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Abstract Book

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EVALUATING BIOPSY TECHNIQUES IN THE UPSTAGE RATE OF PAPILLARY BREAST LESIONS

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Introduction: Benign papillary lesions (BPL) continue to be a controversial topic in both the literature and management of these lesions.

Objective: The purpose of this study is to examine various biopsy techniques along with lesion characteristics to determine if there is an association between the method of biopsy and the upstage rate of BPL.

Methods: A retrospective review of all breast biopsies performed at Rush University from January 1, 2011 to July 9, 2019 was performed to identify patients with papillary breast lesions. Lesions were divided into two groups: BPL and papillomas with atypia or other high risk lesions (HRL). Surgical pathologies were reviewed to determine the upstage rate. Upstaged and non-upstaged papillomas were compared for variables of interest.

Results: 330 papillary lesions were biopsied with 270 classified as BPL and 60 classified as papillomas with atypia or HRL. Of the 270 BPL, 167 underwent surgical excision, 80 elected for follow-up and 23 were lost to follow-up. Of the 60 papillomas with atypia/HRL, 50 underwent surgical excision, 7 elected for follow-up due, and 3 were lost to follow-up. 80.6% of the lesions (n=175) had either concordant pathology or were downstaged on surgical specimen: BPL to BPL 85.5% (n=141), atypia/HRL to atypia/HRL 38.5% (n=20), or atypia to BPL 26.9% (n=14). 19.4% of the lesions (n=42) were upstaged from biopsy to surgical pathology: BPL to atypia/HRL 12.1% (n=20), BPL to DCIS 1.2% (n=2), BPL to invasive carcinoma 1.2% (n=2) or papilloma with atypia/HRL to DCIS or invasive carcinoma 34.6% (n=18). There was no statistical difference in upstage rate between the various biopsy techniques, including imaging modality, number of samples taken, or use of a vacuum-assisted device. In examining characteristics between non-upstaged and upstaged lesions, there was no difference in the mean size or presence of ipsilateral or contralateral synchronous cancer.

Conclusion/Significance: This study supports the standard practice of surgical excision in papillomas with atypia or HRL, with an upstage rate to malignancy of 34.6%. Shared-decision making is necessary to discuss excision for BPL, with an upstage rate of 14.5%. This study did not find an association between the biopsy techniques utilized and the rate of upstaged papillomas.

THE EFFECTS OF EXERCISE ON CANCER RELATED FATIGUE AND QUALITY OF LIFE IN HIGH GRADE GLIOMA PATIENTS UNDERGOING TREATMENT

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Introduction: Cancer-related fatigue (CRF) is a challenging symptom among patients often contributing to emotional and cognitive distress, compromising quality of life (QOL), and hindering physical activity. National guidelines recommend regular exercise to minimize CRF symptoms, however this is not consistently being incorporated in cancer care plans.

Objective: This ongoing pilot study aims to assess the impact of regular exercise among patients with high grade glioma on CRF and QOL.

Methods: Institutional review board approval and informed consents from participants were received. High grade glioma patients undergoing chemotherapy and/or radiation are randomized to: 1) Usual Care (UC), 2) Exercise, or 3) Education Alone. Exercise consists of 1 in-person class/week plus written material while Education Alone consists of only written material. CRF is assessed using a Visual analog fatigue score (VAFS) rated on a 0-10 scale and CRF and global QOL are assessed using the 30-item European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ30) at weeks 0, 3, and 10. Data have been analyzed using descriptive statistics and percent change pre-post 10 weeks.

Results: Among 16 participants enrolled to date, the majority are Caucasian 63%, male 56%, aged 62 ± 16.56 and randomized to: UC (n=10), Exercise (n=5), and Education Alone (n=1). With respect to CRF, UC had a +25.6% change in VAFS (3.9 ± 2.2 vs 4.9 ± 2.9) and +35.3% change in EORTC-QLQ30 fatigue (FA) (43.1 ± 18.3 vs 58.3 ± 30.7), whereas Exercise had a -25.0% change in VAFS (2.0 ± 0.8 vs 1.5 ± 1.3) and a -20.1% change in EORTC-QLQ30 FA (27.8 ± 6.4 vs 22.2 ± 12.8). In terms of global QOL, UC had a -16.5% change (69.8 ± 18.9 vs 58.3 ± 20.4) whereas Exercise had a +2.7% change (79.2 ± 8.3 vs 81.3 ± 17.2).

Conclusion/Significance: These preliminary findings suggest that regular exercise decreases CRF and improves QOL among this population of cancer patients. Nurses are in a key position to promote regular exercise as a non-pharmaceutical intervention to minimize CRF and improve QOL. Further research is needed with a larger sample size to generalize our preliminary findings.

FUNCTIONAL DIET OUTCOMES AFTER TORS RESECTION OF OROPHARYNGEAL TUMORS

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Introduction: Transoral robotic surgery (TORS) has become a favored technique to lessen the adverse complications and outcomes associated with open surgeries for tumors of the oropharynx. However, data regarding swallowing-related functional outcomes in patients who underwent TORS is sparse.

Objective: This study assessed the effect of TORS on functional swallowing prior to other adjuvant treatments.

Methods: A retrospective chart review was completed on 46 patients (mean age 58.9±11.4 years) who underwent TORS procedure for oropharynx tumor (tonsil or base of tongue) management at Rush University Medical Center (RUMC) between January 1, 2014 and June 18, 2019. Tumor site, stage, time to post-op oral diet initiation, and functional swallowing ability pre, post, and 1-month post-surgery, were examined, prior to starting other adjuvant treatments. Functional swallowing was assessed using the Functional Oral Intake Scale (FOIS). Gender effects and tumor effects on time to initiate an oral diet and functional swallowing were assessed via ANOVA. TORS effect on functional swallowing was assessed via paired-samples t-test.

Results: Majority of patients were male (84.5%) with tonsil tumors (56.5%), staged from Tx through T3 (Tx=8.7%, T1=45.7%, T2=17%, T3 =8.7%). No significant gender or tumor effect on functional swallowing/oral diet was noted at any time point, or on time to initiation of an oral diet immediately post-op. At baseline all patients consumed an oral diet (mean FOIS=6.37 ±1.02). Postoperatively, 45 of 46 patients continued on an oral diet, initiating that diet within 2 days but showed a slight decrease in diet level (mean FOIS=4.98±1.04). One patient required non-oral alimentation via gastrostomy tube. By 1 month post-op, all patients including the patient with the gastrostomy tube, returned to an oral diet (mean FOIS=6.54±0.75). Decrease in group mean FOIS score from pre to post-op was statistically significant (t= 7.52, p<.0001), but, had resolved by 1 month post-op (t=0.916; p=0.365).

Conclusion/Significance: Results support TORS as a surgical technique with favorable postoperative functional swallowing outcomes. Patients can be effectively counseled pre-operatively regarding expectations for swallow outcomes without concern for tumor site or staging. Patients can expect a quick return to an oral diet and a return to foods similar to their baseline by 1-month post-surgery.

PERSISTENT RENAL TOXICITY AFTER INCREASED USE OF REACTIVE GASTROSTOMY TUBE PLACEMENT IN OROPHARYNX CANCER PATIENTS TREATED WITH CHEMORADIATION

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Introduction: Prophylactic percutaneous gastrostomy tube (PEG) insertion reduces toxicity from chemoradiation to the head and neck but is thought to increase long term feeding tube dependence.

Objective: This study retrospectively examines incidence and risk factors for treatment-related complications of oropharynx cancer patients with and without prophylactic PEGs.

Methods: Rush oropharynx cancer patients who received chemoradiation between 2007-2018 were included. Classifications were: 'therapeutic' PEG (pretreatment for immediate use due to inability to swallow), prophylactic PEG, reactive PEG (patient/physician preference or 10% weight loss from baseline), and no PEG inserted on treatment. We compared patients with reactive or no PEG to (1) patients with prophylactic PEG only, and (2) patients with prophylactic PEG and therapeutic PEG. Multivariate linear and logistical regression models were used to test PEG effect on weight loss, hospital admission, and incidence of acute kidney injury (AKI). Models were adjusted for covariates. Acute kidney injury (AKI) was creatinine 1.5-2x above baseline.

Results: In all, 104 patients were included with mean age 60.1 (SD=8.65) and baseline BMI 29.6 (SD=5.62). 53.4% (N=55) had a prophylactic PEG, 38.8% (N=40) had reactive or no PEG, 7.8% (N=8) had a therapeutic PEG. 80 (76.9%) were treated with cisplatin. Analyses showed that reactive PEG or no PEG patients were more likely to develop AKI during treatment compared to patients with a prophylactic PEG (OR:3.2, p=0.03), and to patients with prophylactic PEG and therapeutic PEG combined (OR:3.5, p=0.02). There were no statistically significant differences between PEG groups for weight loss and hospital admission rate. In cisplatin treated patients, reactive PEG or no PEG patients were more likely to be admitted to the hospital compared to prophylactic PEG patients (OR:3.8, p=0.04). Compared to patients with prophylactic PEG and therapeutic PEG combined, however, there was no statistically significant difference. Patients with reactive or no PEG were more likely to have AKI than prophylactic PEG (OR:5.2, p<0.01), and than patients with therapeutic PEG or prophylactic PEG (OR:1.5, p=0.02).

Conclusion/Significance: Reactive PEGs were associated with increased AKI and hospitalizations compared with prophylactic PEG. With a reactive PEG model, patients may need to have routine lab work and monitoring adjusted to reduce treatment complications.

ETIOLOGY OF PULMONARY TUMOR EMBOLISM: PRIMARY SINUSOIDAL ANGIOGENESIS VS LIPIODOL ADMINISTRATION

Presenting Author: Aamir Ahmed, MD

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Introduction: Hepatocellular carcinoma (HCC) has a tendency for intravascular dissemination. Studies have shown that this occurs through tumor embolization. We present a case where a patient developed respiratory failure after undergoing lipiodol administration, raising the concern that the lipiodol administration facilitated embolization.

Objective: To elucidate pathophysiology of pulmonary tumor embolism

Methods: A 72 year old male with history of hemochromatosis presented for evaluation of right atrial thrombus. The patient was diagnosed with portal vein thrombus two months prior, which was located in the left hepatic lobe and extended into the left portal, main portal, and superior mesenteric veins. Despite anticoagulation, repeat CT scan which showed increasing portal vein thrombus, and TTE suggested thrombus in the IVC/right atrium. TEE confirmed this echodensity. CT A/P showed a 3.4 cm enhancing lesion concerning for hepatic malignancy. On repeat TTE and cardiac MRI, no RA thrombus was identified. MRI abdomen showed cirrhotic liver without focal mass. Arterial phase enhancement was suboptimal. AFP was elevated.

Results: Patient underwent lipiodol embolization of hepatic arteries for evaluation of questionable lesion in hepatic segment. This showed diffuse lipiodol uptake with heterogeneous foci throughout right hepatic lobe and more mass-like uptake within segment 4a. Shortly thereafter, the patient's respiratory status declined, necessitating endotracheal intubation. CT chest showed scattered nodular opacities in all five lobes concerning for infectious versus inflammatory process, although the patient failed to improve after antibiotics or steroids. Lung biopsy demonstrated tumor emboli in the small and large vessels of the lung. The poor prognosis was discussed with the family, who decided to pursue comfort care. The patient expired shortly thereafter.

Conclusion/Significance: In this patient's case, there are two possible mechanisms for the pulmonary tumor embolism discovered in the pulmonary vasculature. First is primary pulmonary tumor embolism caused by sinusoidal angiogenesis. The patient's thrombi in the portal vein and RA may have been tumor thrombi rather than bland thrombi, possibly representing HCC that had previously spread to the vessels. Alternatively, the patient underwent lipiodol angiography, and lipiodol itself has a rare side effect of pulmonary tumor embolism. Patient's rapid decline in pulmonary function following this study supports this theory.

