Urogynecologic practice) to assess pelvic floor disorder, incontinence, and quality of life (MESA, PFIQ-7, PFDI-20). Following hip procedures, details of the operations and extent of hip dysfunction will be logged. Patients will then complete the same set of surveys at 3-month and 12-month post-procedural checkpoints. Data will be analyzed using descriptive statistics.

RESULTS/CONCLUSION: pending (study currently enrolling)

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SEXUAL FUNCTION EXPECTATIONS, OUTCOMES, AND DISCUSSIONS FOR PATIENTS UNDERGOING GENDER-AFFIRMING SURGERY

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INTRODUCTION Transgender and gender diverse individuals may undergo gender-affirming surgical interventions as part of their transition. Gender-affirming surgery (GAS), referred to as "bottom surgery" (ie vaginoplasty, metoidioplasty, and phalloplasty) and "top surgery" (ie breast/chest surgery) requires a multidisciplinary approach (The Standards of Care, WPATH, version 7). These procedures impact quality of life and sexual function, both of which are components of general well-being. In spite of their importance, sexual goals and sexual function are not reliably discussed prior to surgery. This study investigates whether sexual goals and expectations are discussed prior to GAS. **METHODS**

A prospective study of 50 adult individuals (> 18 years) undergoing GAS was initiated. The study involves pre- and post-operative questionnaires of individuals undergoing either genital or breast/chest surgery. Surveys were administered via Redcap. In addition to demographic data, individuals were queried as to: 1) their sexual goals and expectations regarding their planned surgery and 2) which providers, if any, discussed these issues prior to surgery. Postoperative surveys will be distributed at 6th month and 1 year time points. Surveys utilize both open answer and Likert scale measurements for qualitative and statistical analysis. **RESULTS** Preliminary results from the 16 completed preoperative surveys indicate that 37.5% (N=6) of respondents did not discuss their sexual history with any provider. 56.3% of respondents (N=9) did not discuss their post-operative sexual expectations with any provider. 70% (N=7) of top surgery respondents indicated that their providers did not discuss sexual expectations. Of those that did, 67% (N=2) were discussed by the surgeon, and 33% (N=1) were discussed by the PCP. 67% (N=4) of bottom surgery respondents did discuss their expectations with providers. 50% (N=2) were discussed with the surgeon, 25% (N=1) were discussed with the therapist and PCP, and 25% with just the therapist (N=1). **CONCLUSION** Gender-affirming surgery impacts sexual function and quality of life, and these domains are an important component of general wellness. Preliminary data suggest that preoperative sexual goals and expectations are not routinely discussed prior to surgery. This study demonstrates the need for exploration of sexual goals and expectations prior to undergoing GAS.