NUCLEOLIN EXPRESSION CHANGES REFLECT MALIGNANT FORMATION IN THE FIMBRIA AND ONSET OF OVARIAN CANCER.**Presenting Author:** Elizabeth Paris, BA**Co-Authors:** Itzel Lazcano (Rush University), Pincas Bitterman (Rush University), Janice M Bahr (UIUC), Sanjib Basu (Rush University), Animesh Barua (Rush University)

Introduction: Ovarian cancer (OVCA) remains a fatal malignancy of women largely due to its detection at late stages. Fallopian tube fimbriae have been suggested as the origin of high grade serous carcinoma (HGSC) and lack of information on the malignant transformation of fimbrial surface epithelial (FSE) cells is a significant barrier to developing early detection tests for OVCA. Tumor-associated changes in cell nuclei and a rearrangement in nuclear matrix proteins lead to shedding these proteins into the circulation. Shed proteins or autoantibodies against them represent markers of early changes for detection of OVCA.

Objective: The goal of this study was to examine changes in serum prevalence of a nuclear protein, nucleolin, associated with malignant changes in ovarian and FSE cells.

Methods: This was an exploratory pilot study with subjects/patients and the laying hen model of spontaneous OVCA. Nucleolin expression was examined in fimbrial tissues from subjects (BRCA1 mutated) with risk of OVCA development who underwent prophylactic surgery (n=5, age 40-50) and ovarian tumors from OVCA patients at early stage (n=5, age 60-70). Serum, fimbrial and ovarian tissues from healthy hens (n=10, 4 yr.), hens with fimbrial tumors (n=5) and hens with late stage OVCA (n=10) were also used. Nucleolin expression was examined by immunohistochemistry, Western blotting, and proteomic and gene-expression studies. Significant differences (P<0.05) in the expression intensity among normal, fimbrial, and ovarian tumor groups were determined.

Results: Intense expression for nucleolin was observed in FSE cells from subjects with BRCA1 mutation and in ovarian tumor cells from OVCA patients. Similar patterns of expression were also detected in fimbrial tumors and ovarian tumors at late stage in hens. Detection methods revealed a protein of approximately 76kDa, spectra indicative of serum prevalence in tumor samples, and strong amplification of nucleolin gene expression in fimbrial and ovarian tumors in hens as compared with normal fimbria.

Conclusion/Significance: Nucleolin expression increases with malignant transformation in the fimbria and ovarian tumor development. Serum prevalence suggests that nucleolin may be used as a marker of early OVCA development. Nucleolin may constitute a member of a panel of markers for early detection of OVCA. Support: NIH/NCI: CA210370

RUNX2 PROMOTES MICROTUBULE STABILITY FOR SURVIVAL OF BONE METASTATIC BREAST CANCER CELLS

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Introduction: Bone metastasis of breast cancer causes significant patient mortality. During metastasis, breast cancer cells induce autophagy to survive metabolic stress. Although the core autophagy machinery has been characterized, the regulatory mechanisms of autophagy in bone metastatic cancer cells remains unknown.

Objective: To examine autophagy during bone metastasis, we used a bone metastatic isogenic variant of breast cancer MDA-MB-231 cells. Previously, we and others have shown that Runt-related transcription factor-2 (Runx2) promotes cell survival, invasion, and tumor associated osteolysis. Therefore, we examined the regulatory mechanisms of Runx2-mediated autophagy for increased cell survival in the bone microenvironment.

Methods: Our results show that Runx2 promotes microtubule (MTs) stability to enhance autophagic flux. Runx2 silencing significantly decreases acetylated α -Tubulin (Ac- α -Tub) levels, a marker of stable MTs, which acts to promote trafficking of autophagosomes. Ac- α -Tub also increases during cellular stress, such as glucose starvation. We found that Runx2 knockdown cells are able to induce Ac- α -Tub but are unable to maintain acetylated polymer mass upon removal of stress. Furthermore, expression of wild type or transcriptionally inactive Runx2 can restore Ac-polymer of MTs in Runx2 knockdown cells, while C-terminal deletion mutant failed to rescue MT polymer mass. Interestingly, PCR array analysis showed that the core regulators of autophagy and cytoskeletal dynamics are unchanged with Runx2 silencing suggesting a transcriptionally independent function for Runx2 for maintaining the MTs stability.

Results: As MT targeting agents are often used as chemotherapeutics, we found that vinblastine treatment decreases Ac-polymer MTs with Runx2 silencing or expression of C-terminal mutant Runx2, while WT and transcriptionally inactive Runx2 expressing cells exhibit resistance to the treatment. Conversely, Docetaxel treatment enhances Ac- α -Tub polymer MTs. Recently, Ac- α -Tub has been linked with aggressive breast cancer. We performed immunohistochemistry for Ac- α -Tub levels in patient samples and found significantly strong Ac- α -Tub positive cells in matched and unmatched bone metastatic tumors compared to the primary tumors.

Conclusion/Significance: Our findings indicate that inhibition of Runx2 may sensitize metastatic tumors to MT targeting agents, and Runx2 and Ac- α -Tub levels may serve as markers for metastatic tumors to help stratify patients for optimal treatment for bone metastatic tumors.

INTRODUCTION OF CRYOTHERAPY IN A SEE AND TREAT PROTOCOL FOR CERVICAL DYSPLASIA IN HAITI

Presenting Author: Stephanie Dietz, MD

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Introduction: Cervical cancer mortality disproportionately affects women living in lower income countries, in part due to lack of access to cytologic screening for pre-cancerous abnormalities of the cervix. Visual inspection with acetic acid (VIA) followed by immediate treatment of suspected dysplasia has been demonstrated in low or middle income countries to be an effective approach to reducing cervical cancer incidence and mortality. Rush University has developed a partnership with a community in Haiti to utilize a 'see and treat' approach for identifying women with cervical dysplasia lesions and providing same-day treatment with thermocoagulation therapy.

Objective: To assess the reliability of a physician with brief training in VIA to reliably and accurately detect cervical dysplasia and to safely and appropriately administer same day treatment of dysplasia with thermocoagulation.

Methods: Women between the ages of 21 and 65 years of age were identified in the clinic during triage. Informed consent for screening for cervical dysplasia was obtained. Women underwent examination with a mobile colposcope. Images of the cervix before and after thermocoagulation (if applicable) were uploaded to MobileODT, a secure web application for viewing and storing colposcopic images. Study personnel at RUMC reviewed images to determine whether images were satisfactory for evaluation for cervical dysplasia and whether there was agreement with the Haitian physician's assessment of the presence or absence of cervical dysplasia.

Results: Between December 2018 and May 2019, 91 women were screened for cervical dysplasia. The average age was 41.1 years and the average number of live births per patient was 2.6. Thermocoagulation was performed on 14 of 152 patients. No patients experienced complications from thermocoagulation procedure. There was initial difficulty interpreting colposcopic images at Rush due to technical factors, which improved after feedback was provided to the colposcopist in Haiti.

Conclusion/Significance: Thermocoagulation appears to be safe and well tolerated among patients in Haiti. Next steps in this project will include determining the concordance of Haitian providers' colposcopic impressions with Rush providers' colposcopic impressions. See and treat protocols for cervical dysplasia in lower resource settings are feasible and may aid in addressing the greater burden of cervical cancer related morbidity and mortality in these settings.

THE ROLE OF CCL2 AND TUMOR ASSOCIATED MACROPHAGES (TAMS) IN LUNG ADENOCARCINOMA

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Introduction: Tumor Associated Macrophage (TAM) density in the tumor immune microenvironment (TME) has been shown to be immunosuppressive and increase tumor growth. While new immunotherapies are currently being developed to target TAMs, it is unknown which subsets of patients will benefit most from them and how to determine TAM densities around a tumor. Prior studies have shown that CCL2 is the primary chemokine that recruits myeloid cells from bone marrow, and it is associated with worse overall survival in lung adenocarcinoma. A new compound, GB1275 seems to reduce TAM density and CCL2 through agonism of CD11b in mice.

Objective: To determine the effect of GB1275 on CCL2 levels and the TME and correlate CCL2 levels with TAM densities to better establish patient sub-groups that would benefit from receiving TAM-targeted immunotherapies.

Methods: Both GB1275 treated mice and CD11b KI mice were created to study their respective effects on the TME. Flow cytometry and immunohistochemistry were used to determine the effect of GB1275 and CD11b on various cell markers and cell types. Data collected from The Cancer Genome Atlas was analyzed using Excel and CIBERSORT. The IRB and IACUC at RUMC approved all animal studies under protocol #17060903-IRB02.

Results: The flow cytometry analysis showed that TAMs, especially M2 TAMs, decreased in both GB1275 treated and CD11b KI mice. Analysis of sera from both mice showed a significant reduction in CCL2 levels. When comparing CCL2 levels to M2 macrophages in 125 humans with Lung Adenocarcinoma, we found a Pearson correlation of 0.56 ($P < 0.01$), which increased when accounting for sex, tumor stage, and most drastically when accounting for pack years. Those in the bottom tertile based on pack years had a Pearson correlation of 0.66 ($P < 0.01$) and those in the top tertile had a Pearson correlation of 0.69 ($P < 0.01$).

Conclusion/Significance: This study demonstrated the effects of GB1275 on the TME, and identified CCL2 as a possible marker for high M2 macrophage densities. However, more data is likely needed to study this in humans, as the effect seemed to be less clear than it was in our murine model, possibly due to varying patient demographics and lifestyles.

RISK OF VENOUS THROMBOEMBOLISM AMONG PATIENTS UNDERGOING SURGICAL EXCISION FOR CUTANEOUS MALIGNANCY

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Introduction: Venous thromboembolism (VTE), either deep vein thrombosis or pulmonary embolism, is one of the leading causes of postoperative morbidity and mortality in cancer patients. VTE risk differs depending on type of malignancy.

Objective: Using the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP), we evaluated the incidence of VTE in patients undergoing surgical excision for cutaneous malignancies.

Methods: A retrospective cohort study of patients undergoing cutaneous excisions was performed using the ACS NSQIP database (2008-2017). Current Procedural Terminology (CPT) codes were used to identify patients who had undergone surgical excision for benign or malignant disease. Patients were categorized by the presence of cutaneous malignancy (melanoma, basal cell carcinoma, squamous cell carcinoma) or the absence of cutaneous malignancy using International Classification of Diseases (ICD) codes. The incidence of 30-day postoperative VTE was compared between groups. We further evaluated VTE incidence between various procedure types using CPT codes.

Results: Twenty-nine VTE events were found among 15,169 patients. The incidence of VTE for patients with cutaneous malignancy was 0.18% (9/4,901) while the incidence of VTE for patients without cutaneous malignancy was 0.19% (20/10,239) ($P=0.8778$). No difference was found when comparing VTE incidence between melanoma (0.21%), basal cell carcinoma (0.18%), squamous cell carcinoma (0.13%), and benign pathology (0.20%) ($P=0.9777$). Additionally, no difference was found when comparing VTE incidence between various procedure types, including benign excision (0.19%), malignant excision (0.07%), malignant excision and sentinel lymph node biopsy (0.25%), malignant excision and lymph node dissection (0.88%), malignant excision with reconstruction (0.38%), or malignant excision with reconstruction with either sentinel lymph node biopsy or dissection (0%) ($P=0.1456$).

Conclusion/Significance: Cutaneous malignancy does not appear to be associated with VTE in patients undergoing surgical excision of primary disease. Therefore, the decision for perioperative anticoagulation should be determined by individual patient risk factors.

THE ROLE OF GLUTAMATE RECEPTOR INHIBITION IN THE TREATMENT OF MELANOMA**Presenting Author:** Jesus Diaz, BA**Co-Authors:** Jesus Diaz (Rush)*; Kajal H. Gupta (Rush); Kevinn Eddy (Rutgers); Ann W. Silk (Harvard); Suzie Chen (Rutgers); and Andrew Zloza (Rush)

Introduction: Melanoma is the most aggressive form of skin cancer. Late stage (stages 3 and 4) melanoma is currently not curable. Currently the frontline therapy for patients with late-stage melanoma is PD-1 checkpoint blockade, which releases a brake imposed on the immune system towards harnessing the natural ability of host immunity to overcome cancer. However, only a small proportion of patients demonstrate long-term benefit. Therefore, additional studies of single and combination treatments are needed. Recently, it was discovered that melanoma expresses increased glutamate receptor (GRM1), which could provide a new target for cancer treatment via its blockade. Preliminary studies show that a drug, riluzole, blocks glutamate signaling, but it is not sufficiently effective because of its high patient-to-patient variability, due to heterogeneous elimination from the body. Recently, a new riluzole-derivative drug, troriluzole, has been developed that has demonstrated less patient-to-patient variability, a 30% greater oral bioavailability, and the ability to last longer in the body. Preliminary data suggest that immune-related changes underline the anti-tumor efficacy of this combination treatment.

Objective: The data from the combination treatment can be utilized to determine predictive biomarkers of cancer outcome and potential immune mechanisms.

Methods: For our studies, we treated melanomas in a genetically engineered mouse model (GEMM) with troriluzole, in combination with PD-1 blockade and interrogated blood samples obtained from treated or control mice to determine predictive immune biomarkers of response at various time points. From tumor growth curve kinetics and luminex analysis of immune cytokines and chemokines in the blood, we are working to predict whether the mice are responders or non-responders to the proposed therapy.

Results: Results showing tumor growth and biomarkers discovered will be presented.

Conclusion/Significance: We envision that this study will lead to the discovery of biomarkers that we can test in an upcoming clinical trial from limited samples that can be obtained from patients, towards predicting which patients will respond and which will not respond (and thus need additional or alternative treatments). Further, this study will allow us to determine mechanisms by which troriluzole alone and in combination with anti-PD-1 decreases tumor growth towards the formulation of further improved treatments for cancer.

REGULATION OF ACETYL-CoA SYNTHETASE PROTEINS ACS1 AND ACS2 IN BREAST CANCER**Presenting Author:** Sarah Calhoun, BA**Co-Authors:** Sarah Calhoun, Lei Duan, Carl Maki

Introduction: Breast cancer (BC) is the second most common cause of cancer death for women in the United States. About 70% of BC cases are classified as estrogen receptor positive (ER+). ER+ tumors rely on estrogen receptor- α (ER α) for cell growth and proliferation. Tamoxifen (TAM), a partial antiestrogen, is used to treat ER+ BCs in premenopausal women. TAM has increased 5-year overall survival by 50% compared to no treatment. However, about 1/3 of these women will acquire TAM resistance and develop recurrent, more aggressive disease. Acetyl-CoA Synthetase (ACS1 and ACS2) are proteins shown to promote cancer cell survival in several cancers, including breast cancer. Both ACS1 and ACS2 convert acetate to acetyl-CoA which can be used for lipid synthesis, autophagy, and histone/protein acetylation events.

Objective: In TAM resistant cells, we identified ACS1 as a gene upregulated in response to TAM in TAM-sensitive MCF-7 cells and basally upregulated in TAM-resistant cells. Therefore, we hypothesized ACS1 and/or ACS2 may be regulated in ER+ breast cancer cells by ER \pm .

Methods: ER+ cell lines (MCF-7) and ER- cell lines (SUM159PT, MDA231) were treated with an estrogen, 17 β -estradiol (E2), or the active metabolite of tamoxifen, 4-hydroxytamoxifen (4-OHT). Western blot and mRNA gene analyses were used to measure protein and gene expression of ACS1 and ACS2 in these cells.

Results: mRNA gene analysis identified ACS1 as a gene upregulated in 4-OHT treated MCF-7 cells and basally upregulated in TAM resistant cell lines. Immunoblot analysis and mRNA gene analysis demonstrated ACS1 was downregulated in response to E2 and upregulated in response to 4-OHT in MCF-7 cells but not in ER- cells. ACS2 mRNA and protein was increased in two ER- cell lines but not in MCF-7 cells. ACS2 was increased in response to the autophagy inhibitor bafilomycin-A, while ACS1 was not.

Conclusion/Significance: ACS1 was regulated through E2 and 4-OHT and appears to be dependent on ER \pm . ACS2 expression was not changed by E2 or 4-OHT but was in response to bafilomycin, suggesting a different means of regulation. Future studies will clarify how ACS1 and ACS2 are regulated in breast cancer and the consequence of this increase.

STORAGE CONDITIONS OF DRIED BLOOD SPOT EFFECT ON ANALYTE STABILITY

Presenting Author: Claire Auger, Bachelors Degree in Biology

Co-Authors: Claire Auger, Grant Lewin, Imad Tarhoni, Hita Moudgalya, David Gerard, Jeffrey Borgia

Introduction: Measuring circulating biomarkers for diagnostic and prognostic purposes is a field that has garnered much interest. Dried Blood Spot (DBS) offers the potential for a minimally invasive and cost-effective method for measuring serum analytes. Historically, limited sample material collected by DBS limited its clinical application. The development of more sensitive protein measurement techniques, such as mass spectrometry and Luminex, has expanded the potential for the use of DBS as a collection method. Despite this progress, benchmarks for analyte integrity and quality control as measures to ensure platform accuracy and robustness have not been fully developed and are sparsely unavailable in the literature.

Objective: Blood will be spotted onto filter paper cards, specifically constructed to permit the removal of serum from whole blood. These cards will subsequently be subjected to different storage conditions before the extraction of the analytes from the card. This method will determine if a significant change in stability of the analytes is related to the storage environment of the cards.

Methods: Whole blood from eight late stage cancer patients was collected, and 100ul volumes were spotted onto cards and stored under varying temporal (0, 1, 3, 14, 28 days), temperature (4°C, -25°C, -80°C), and additive (with or without protease inhibitor [PI])-based combinations. Proteins were extracted from the cards and were tested for hypothesized biomarkers via kits utilizing the Luminex platform (Angiogenesis II and Cancer Biomarkers). Analyte variability between different storage conditions were analyzed for significance (MANOVA).

Results: No significant differences between the variants were detected on the Average Net MFI or the Average Results (p-value > 0.05) for the Angiogenesis II markers, which included sEGFR, suPAR, and OPN. The Average Results for the two tested Cancer Biomarkers, Leptin and CEA, were not significantly impacted by the time, temperature, and PI treatments.

Conclusion/Significance: Different storage conditions do not significantly influence the measurement of blood-based analytes as performed by Luminex. The DBS collection paradigm, therefore, allows sample serum analytes to be stably preserved regardless of the storage conditions.

AUGMENTING TUMOR ANTIGEN REPRESENTATION TO IMPROVE IMMUNITY TO CANCER

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Introduction: Immuno-oncology (IO) has revolutionized the treatment of cancer by harnessing and boosting the inherent ability of the immune system to recognize and eliminate tumors. However, only a small portion of patients treated with any single cancer immunotherapy demonstrate a response. Importantly, those patients who do respond, experience durable long-term benefit.

Objective: Although precision medicine increasingly is allowing us to determine mutations shared across patients with similar tumor types, our current knowledge of which resulting mutation-induced tumor antigens should be targeted for optimal anti-tumor immune responses is lacking. Further, the cost and time necessary to develop these personalized therapies is prohibitive and related clinical trials, thus far, have not demonstrated improved cancer outcomes. When antigens associated with danger are visible to a stimulated immune system, such as in the context of pathogens, potent actions are taken by immune populations. To recreate such outcomes in the context of cancer, we have sought to develop an efficient, cost-effective, rapidly constructed platform to create augmented anti-tumor immune responses within the tumor microenvironment.

Methods: Specifically, we have targeted improving tumor antigen presentation by re-presenting the whole spectrum of tumor antigens to the immune system via the utilization of nanoparticle biotechnology. We have termed this platform, the Antigen-Maximizing Presentation System [AMPS].

Results: The strength of our approach is that it does not require a priori knowledge of the antigens (including sequence or number) that need to be targeted for an optimal immune response. It is not limited to any specific type of tumor and it utilizes inherent potent immune responses to deliver improved antitumor immunity. Our preliminary findings in the context of a mouse melanoma (B16-F10) model suggest that antigen presentation is improved by this platform and results in reduced tumor growth.

Conclusion/Significance: It is vital for us to determine how immunotherapy can overcome the barriers to potent anti-tumor immune responses in a greater proportion of patients. An initial requirement for the long-term and widespread immune responses is recognition of the tumor by the immune system. Fundamental among these is reduction and suppression of innate tumor antigen presentation which prohibits memory and systemic adaptive immune responses.

ROLE OF INFLUENZA-DERIVED TLR AGONISTS IN CANCER IMMUNOTHERAPY**Presenting Author:** Eileena Giurini, BS**Co-Authors:** Eileena F. Giurini* (Rush), Kajal H. Gupta (Rush), Christina A. Nowicki (Rush), Gabriel Guevara-Aleman (Rush), Josef Goldufsky (Rush), Amanda Marzo (Rush), Andrew Zloza (Rush)

Introduction: Immunotherapy has revolutionized the scope of treatment for cancer; however, there is still a number of limitations. This presents an urgent need to make the next great leap forward in the treatment of cancer that results in an impactful decrease in cancer morbidity and mortality. Cancer immunotherapies mainly target tumor-specific-antigen (i.e., self-antigen) immune responses and have resulted in long-term benefit only in a small fraction of treated patients with cancer. However, the immune system is capable of developing strong responses against non-self antigens (such as the antigens of pathogens). Our previous studies have shown that FDA-approved non-adjuvanted influenza vaccines, when injected directly into tumors in mice, generate a strong anti-cancer response and serve as an effective cancer immunotherapy. But, an influenza vaccine with an added squalene-based adjuvant did not improve cancer outcomes. Importantly, both types of vaccines provided protection to the mice against future active lung influenza infection

Objective: This demonstrated a disconnect between the requirements for potent anti-tumor and anti-pathogen immune responses and inspired us to determine the immune mechanisms underlying these findings. Based on our observations, we hypothesized that the introduction of influenza vaccines (i.e., 'flu shots') into the tumor microenvironment stimulates TLRs to produce an immune response, and that adjuvants may alter this TLR stimulation

Methods: To investigate this, we used a series of cell lines each co-transfected with a single murine TLR and an NF- κ B inducible secreted embryonic alkaline phosphatase (SEAP) reporter plasmid (HEK-Blue TLR Reporter cell lines). These HEK-Blue cell lines were stimulated for 18 hours with non-adjuvanted influenza vaccine or adjuvanted influenza vaccine. TLR engagement was quantified via spectrophotometer readings at OD620nm.

Results: While non-adjuvanted influenza vaccine engaged TLR2, TLR9, and TLR7, the adjuvanted vaccine only engaged TLR2 and TLR9. These results indicate that TLR7 stimulation may play an important role in the reduction of tumor growth resulting from the non-adjuvanted influenza vaccine in our previous studies.

Conclusion/Significance: Current studies seek to confirm this finding utilizing TLR7 inhibitors and knockout mice and to elucidate the components of the non-adjuvanted seasonal influenza vaccine that serves as the agonist to these TLRs.

GUT MICROBIAL CHARACTERISTICS OF WOMEN WITH AND WITHOUT BREAST CANCER

Presenting Author: Hanna Hindt, Dietetics, BS

Co-Authors: Hanna Hindt (Rush); Ece Mutlu (Rush); Amber Smith (Rush); Patricia Wolf (UIC); and Sandra Gomez-Perez (Rush)

Introduction: Breast cancer is the most common cancer in the United States based on estimated new cases in 2019. Sulfidogenic bacteria in the gut microbiota have been studied for their role in diseases, such as inflammatory bowel disease and colorectal cancer, although their role in breast cancer (BC) remains unclear.

Objective: The purpose of this study is to compare the absolute abundance of sulfidogenic bacteria among women with and without a history of BC.

Methods: A secondary analysis was conducted on a de-identified dataset in women with and without a history of BC prospectively enrolled at Rush University Medical Center between 2013-2018. Sulfidogenic bacterial gene targets were extracted from stool samples and analyzed using qPCR. Absolute abundance presented as gene copy numbers per nanogram of DNA.

Results: The sample (N=231) consisted of 74 women with a history of BC (age 55.64±8.913, BMI 25.05 (7.00)) and 157 women with no history of BC (age 55.41± 8.864, BMI 24.60 (6.70)). The two groups did not significantly differ in ethnicity, menopausal status, education, number of children, diabetes, gastrointestinal problems, and smoking and alcohol history. Mann-Whitney U tests showed differences in 5 out of 7 sulfidogenic bacterial gene targets: *Desulfobulbus* spp. (DBB), *Desulfotomaculum* spp. (DFM), *Desulfobacter* spp. (DSB), pan-dissimilatory sulfite reductase (pan-dsrA), and *Fusobacterium nucleatum* L-cysteine desulfhydrase (FN0625). DBB and pan-dsrA were more abundant in women with a history of BC (1.05 (0.54) vs. 0.42 (0.44), $p<0.001$, and 0.32 (0.71) vs. 0.11 (0.42), $p=0.001$, respectively), while DFM, DSB, and FN0625 were lower in women with a history of BC (0.11 (0.19) vs. 7.53 (24.76), $p<0.001$, 292.02 (563.77) vs. 5268.50 (6873.47), $p<0.001$, and 19.56 (20.74) vs. 33.01 (72.40), $p<0.001$). No significant differences were found for *Bilophila wadsworthia* specific dsrA (dsrA-BW) or *Desulfovibrio* spp. (DSV) ($p=0.117$, $p=0.128$).

Conclusion/Significance: The results indicate that the absolute abundance of sulfidogenic bacteria differs in women with and without a history of BC. The differences in sulfidogenic bacteria may reflect a modifiable risk factor for BC. Diet can affect sulfidogenic bacteria. More research is warranted to find the potential clinical relevance of compositional differences with BC.

PREVALENCE OF SARCOPENIA IN WOMEN WITH METASTATIC BREAST CANCER

Presenting Author: Giulia Buzzi, Bachelor of Science (Nutrition, Dietetics, and Wellness)

Co-Authors: Giulia Buzzi (Rush), Rachel Barrett (Rush), Monica Bojko (Rush), Melissa Morales-Perez (Rush), Amber Smith (Rush), Paula O'Connor (Loyola), Steve Supple (Rush), Joy Sclamberg (Rush), Ruta Rao (Rush), Melody Cobleigh (Rush), Lydia Usha (Rush), April Swobod

Introduction: Sarcopenia is a severe form of muscle wasting associated with aging and inflammatory diseases, including cancer. Sarcopenia at diagnosis has been associated with decreased survival in the cancer population, including women with metastatic breast cancer (BC); however, research is limited characterizing overall body composition and prevalence of sarcopenia in this population.

Objective: To characterize anthropometrics and body composition characteristics including prevalence of sarcopenia and sarcopenic obesity, in women living with metastatic BC in order to better understand the relationship between body composition and cancer symptomology.

Methods: Women (n=47) with metastatic BC were recruited (2015-2019) from two academic medical institutions. Clinical data, anthropometric measurements (waist circumference, BMI), handgrip strength, and computed tomography (CT) images for body composition at metastatic diagnosis were collected from a subgroup of participants (n=22). Sarcopenia was determined from skeletal muscle index (SMI) (skeletal muscle area cm²/height in m²) using cut-points for normal and underweight adults and for adults with overweight and obesity (SMI <41 for women). Data were reported in means ($\hat{\mu}\pm\text{SD}$).

Results: Age and BMI of the total sample (n=47) was 55.7(\pm 11.8) years and 29.5 (\pm 7.5) kg/m². Participants were predominantly white (total sample = 25/47; 53%; subset =17/22; 77%). Waist circumference in the subgroup was 102.7 (\pm 18.1) cm and 77.3% (17/22) were classified as having abdominal obesity. Right and left handgrip strength was 26.0 (\pm 6.9) and 25.2 (\pm 7.3) kg, respectively. SMI was 46.8(\pm 7.5) cm²/m². Sarcopenia and sarcopenic obesity were present in 32% (n=7/22) and 14% (n=3/22), respectively.

Conclusion/Significance: CT-defined sarcopenia was observed in one out of three women with metastatic BC. This was an unexpected finding since these women had greater functional status based on their Eastern Cooperative Oncology Group (ECOG) scores of 0 or 1. Given the poor prognosis associated with sarcopenia and the cancer population, the prevalence of sarcopenia amongst women with metastatic BC is of concern. Based on these findings, further research analyzing body composition, particularly skeletal muscle are needed in this unique population of women. This information can potentially be incorporated within future lifestyle interventions, such as physical activity and nutrition studies, to improve overall quality of life and survival.

THE ABILITY OF GUT MICROBIOTA INTERACTION PATTERNS TO PREDICT THE PRESENCE OF A DISTANT TUMOR

Presenting Author: Marco Rossi, MS, MLS(ASCP)CM

Co-Authors: Marco W. Rossi* (Rush) 1, Salvatore M. Aspromonte (Rutgers) 2, Preston Daniels (Rush) 1, Jose Alejandro Guevara-Patino (Loyola) 3, and Andrew Zloza (Rush) 1. (1)Division of Hematology, Oncology, and Cell Therapy, Department of Internal Medicine, Rush Un

Introduction: Recent advances in cancer immunotherapy have greatly altered the course of cancer outcomes, however, thus far only in a limited proportion of patients. Multiple factors affecting immunotherapy efficacy and outcomes have been elucidated. A significant factor that has gained wide attention is the gut microbiota. The gut microbiota have also been demonstrated to affect cancers that are distant from the GI tract. The possibility of altering the gut microbiota constitution to change cancer outcomes has been proposed by various previous studies. However, whether conversely gut microbiota are altered by the presence of distant cancer is unknown. The dynamics of bacterial communities in the gut are determined by various aspects, including physiochemical changes, metabolite exchange, metabolite conversion, signaling, chemotaxis and genetic exchange resulting in genotype selection. This coordination of activity can alter the overall composition of the gut microbial community, which can affect gut microbial responses. The presence of specific gut microbiota taxa has been linked to positive and negative cancer outcomes in and beyond the GI tract.

Objective: Our preliminary data show that the presence of a distant (non-gut) cancer can alter gut microbiota, resulting in identifiable tumor-induced microbial interaction patterns. Based on this finding, we hypothesized that gut microbial interaction patterns can be utilized to detect a distant tumor.

Methods: To investigate this hypothesis, genetically identical B6 mice with similar gut microbiota were challenged with B16-F10 melanoma to form intradermal tumors. Mouse fecal pellets were collected and 16S ribosomal RNA sequencing was conducted to define relative fractions of gut microbial taxa. Interaction patterns between treatment groups were determined and analyzed using the R programming language and the Orange3 data mining program.

Results: The analyzed data, in the forms of correlations between taxa, deviations from linearity, and differences in individual taxa were implemented in machine learning algorithms and we found the best form to be 81% accurate for the prediction of tumor presence or absence.

Conclusion/Significance: The performance of these models has shown great promise in the accurate, computational detection of distant tumors. Through further improvements in our machine learning algorithms a novel, early, non-invasive means to detect distant cancers may be developed.

OVARIAN MALIGNANT TRANSFORMATION IS ASSOCIATED WITH INCREASED EXPRESSION OF DNA REPAIR ENZYME OXOGUANINE GLYCOSYLASE 1

Presenting Author: MOUMITA MAJUMDER, PhD

Co-Authors: Moumita Majumder (RUMC); Elizabeth A Paris (RUMC); Animesh Barua (RUMC)

Introduction: Early detection remains the most effective option to prevent higher rates of death due to ovarian cancer (OVCA), a fatal malignancy of women. Chronic inflammation and prolonged oxidative stress can transform normal cells to malignant cells. Reactive oxygen species (ROS) generated can oxidize DNA bases resulting in DNA damage. Formation of 8-oxo-7,8-dihydro-2-deoxyguanosine (8-Oxo-2dG), the most prevalent mutagenic DNA adduct, is produced during DNA oxidation. 8-Oxo-2dG may be associated with malignant transformation and can be removed by oxoguanine glycosylase 1 (OGG1). OGG1 is a member of DNA base excision repair mechanism. Decreased OGG1 expression may lead to increased formation of 8-Oxo-2dG DNA adducts resulting in malignant transformation. Changes in OGG1 expression may be a marker for early detection of OVCA and its prevention.

Objective: The goal of this study was to determine the changes in expression of OGG1, a marker of increased 8-Oxo-2dG formation, during malignant transformation in the ovary.

Methods: Expression of OGG1 was examined in archived normal ovarian tissues (n=10, 40-70 years old) and ovarian malignant tumors (n=15, 60-70 years old) collected under and IRB approved protocol. Expression of OGG1 was determined by immunohistochemistry, immunoblotting and gene expression studies. The intensity of OGG1 expression in tissue sections was determined using a light microscope and a computer-assisted software program. Significant differences in OGG1 expression between the normal and OVCA were determined by paired t-test and differences were considered significant when $P < 0.05$.

Results: Expression of OGG1 was detected in the epithelial cells in precursor lesions including cortical inclusion cysts and stromal invaginations in normal ovaries as well as in malignant tumors. Stronger OGG1 expression was observed in malignant cells than normal epithelial cells. The intensity of OGG1 expression increased significantly during ovarian malignant transformation ($P < 0.001$). Similar patterns were also observed in immunoblotting and gene expression studies.

Conclusion/Significance: Increased expression of OGG1 indicates prevalence of carcinogenic DNA adducts and offers a potential marker for early detection of OVCA. The results of this study may form a basis for a clinical study to determine the potential of OGG1 as a marker for DNA oxidation associated with OVCA development

BASELINE SERUM BIOMARKER LEVELS AND PRE-BASELINE CLINICAL PARAMETERS ARE EFFECTIVE TOOLS FOR RISK STRATIFICATION OF CACHEXIA/PRE-CACHEXIA IN PRE-TREATED NON-SMALL CELL LUNG CANCER (NSCLC) PATIENTS

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Introduction: Cancer-associated cachexia decreases quality of life, increases susceptibility to treatment-related toxicities, and elevates cancer-related mortality. Approximately half the patients with advanced NSCLC who undergo chemotherapy exhibit cancer cachexia at baseline, and about 20% of lung cancer patient deaths relate to cachexia. Predictive tools identifying patients at risk of developing cancer cachexia to receive anti-cachexic treatments can improve clinical outcomes.

Objective: The generation of a predictive/prognostic paradigm for sequential development of cancer cachexia/pre-cachexia was studied as a relationship between the weight, body mass index (BMI), and neutrophil/lymphocyte ratio (NLR) in advanced stage NSCLC patients and their baseline serum protein biomarkers. The members of this cohort indicated progression on front-line therapy, with clinical parameters measured ± 12 weeks of induction of salvage therapy.

Methods: Clinical parameters including body weight, BMI, and NLR and outcome variables were obtained with full IRB-approval. 92 unique protein biomarkers were surveyed in sera from advanced NSCLC patients (n=137) collected prior to their salvage regimen using the Luminex immunobead-assay platform. Progression-Free Survival (PFS) and Overall Survival (OS) associations were achieved via the Cox PH-test, and biomarker levels were evaluated as continuous variables with the cachexia surrogates using the Mann-Whitney test and Pearson correlation. 101 variables were selected for algorithm development to optimally classify patients based on the risk of manifesting pre-cachexia after treatment induction.

Results: PFS and OS were closely associated with percent changes (relative to baseline) in weight ($p < 0.01$), BMI ($p < 0.01$) and NLR ($p < 0.001$). Nine biomarkers were significantly associated with post-baseline percentage weight loss, whereas two biomarkers were significantly associated with percentage BMI loss; Osteopontin and VEGFR2 were common molecules in both. Twelve molecules were significantly related to post-baseline NLR changes, with BMP-9, SCFR, and sVEGFR2 being most prominent. A Random Forest algorithm selected twelve variables out of 101 variables that demonstrated the most significance as predictors of pre-cachexia development and the test displayed an accuracy rate of 82.8%

Conclusion/Significance: A panel of circulating protein biomarkers primarily corresponding to metabolic regulation and systemic inflammation/acute phase response together with pre-baseline clinical parameters were found to be significant predictors of cachexia/pre-cachexia syndromes in advanced NSCLC patients.

MECHANICAL DISPERSION IS A PREDICTOR OF 30-DAY PERMANENT PACEMAKER IMPLANTATION AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT

Presenting Author: Allison Zimmerman, MD

Co-Authors: Mohamad Hemu (RUMC), Ahmad Manshad (Loyola), Fatima Ballout (RUMC), Kyaw Hein (RUMC), Clifford Kavinsky (RUMC)

Introduction: Transcatheter aortic valve replacement (TAVR) related conduction disturbance resulting in permanent pacemaker (PPM) implantation is common complication. The mechanical effects of these conduction abnormalities can be measured as regional heterogeneity of contraction by myocardial strain imaging. Mechanical dispersion (MD) is a strain-related, LVEF-independent, echo parameter that reflects subtle ventricular dyssynchrony and is related to fibrosis.

Objective: We hypothesize that MD measured after TAVR will predict all-cause mortality in severe AS.

Methods: We retrospectively analyzed 137 patients (48% men, 80±9 years) who underwent TAVR at our institution after excluding patients with pre-existing PPM. 2D speckle-tracking echocardiography was used to assess MD (SD of time from Q/R on the electrocardiogram to peak strain in 16 LV segments) immediately after TAVR (median, 1 day). Images were analyzed offline using a vendor-independent software (TomTec). Baseline multivariable Cox regression model and Chi-squared analysis was used.

Results: At 30 days post-TAVR, 14 (10.2%) patients underwent PPM implantation. Patients requiring PPM had more pronounced MD ($p=0.012$), pre-existing RBBB ($p=0.017$), pre-existing LAHB ($p<0.001$), and peri-procedural AVB ($p=0.005$). Multivariate Cox regression analysis of important clinical covariates (model 1 = age, sex, RBBB, LAHB, and AVB) showed significant predictive value for PPM implantation (chi-square 41.8, $p<0.001$). Addition of MD to the model resulted in a significant chi-square increase (from 41.8 to 47.3, $p=0.01$).

Conclusion/Significance: Left ventricular MD, measured immediately after TAVR, was associated with 30-day PPM and provided incremental predictive value to important clinical variables.

PULMONARY ARTERY ENDOTHELIAL CELLS ARE SEX DIMORPHIC IN THEIR PROLIFERATIVE POTENTIAL. IMPLICATIONS FOR PLEXIFORM ARTERIOPATHY

Presenting Author: Patrick Drazkowski, BS

Co-Authors: Shanshan Qin (Rush); Monal Patel (Northwestern); Patrick Drazkowski (Rush); Balaji Ganesh (UIC); Dan Predescu (Rush); and Sanda Predescu (Rush)

Introduction: Pulmonary arterial hypertension (PAH) is a sex-biased disease with a female predominance of around 2 - 4 over men for all races and ethnicities and across all ages that have been studied to date. Yet, the female predominance in PAH incidence remains largely unexplained. During inflammation associated with PAH, granzyme B cleaves intersectin-1 (ITSN) to produce two biologically active fragments: the NH₂-terminal (EHITSN) with endothelial cells (ECs) proliferative potential and the trigger of the plexiform arteriopathy in a murine model of PAH, via p38MAPK/Elk1/c-Fos signaling. The COOH-terminal (SH3A-EITSN) has dominant negative effects on Erk1/2MAPK.

Objective: We aimed to determine the effects of the EHITSN or of the concurrent expression and interplay between the two protein fragments on the proliferation of male and female pulmonary artery ECs.

Methods: We used human pulmonary artery ECs of male and female donors, expressing individually or together the Myc/CeGFP-EHITSN and the Flag/Cherry-SH3A-EITSN cDNAs as well as pulmonary artery ECs of male and female PAH patients, in conjunction with molecular biology (quantitative RT PCR, RNASeq, dual Renilla/Luciferase assay), biochemical (Western blot, cellular fractionation, immunoprecipitation, ELISA, MTT assay) and morphological (flow cytometry, fluorescent microscopy) approaches. Quantitative assessments were done by densitometry, image analyses and Kaluza software.

Results: We demonstrate that the two ITSN fragments increase p38/Elk1 activation and p38/Erk1/2 activity ratio leading to increased pulmonary artery ECs proliferation, with female cells being more responsive than the male ones. Furthermore, EHITSN substantially upregulates the long non-coding RNA (lncRNA) Xist in pulmonary artery ECs of female donors, which in turn represses the myocyte enhancer factor-2C (MEF2C) and its target Krüppel-Like-Factor 2 (KLF2) expression. The PenNPF peptide, a specific inhibitor of the EHITSN, decreases activation of the p38/Elk1/c-Fos signaling, Xist expression and ECs proliferation.

Conclusion/Significance: These molecular events are recapitulated by the pulmonary artery ECs of female PAH patients and they may account, at least in part, for the increased responsiveness of female pulmonary artery ECs to the EHITSN expression. Thus, Xist/MEF2/KLF2 axis may explain the pulmonary artery ECs' sexual dimorphism in the proliferative response. [Poster presentation by Patrick Drazkowski].

ANTI-ARRHYTHMIC DRUGS MODULATE CALCIUM ALTERNANS IN ATRIAL MYOCYTES

Presenting Author: Elizabeth Martinez-Hernandez, PhD

Co-Authors: Elizabeth Martinez-Hernandez (RUMC), Giedrius Kanaporis (RUMC) and Lothar A. Blatter (RUMC)

Introduction: Cardiac alternans is defined as beat-to-beat alternations in the amplitude of calcium transients (CaTs), action potential (AP) duration and contraction at a constant heart rate. Development of alternans is multifactorial, and reflects disturbances of the bi-directional regulation of membrane potential (V_m) and intracellular calcium $[Ca]_i$. V_m modulates $[Ca]_i$ directly by Ca entry through voltage-gated Ca channels, whereas changes of $[Ca]_i$ control V_m through Ca-dependent membrane currents. Carvedilol is an FDA-approved β -blocker used for treatment of high blood pressure, congestive heart failure and cardiac tachyarrhythmias, including atrial fibrillation.

Objective: Determine the effects of carvedilol on Ca alternans and membrane currents in rabbit atrial myocytes.

Methods: We used isolated rabbit atrial myocytes and whole-cell patch-clamp experiments in combination with $[Ca]_i$ measurements (Fluo-4) and confocal microscopy to investigate the effect of carvedilol (1 μ M) on CaT alternans.

Results: Carvedilol induced a \sim 60% increase of the degree of Ca alternans, quantified as alternans ratio (AR), i.e. the ratio of the amplitudes of the large and small CaT of a pair of alternating CaTs. The AR increase was accompanied by a strong inhibition (\sim 80%) of peak current through voltage-gated sodium channels (INa), whereas the L-type Ca current was not affected markedly. Overall, the CaT amplitude was reduced by \sim 50% and failure of excitation-contraction coupling (non-responsiveness to electrical stimulation) was observed in \sim 15% of myocytes. To further explore the effect of Na channel inhibition we used an inhibitor that selectively blocks the persistent late sodium current (INaL), with no effect on peak INa (compound GS-967). Interestingly, we found that the inhibitor GS-967, in contrast to carvedilol, induced a \sim 40% reduction in AR.

Conclusion/Significance: Selective inhibition of components of INa has opposite effects on CaT alternans. Blocking peak INa and membrane depolarization with carvedilol enhances Ca alternans, while INaL inhibition ameliorates alternans. Cardiac alternans is a phenomenon with clinical implications including cardiac arrhythmias. The recognition of the central role of membrane currents such as INa and INaL for alternans will pave the way to develop novel therapeutics for the suppression of cardiac arrhythmias.

MITOCHONDRIAL CALCIUM UNIPORTER COMPLEX ACTIVATION PROTECTS AGAINST CALCIUM ALTERNANS IN ATRIAL MYOCYTES

Presenting Author: Maria Yuriana Oropeza Almazan, PhD

Co-Authors: Yuriana Oropeza Almazan (RUMC); Lothar A. Blatter (RUMC)

Introduction: Cardiac alternans, defined as beat-to-beat alternations in action potential duration, cytosolic Ca transient (CaT) amplitude and cardiac contraction is associated with atrial fibrillation (AF) and sudden cardiac death. At the cellular level, cardiac alternans is linked to abnormal intracellular calcium handling. We previously have shown that impairment of mitochondrial Ca (mCa) sequestration promotes Ca alternans. mCa uptake occurs by the Mitochondrial Calcium Uniporter Complex (MCUC) and Ca is extruded through the mitochondrial permeability transition pore (mPTP).

Objective: We tested the hypothesis that enhanced mCa sequestration by activation of MCUC with kaempferol and spermine, or increased mCa retention after mPTP inhibition with cyclosporin A (CsA) rescue pacing-induced Ca alternans in rabbit left atrial myocytes.

Methods: Cytosolic CaTs were recorded using Fluo-4/AM and Ca alternans was induced by electrical pacing. The degree of alternans was quantified as the alternans ratio ($AR = 1 - S/L$; S/L is the ratio of the small to the large amplitude of a pair of alternating CaTs). mCa uptake measurements were performed in permeabilized cells loaded with Fluo-4/AM and exposed to increasing extramitochondrial Ca. Data are presented as mean \pm SEM and statistical analysis was determined by Student's t-test or ANOVA test.

Results: Spermine treatment decreased AR by 66% ($p=0.0019$, $n=8$) and kaempferol decreased AR by 79% ($p=0.0006$, $n=7$). The MCUC inhibitor Ru360 increased AR by 43% ($p=0.045$, $n=5$). After CsA exposure, the AR decreased by 64% ($p=0.0019$, $n=8$). Caffeine was used to estimate sarcoplasmic reticulum (SR) Ca load. Ca load was identical after the L and the S CaT, and spermine and CsA had no significant effect on releasable Ca from the SR. In permeabilized cells, spermine enhanced mCa uptake by 46% in the presence of 0.5 μ M extramitochondrial Ca ($p=0.0001$, $n=7$). The data show that stimulation of mCa uptake and Ca retention by mitochondria rescued Ca alternans.

Conclusion/Significance: Our results suggest that activation of mCa sequestration could be a target for protective interventions to ameliorate cardiac alternans, thereby reducing a risk factor for AF.

ULTRA-HIGH SENSITIVITY CARDIAC TROPONIN I ELEVATION, MYOCARDIAL MALPERFUSION, AND DIASTOLIC DYSFUNCTION IN WOMEN WITH ISCHEMIA AND NO OBSTRUCTIVE CORONARY ARTERY DISEASE: FROM THE WOMEN'S ISCHEMIA SYNDROME EVALUATION CORONARY VASCULAR DYSFUNCTION PROJECT

Presenting Author: Bijan Zarrabi, B.S.

Co-Authors: Odayme Quesada (Cedars-Sinai); Omeed Elboudwarej (Cedars-Sinai); Michael D. Nelson (UT Arlington); Mitra Mastali (Cedars-Sinai); Janet Wei (Cedars-Sinai); Bijan Zarrabi (Rush University); Ahmed Al-Badri (Emory University); Nissi Suppogu (Cedars-Sinai); H

Introduction: Ischemia with no obstructive coronary artery disease (INOCA) is a condition in which patients present with chest pain that is typical for angina pectoris but are found to have non-obstructed arteries. Women are disproportionately impacted by both INOCA and heart failure with preserved ejection fraction (HFpEF). Coronary microvascular dysfunction (CMD) resulting in chronic myocardial hypoperfusion and subclinical ischemia may be mechanistically linked to the development of left ventricular diastolic dysfunction that progresses to HFpEF in INOCA. Ultra-high sensitivity cardiac troponin-I (u-hs-cTnI) assays have high analytical precision with the capability to quantify low levels of cTnI that allow for early detection of subclinical ischemia and myocardial injury not detected by conventional cTn assays.

Objective: We hypothesized that ultra-hs-cTnI detects myocardial injury in women with INOCA identified through myocardial hypoperfusion and adverse left ventricular (LV) remodeling and diastolic dysfunction.

Methods: We evaluated 330 women with suspected INOCA enrolled in the Women's Ischemia Syndrome Evaluation-Coronary Vascular Dysfunction (WISE-CVD) Project and assessed myocardial injury using an ultra-hs-cTnI assay (Simoa HD-1 Analyzer, Quanterix Corporation). Cardiac magnetic resonance imaging was performed before and during vasodilatory stress (iv adenosine) to assess myocardial perfusion reserve index (MPRI, a marker of CMD), LV morphology, and LV strain/strain rate.

Results: Levels of u-hs-cTnI were detectable in all 330 women, ranging from 0.004 to 79.6 pg/mL. u-hs-cTnI were modestly correlated with MPRI ($r=-0.12$, $p=0.03$), LV mass index ($r=0.24$, $p<0.001$) and mass-to-volume ratio ($r=0.24$, $p<0.0001$), early diastolic radial strain rate ($r=0.23$, $p<0.0001$), early diastolic circumferential strain rate ($r=-0.29$, $p<0.0001$) and early diastolic longitudinal strain rate ($r=-0.37$, $p<0.0001$). Relationships between u-hs-cTnI and left ventricular early diastolic strain measures are shown in Figure 1.

Conclusion/Significance: Consistent with our hypothesis, our cohort of women showed that u-hs-cTnI is adversely associated with myocardial malperfusion and measures of diastolic dysfunction and LV remodeling. These observations suggest that CMD-related myocardial injury may be a pathophysiologic mechanism of LV dysfunction in INOCA leading to HFpEF.

INOSITOL 1,4,5-TRISPHOSPHATE SIGNALING AND ATRIAL CALCIUM ALTERNANS**Presenting Author:** Giedrius Kanaporis, PhD**Co-Authors:** Giedrius Kanaporis, Zane M. Kalik, Lothar A. Blatter

Introduction: Cardiac alternans describes beat-to-beat alternations in contraction strength, action potential (AP) morphology or cytosolic Ca transient (CaT) amplitude at constant pacing frequency that generates a pro-arrhythmic substrate and leads to sustained arrhythmias. Alternans is observed under various pathological conditions including heart failure (HF). In the atrium alternans has been identified as a precursor of atrial fibrillation. Under pathological conditions the heart attempts to compensate for injury through various cellular pathways that lead to altered electrophysiology, Ca handling and structural changes. Previously, we have demonstrated that during heart failure inositol 1,4,5-trisphosphate (IP3) dependent intracellular Ca signaling is elevated.

Objective: To investigate how alterations in IP3 signaling affect susceptibility to alternans in the atrium.

Methods: Experiments were carried out in single atrial myocytes isolated from normal and HF rabbit hearts. Intracellular Ca concentration ($[Ca]_i$) was monitored by fluorescence microscopy during field stimulation or in combination with the patch clamp recordings, which allows simultaneous measurements of membrane currents or APs together with $[Ca]_i$.

Results: Intracellular Ca handling properties of HF atrial cells were significantly altered. HF atrial myocytes were significantly more prone to develop alternans, and at any given pacing frequency a higher degree of CaT alternans was observed. Our data show that activation of the IP3 signaling pathway with angiotensin II (500 nM) or endothelin-1 (100 nM) increased the degree of atrial alternans. Interestingly, however suppression of IP3 receptors by the putative IP3 receptor blocker 2-aminoethoxydiphenyl borate (2-APB; 20 μ M) also led to increased predisposition to atrial alternans.

Conclusion/Significance: In atrial myocytes the IP3 signaling pathway plays a significant role in intracellular Ca regulation on a beat-to-beat basis. Dysregulation of IP3 dependent Ca cycling in form of both, enhanced or reduced IP3 receptor dependent Ca release leads to increased susceptibility to pro-arrhythmic alternans.

DEPARTMENT-LEVEL DATA: AN IMPROVEMENT OF COLLECTION METHODS TO EVALUATE HF READMISSION

Presenting Author: Laura Zimmerman, BSN

Co-Authors: Laura F Zimmerman (RUMC); Margaret Gladman (RUMC)

Introduction: In fiscal year 2019, hospital readmission rates for HF were 23.39%, failing to meet the goal of 18.29% at RUMC. The Population Health department created several interventions to address HF in a specific population to align with the medical center's goals. Barriers to quantitative evaluation of readmissions at our department-level became clear, prompting this project.

Objective: To develop an accurate data reporting method to evaluate the heart failure (HF) readmission rate for a specific patient population enrolled in outpatient care management services.

Methods: A plan, do, study, act (PDSA) model was utilized to compile and analyze department-level HF readmission data. Data limitations are present on the insurance and MCO level. The readmission rate at this academic medical center for patients with CountyCare insurance was 30.62%, noted to be higher than the hospital-wide data. The limitation is that the data included several MCOs not managed by Population Health CM team. Data was provided on patients enrolled in the MCO. However, Care Management services are offered to patients on a voluntary basis therefore this data included patients who are not receiving CM services. Through several rounds of the PDSA model a workflow was created. From this report, a chart review is completed by department RNs to ensure the ICD-10 code aligns with patient's clinical reason for hospitalization and that the patient is active in CM services.

Results: Accurate, department-wide data collection on HF is best gathered by combination of two actions: EMR report based on ICD-10 codes and registered nurse chart review to ensure accuracy.

Conclusion/Significance: A combination of EMR report via ICD-10 codes and registered nurse chart review provides the most accurate readmission rates for patients with heart failure enrolled in CM services at our medical center.

LUMINAL Ca²⁺ CONTROL OF TYPE-1 INOSITOL 1,4,5-TRISPHOSPHATE RECEPTOR.

Presenting Author: Allison Tambeaux, BS

Co-Authors: Allison Tambeaux (Rush University); Yuriana Aguilar-Sanchez (Rush University); Rafael Mejía-a-Alvarez (Midwestern University); Michael Fill (Rush University); S.R. Wayne Chen (University of Calgary); and Josefina Ramos-Franco (Rush University)

Introduction: Inositol 1,4,5-trisphosphate receptor (IP3R) and ryanodine receptor (RyR) are homologous endo/sarcoplasmic reticulum Ca²⁺ release channels. IP3R and RyR are tightly controlled by both cytosolic and luminal Ca²⁺. The negatively charged residue E4872 in RyR2 (cardiac isoform) electrostatically interacts with luminal Ca²⁺, explaining RyR2's luminal Ca²⁺ dependency (Chen et al., 2014). The corresponding residue in IP3R type 1 is D2594, but its role (if any) in IP3R function is unknown.

Objective: Our objective is to test the hypothesis that the IP3R1-D2594 electrostatically interacts with luminal Ca²⁺ to determine IP3R1 luminal Ca²⁺ sensitivity.

Methods: A mouse knock-in model harboring the D2594K mutation was created, in which the negatively charged IP3R1-D2594 residue was replaced by lysine, a positively charged residue. IP3R1-WT and -D2594K cerebella microsomes were isolated and reconstituted into planar lipid bilayers for single channel studies.

Results: Single channel IP3R1 studies showed the conductance properties of IP3R1-WT and -D2594K channels are similar. The IP3R1-D2594K channels exhibited WT-like IP3 affinity, but had substantially greater IP3 efficacy. The IP3R1-D2594K also had altered luminal Ca²⁺ sensitivity. Unlike IP3R1-WT, D2594K channel activity did not decrease at low luminal Ca²⁺ levels.

Conclusion/Significance: Taken together, these results indicate the IP3R1-D2594 residue, as it does in RyR2, electrostatically interacts with luminal Ca²⁺, explaining at least in part, the IP3R's sensitivity to luminal Ca²⁺. This newly identified mechanism together with luminal Ca²⁺ feed-through may explain the luminal control of IP3R1.

ATRIAL ALTERNANS FORMS A DYNAMIC SUBSTRATE FOR THE INDUCTION OF ATRIAL FIBRILLATION**Presenting Author:** Carlos Pereira, Ms**Co-Authors:** Carlos Pereira (Rush, UFPR); Kathrin Banach (Rush)

Introduction: Cardiac alternans describes beat-to-beat variations in cardiac electrical activity and contractile strength. Ventricular alternans has been linked to an increased risk for ventricular arrhythmia and sudden cardiac death. New clinical data suggest that atrial alternans could precede the onset of atrial fibrillation (AF) the most common cardiac rhythm disorder.

Objective: We have previously described that loss of p21-activated kinase (Pak1) promotes an increased propensity for AF due to enhanced NOX2 dependent ROS production. In current experiments we tested the hypothesis that changes in Pak1 also increase the propensity for atrial alternans.

Methods: Hearts from male WT (n=5) and Pak1^{-/-} (n=5) mice were isolated and maintained in a Langendorff perfusion system. Atrial electrograms were recorded with electrodes placed on the left atrial surface (bi-electrode, Multi (32)-electrode array), pacing electrodes were inserted in the right atrium. Electrical activity from the atria was recorded in sinus rhythm or at increasing pacing frequencies. The T-wave representing atrial repolarization (Ta) was quantified by its amplitude, duration at 90%, and area. Alternans was quantified as alternans ratio (AR = 1-Ta₂/Ta₁), AF inducibility is determined after burst pacing (15 x 10s at 50 Hz).

Results: The propensity for WT and Pak1^{-/-} hearts to display alternans increased with pacing frequency, reflected in an increase of the alternans ratio. In Pak1^{-/-} hearts the pacing induced increase in AR reached significance at 11.5 Hz when compared to AR at initial condition (8Hz) (repeated measures ANOVA, p<0.05). In WT the increase in AR did not reach significance. During perfusion with Angiotensin II the number of atria that developed alternans at low pacing frequencies increased. However, the frequency induced change in AR was biphasic. After an initial increase, AR decreased toward faster pacing frequencies in WT and Pak1^{-/-}. Further experiments will test the hypothesis that AngII increases the propensity of discordant alternans. AF inducibility correlated with the propensity for alternans, with Pak1^{-/-} animals showing increased AF inducibility (p=0.03, two-proportions z-test, one-tailed).

Conclusion/Significance: This study is the first to show increased vulnerability of PAK1^{-/-} atria to alternans and provides further evidence that atrial alternans forms a dynamic substrate that increases the risk for atrial fibrillation.

WOMEN CAREGIVERS WITH HEART DISEASE: A PILOT STUDY TO UNDERSTAND THE LEVEL OF CAREGIVING STRESS AND NEEDS OF WOMEN WITH HEART DISEASE THROUGH THE DEVELOPMENT OF A CARDIOLOGY SPECIFIC CAREGIVING PROGRAM TO IMPROVE CAREGIVER QUALITY OF LIFE AND HEALTH

Presenting Author: Grace Alexander, BS

Co-Authors: Authors: Grace Alexander (1), Sonal Chandra, MD (1), Anitha Rao, MD (2), Annabelle Santos Volgman, MD (1), Neelum T. Aggarwal, MD (1,3) (1) Rush University Medical Center, Chicago, IL, USA, (2) Neurocern, Chicago, IL USA (3) Rush Alzheimer's Disease C

Introduction: The stress of caregiving is an underreported health threat for both women and men. Relatively little has been reported in the literature regarding how providing care impacts caregivers who themselves have cardiovascular disease (CVD).

Objective: The RHCW Cardio-Caregiving study aims to 1) recruit a diverse group of caregivers (CG) with clinically diagnosed CVD from the Rush Heart Center for Women (RHCW), and 2) ascertain how caregiving impacts their own health and quality of life.

Methods: Six participants (5F, 1M, 65.3±10.6 y, 3 white, 1 AA, 2 "other") were recruited from Rush (Main Campus, South Loop, River North, Oak Park) who indicated they were a CG to an older adult with memory concerns. Phone surveys regarding well-being, sleep quality, perception of dementia, level of CG stress, and memory concerns were administered. Post survey patients were referred to the Alzheimer's Association's Direct Connect Program (AADCP)-an intervention program providing resources and consultation tailored to the needs of the caregiver. Follow up calls included ascertainment of medical history, level of disability and health literacy. Patients interested in additional resources will be directed to Neurocern (www.neurocern.com) a web-based CG assessment tool.

Results: On self-report, CGs noted an average of 6.1 hours of sleep, with 66% agreeing the demands of everyday life 'often get them down'. A third had a family history of AD/dementia, and 50% noted that their current source of dementia information was not very useful. All 6 patients were referred to the AADCP; 2 requested information regarding community support groups/24/7 helpline; 1 received a referral for in-person care navigation and early stage peer to peer programs; and 1 needed information about adult day programs and retirement communities. Data collection is ongoing and statistical analyses will characterize baseline and post-intervention BP, laboratory data (lipid panels, HbA1C, ESR, CRP, electrolytes), obtained via the electronic medical record. Analyses will also compare change in survey results based on AADCP intervention, among Neurocern and non-Neurocern users.

Conclusion/Significance: The data collected will provide valuable information to practicing cardiologists and the dementia care community regarding the impact of CG stress to the overall health and well-being of this group of patients.

AN APPLICATION OF A CHICAGO-BASED CLINICAL DATABASE RESEARCH NETWORK: INVESTIGATING THE AMERICAN HEART ASSOCIATION'S SIMPLE 7 AND ITS ASSOCIATION WITH HOSPITALIZATION.

Presenting Author: Terrence Murphy, MPH

Co-Authors: Raj Shah, MD (Rush University Medical Center)

Introduction: Heart disease has remained the leading cause of death in the United States, Illinois, and Chicago since 1980. To assist public health agencies, providers, and patients, The American Heart Association developed the Life's Simple 7 (LS7) model, a set of measures assessing overall cardiovascular health using data commonly collected during outpatient encounters. The LS7 tool has been shown to have predictive capacity for peripheral artery disease, heart failure, and post-stroke mortality, but it has yet to demonstrate predictive capacity for healthcare cost and utilization.

Objective: To investigate the association between the LS7 cardiovascular health metric and hospitalization rates for primary care patients at Rush University Medical Center (RUMC).

Methods: A retrospective cohort study using data collected from the Chicago Area Patient Centered Outcomes Research Network (CAPriCORN) database. Life's Simple 7 scores were calculated for RUMC primary care patients and used to produce three cohorts stratified by individual total score, i.e. cardiovascular health status. Final LS7 scores were adapted for data not traditionally captured in electronic medical records, including diet and physical activity. All-cause hospitalization rates were calculated for each of the three cohorts. Multinomial bivariate logistic regression models were employed to assess for relationships between LS7 score and hospitalization, controlling for age, sex, race, insurance provider, and encounter count.

Results: A total of 16,088 Rush primary care patients (LS7 M: 6.84) met inclusion criteria for study. Three patient cohorts were produced based on individual LS7 score out of a possible 14: poor cardiovascular health (n=1,061, M: 3.59), intermediate cardiovascular health (n=9,674, M: 6.90), and ideal cardiovascular health (n= 5,353, M: 11.61). The final multivariate binomial regression model ($\chi^2(15) = 967.942$, $p < .000$) indicated there was not a significant association between LS7 score and hospitalization ($B(1) = .194$, $p = .058$).

Conclusion/Significance: Results indicate that the AHA's LS7 score does not have a statistically significant predictive capacity for hospitalizations in the Rush primary care population. Other variables included in the model did have statistically significant relationships, including age, sex, race, and insurance status. Notable limitations of this study include data points not captured by the Rush electronic medical record, including diet, physical activity level, and outside inpatient hospitalizations.

A RARE CASE OF REVERSE TAKOTSUBO CARDIOMYOPATHY WITH RIGHT VENTRICULAR INVOLVEMENT

Presenting Author: Natasha Rana, MD

Co-Authors: Natasha Rana, MD (RUMC), Jeffrey Park, MD (RUMC), Olakanmi Olagoke, MD (John H. Stroger, Jr, Hospital of Cook County), Melissa Tracy, MD (RUMC)

Introduction: Takotsubo cardiomyopathy (TCM) is a clinical diagnosis of exclusion that can present in various ways. Diagnosis requires high clinical suspicion and awareness.

Objective: To raise awareness to rare presentations of various cardiomyopathies and to be stout in clinical diagnosis.

Methods: A 76 year old male with multiple comorbidities including coronary artery disease post bypass presented for elective cervical laminectomy. His post-operative course was complicated by prolonged intubation and inability to wean from the ventilator, undifferentiated shock with multiorgan failure and elevations in BNP of 1919pg/mL and troponin of 0.46 ng/mL concerning for cardiogenic shock. Electrocardiogram showed sinus tachycardia with premature atrial complexes and non-specific T-wave changes. Echocardiogram showed mildly reduced systolic function of 50% with hypokinesis of the mid-anteroseptal, inferoseptal and mid-anterior wall with McConnell's sign. Computed tomography (CT) chest for pulmonary embolism and coronary angiogram were both negative.

Results: Given a negative angiogram and elevated hemodynamics consistent with RV dysfunction, a diagnosis of reverse takotsubo with RV involvement was made. He was treated with intravenous diuretics and rapidly improved over a 3-day course with normalization of liver enzymes. A repeat echocardiogram showed normalization of LV wall motion abnormalities and RV function.

Conclusion/Significance: We report a unique case of reverse takotsubo cardiomyopathy with right ventricular involvement which improved after 3 days of conservative management. It remains a diagnosis of exclusion but requires high clinical suspicion.

A CASE OF VANISHING THYMOMA

Presenting Author: Joshua Insler, B.S.

Co-Authors: Joshua E. Insler, B.S. (RUMC, RMC), Christopher W. Seder, M.D. (Thoracic and Cardiac Surgery, RUMC), Mark Pool, M.D. (Pathology, RUMC)

Introduction: Cystic thymoma is a rare clinicopathologic entity. Chronic inflammation within and around these tumors has been suggested to compromise the vascular supply, leading to hemorrhage into the lesion and necrosis. This can result in rapid expansion of the tumor and symptoms due to local compression. We present the case of a patient with a biopsy-proven lymphocytic-predominant thymoma who underwent resection to reveal a hemorrhagic, necrotic mediastinal cyst adjacent to a focus of organizing pneumonia, with no residual thymoma.

Objective: To identify, diagnose, and definitively treat this patient's mediastinal lesion using a combination of both molecular and surgical interventions.

Methods: Serum antibody titers, CT, PET, FNA, and finally en bloc resection of the patient's mediastinal mass were used in diagnosing the tumor.

Results: The patient with biopsy-proven lymphocytic-predominant thymoma which, upon resection, revealed a hemorrhagic and necrotic mediastinal cyst with thymic remnants in adjacent mediastinal fat but no residual thymoma. We believe that the presence of the adjacent organizing pneumonia incited local inflammatory changes that induced occlusive arteriopathy of the vessels supplying the tumor, leading to hemorrhagic infarction, cystic expansion, and ultimately degeneration of the lesion.

Conclusion/Significance: The presence of the adjacent organizing pneumonia incited local inflammatory changes that induced occlusive arteriopathy of the vessels supplying the tumor, leading to hemorrhagic infarction, cystic expansion, and ultimately degeneration of the lesion.

RELATIONSHIP BETWEEN BLOOD GLUCOSE VARIABILITY AND MUSCLE QUALITY AMONG ICU PATIENTS

Presenting Author: Morgan Nienow, B.S.

Co-Authors: Morgan Nienow, BS (U of WI Madison); Kristen Nowak, MS, RDN, LDN, CNSC (RUMC); Dr. Sharon Foley, PhD, RDN, LDN (RUMC); Dr. Sarah Peterson, PhD, RDN, LDN, CNSC (RUMC)

Introduction: Many intensive care unit (ICU) patients experience increased blood glucose variability (BGV) due to disrupted carbohydrate metabolism and exogenous glucose provided via nutrition support (enteral or parenteral nutrition). Additionally, muscle quality may be an important determinant of BGV.

Objective: The study objective was to assess the relationship between muscle quality (in average Hounsfield units (HU)), and BGV (calculated as coefficient of variation (CV)) among adult intubated patients who had an abdominal computed tomography (CT) scan completed within seven days of ICU admission.

Methods: Age, sex, acute physiology and chronic health evaluation (APACHE) II score, and body mass index (BMI) were collected at ICU admission. Blood glucose levels, nutrition support delivery, and sequential organ failure assessment (SOFA) scores were collected daily for the duration the patient required mechanical ventilation. Blood glucose CV ((mean/standard deviation) *100) was calculated from all glucose measurements. Cross-sectional muscle area (cm²) at the third lumbar region was identified utilizing the HU range of -29 to +150. Skeletal muscle index (SMI, cross-sectional muscle area /height (meters)²) and average HU were calculated. Categorical and continuous variables were reported as percent and median (interquartile range: 25th, 75th percentile), respectively. Linear regression was used to determine predictors of BGV.

Results: A total of 82 patients were included (53% female); patients had a median age of 64 (51, 70) years with an APACHE II score of 22 (12, 27) and BMI of 26.9 (22.2, 31.6) kg/m². The median CV was 29.3% (20.2, 37.3). Median SMI and muscle quality were 36.2 (31.2, 44.3) and 20.4 (12.2, 29.4), respectively. Patients received a median of 36% (15, 52) of prescribed calories and 317 (32, 626) grams of carbohydrate while intubated. Of subjects, 40% required insulin. Median average SOFA score was 10 (8, 13) while intubated. Only receiving insulin (regression coefficient 9.7, p<0.001) and muscle quality (regression coefficient -0.3, p=0.02) were significant predictors of blood glucose CV.

Conclusion/Significance: Among this small sample of adult intubated ICU patients who required an abdominal CT, muscle quality (defined as average HU) and receiving insulin were significant predictors of BGV. More research is needed to corroborate these results.

OUTCOMES OF DISLOCATED INTRAOCULAR LENS REPAIR BY MCCANNEL SUTURE

Presenting Author: Bryant Yu, BA

Co-Authors: Bryant K. Yu (Rush University); Kirk H. Packo (Rush University); and Mathew W. MacCumber (Rush University)

Introduction: Cataract surgery is one of the most commonly performed ophthalmic surgeries. Following removal of the cataract, artificial intraocular lens (IOL) are implanted to restore vision. However, certain complications may cause the IOL to dislocate over time. In these patients, multiple surgical approaches are possible, and McCannel suture iris fixation could provide benefit.

Objective: To evaluate the outcome of intraocular lens dislocation repair by McCannel suture iris fixation.

Methods: A total of 15 eyes had IOL dislocation repair by McCannel 10-0 polypropylene suture iris fixation from August, 2005 to May, 2019 at Illinois Retina Associates (McCannel MA, Ophthalmic Surg 1976;7:98-103). The main outcome measures were postoperative best-corrected visual acuity (BCVA), the change from preoperative visual acuity and complications observed until the last follow-up date available. Cases of in-the-bag IOL dislocation were included.

Results: The 15 eyes had a mean follow up of 9.7 ± 8.3 months and an improvement from preoperative ($20/101 \pm 196$) to postoperative BCVA values ($20/62 \pm 97$, $n=15$, $p = 0.08$). Within a four to twenty month follow up period, there was an improvement from preoperative ($20/124 \pm 227$) to postoperative BCVA values ($20/73 \pm 112$, $n=11$, $p=0.09$). The majority of eyes ($n=11$) did not have any postoperative complications. One eye had post-operative vitreous hemorrhage which spontaneously resolved. Two eyes had cystoid macular edema, both resolving after topical therapy. One eye had recurrent subluxation requiring IOL removal and subsequent scleral fixated IOL implantation.

Conclusion/Significance: IOL dislocation repair by McCannel iris suture is a relatively fast and reasonable surgical approach compared to other surgical techniques. Future studies investigating a larger number of eyes is warranted.

CHAPLAINCY CARE IN THE MICU: DESCRIBING THE SPIRITUAL CARE PROVIDED TO MICU PATIENTS AND FAMILIES AT THE END OF LIFE.

Presenting Author: Dirk Labuschagne, MDiv MPH

Co-Authors: Dirk Labuschagne (Rush); Alexia Torke (UI); Daniel Grossoehme (Acron Children's); Katie Rimer (Beth Israel Deaconess); Martha Rucker (Ascension St. Thomas); Kristen Schenk (Rush); James Slaven (IU); George Fitchett (Rush)

Introduction: Gravely ill patients admitted to the Intensive Care Unit (ICU) and their families experience acute spiritual and existential needs and often require complex decisions about their care. Little is known about what constitutes chaplaincy care for patients or families in ICUs. Chaplains report that participation in medical decision-making is part of their role. This study aimed to describe the spiritual care provided to patients and their families in the MICU, and as a secondary aim, to describe what chaplains do in this setting regarding decision-making.

Objective: To describe the spiritual care provided to patients and their families in the ICU.

Methods: This was a retrospective observational study of spiritual care for patients and families in the medical ICUs (MICUs) at four medical centers over a three-month period. Inclusion criteria were death in the MICU or discharge to palliative care or hospice. Measures included medical, treatment and spiritual care information (number of visits, length of visit, chaplain identification and type of spiritual care provided). Descriptive analysis was used primarily. For analyses of key associations, Chi-square, Fisher's Exact Test and ANOVA tests were used as appropriate.

Results: Of the 254 patients, 197 (78%) received a total of 485 spiritual care visits. Seventy-seven percent of visits included provision of emotional/spiritual support; only 15% included decision-making support such as family meetings or goals of care conversations. The proportion receiving spiritual care increased as patients neared death or discharge. Staff chaplains were involved in goals of care conversations to a greater extent than student or part time chaplains ($p < .05$).

Conclusion/Significance: Spiritual care was provided to most patients and/or families at the end of life. Low chaplain involvement in decision-making in the MICU suggests opportunities to improve chaplains' contributions to ICU care.

A SINGLE CENTER RETROSPECTIVE REVIEW OF PHOTOPHERESIS TREATMENT COMPLETION UTILIZING A ONE TO ONE NURSING CARE MODEL

Presenting Author: Kelly Modugno, RN, MSN

Co-Authors: Kelly Modugno (RUMC); Danica Uzelac (RUMC); Mary Heitschmidt (RUMC, CON); and Hugh Vondracek (RUMC, CON)

Introduction: Extracorporeal Photopheresis (ECP) is an immunomodulatory therapy in which leukocytes are collected from a patient's peripheral blood. The leukocytes are then treated with a photosensitizing agent, exposed to ultraviolet radiation, and then reinfused to the patient. The desired result of the procedure is to eliminate expanding neoplastic lymphocytes in patients with cutaneous T-cell lymphoma and to suppress anti-graft lymphocytes in bone marrow transplant patients experiencing Graft Versus Host Disease. Daily ECP treatment lasts approximately two to four hours. Centers providing ECP therapy vary in how they staff ECP procedures however; the manufacturer of ECP equipment recommends one to one care.

Objective: The purpose of this retrospective data collection study is to determine if one registered nurse (RN) caring for only one patient (1:1 nursing care) during ECP therapy at a large, Midwest, urban academic medical center impacts completion rates.

Methods: Retrospective data collected consecutively from all patients scheduled to receive ECP therapy from 01/01/2009 through 12/31/2017. A total sample of 1,692 ECP therapy cases reviewed.

Results: Data were analyzed to determine completion rates using 1:1 nursing care for each ECP treatment. From 01/01/2009 through 12/31/2017 (9 years) a total of 1692 ECP treatments were scheduled. Of those treatments scheduled, 190 were not initiated due to various factors, with the two most common being treatment held for medical reasons (56%) and patient cancellation of ECP appointment (19%). Of the treatments that were initiated, 98.7% were successfully completed utilizing a 1:1 nursing care model.

Conclusion/Significance: One to one RN care for patients receiving ECP treatments at a single center has contributed to a 98.7% successful completion rate of treatments initiated over a 9-year period. Minimal revenue loss for kits and positive financial implications were found. This study validates a specific industry recommended patient centered care model that improves ECP completion rates, patient care, health care quality, and costs. The results of this study support ECP centers using other models to adopt a 1:1 nursing care model.

ASSESSING USE OF A 'DO NOT TURN' ORDER FOR UNSTABLE PATIENTS IN THE ICU**Presenting Author:** Ashley Mazzocco, MSN**Co-Authors:** Ashley Mazzocco (Rush University); JoEllen Wilbur (Rush University)

Introduction: ICU patients are at high risk for developing hospital acquired pressure injury due to sedation, inadequate nutrition, use of vasopressor medications, and remaining bedbound for long periods. Prevention of pressure injury is managed primarily by frequent turning. Some patients, however, are considered too unstable to be turned and receive a 'Do Not Turn' order. The Intensive care unit (ICU) at a large urban medical center had no established guidelines for when to obtain a patient 'Do Not Turn' order, or when to resume repositioning.

Objective: The purpose of this quality improvement initiative was to determine nursing practice for initiating and discontinuing a 'Do Not Turn' order. The project also aimed to assess receptivity of nursing staff to the implementation of a standardized process for turning unstable patients.

Methods: A 15-item survey was developed in collaboration with the unit skin committee, and approved by unit leadership. The survey was administered using REDCap and sent via email to all 98 registered nurses from one ICU unit. Survey questions included: 1) total years of experience in the ICU setting (2 items); 2) rationale for initiating a 'Do Not Turn' order (7 items); 3) rationale for discontinuing a 'Do Not Turn' order (2 items); 4) perceived consequences of not turning patients (2 items); 5) need for practice change (1 item); 6) equipment used for turning (1 item).

Results: The 59 nurses who responded worked an average of 5.1 years in the ICU. Fifty-three percent requested a 'Do Not Turn' in the last 12 months. Seventy percent determined a patient is too unstable to turn after two unsuccessful attempts. A significant drop in mean arterial pressure and in oxygen saturation were the most frequently reported reasons for a 'Do Not Turn' order. Eighty-three percent reported experiencing fear of causing harm/death by turning a patient. Seventy-nine percent believed patients with a 'Do Not Turn' order need to be reassessed every 2-4 hours. Over 75% wanted a standardized guideline for assessing when patients can be turned.

Conclusion/Significance: Findings suggest the need to identify and implement standardized guidelines for turning unstable patients.

THE IMPACT OF TREATMENT ON QUALITY OF LIFE IN SCARRING ALOPECIA

Presenting Author: Samiya Diawara, BA

Co-Authors: Samiya Diawara (RMC), Elizabeth Damstetter (RUMC), Carmen Petrizzo (RUMC)

Introduction: Scarring alopecias, also known as Cicatricial alopecias (CAs), are hair loss disorders that cause permanent and irreversible hair loss. This study will examine the psychological implications of CAs before and after the initiation of treatment among patients in dermatology clinic at RUMC. Prior studies have examined the relationship between quality of life and other forms of hair loss, but a gap exists surrounding the implications of CAs on quality of life, and whether beginning treatment impacts this.

Objective: As CAs are a set of poorly understood conditions with limited research, it is important to understand the implications of the disease on patients' lives. Understanding how hair loss disorders change an individual's quality of life can help us understand both the severity and potential long-term effects.

Methods: Subjects aged 18-75 will be recruited to participate in this IRB-approved study and followed over 3 months. Using the Dermatology Quality of Life Index (DLQI), patients' quality of life related to their hair condition will be evaluated both before (baseline) and after initiation of treatment. Chart reviews will be performed on patients' demographics and comorbidities to stratify/interpret results.

Results: Preliminary data show the average baseline DLQI score of 4 participants was 8.5 (score of 6-10=moderate effect on QOL). Total of 45 patients will be recruited to this study for a $P < 0.01$, Cohen effect size $d_z \geq 0.441$, $\geq 80\%$ power, 5% type 1 error rate.

Conclusion/Significance: CAs have a negative impact on patients' quality of life. Obtaining a better grasp on the disease process in relation to how it impacts the 'whole' person is crucial to developing quality treatment options. Limitations include the subjective nature of questionnaires and the impact other psychiatric conditions have on patients' mental health outside of their dermatologic diagnosis. This study provides a deeper knowledge of the psychological impact CAs have and highlight the importance of considering factors beyond the pathogenesis/physiology of a disease. It will provide groundwork for further research to be done on the mechanisms whereby CAs cause differences in self-perception and negatively impact self-image.

ANALYSIS OF INTERPROFESSIONAL DISCHARGE COMMUNICATION AT RUSH UNIVERSITY MEDICAL CENTER

Presenting Author: Christina Brown, BS

Co-Authors: Christina Brown (Rush), Aliyah Smith (Spelman), Ben Schnieders (Carleton), Christopher Bruti (Rush)

Introduction: The discharge process is complex and high-risk. Clear and accurate communication between the physician or Advanced Practice Provider (providers), nurse, and patient are essential to ensure a safe and effective transition of care. Upon literature review, there have not been studies looking at interprofessional communication during the discharge process. Rush University Medical Center does not have a formal communication plan at the time of discharge.

Objective: Identify barriers in communication in the current discharge process that may impact patient care

Methods: Communication was analyzed on Rush general medical floors between provider, nurse, and patient at the time of discharge. Nurses and providers were surveyed about their satisfaction with and barriers to communication in the current discharge process. The discharge process was studied qualitatively via observation of the discharge process and interviews with providers and nurses.

Results: There were 97 responses to the survey with participation from attending physicians, Advanced Practice Providers, senior residents, interns, and nurses. Providers ranked satisfaction with discharge communication as 3.35/5.00 while nurses ranked it 2.67/5.00 ($p=0.0003$). 76.92% of nurses reported they were notified of the discharge plan via discharge orders in the EMR while 94.87% preferred direct communication or phone calls with the provider. Qualitative analysis showed themes including nursing staff unable to round with providers, ineffective phone calls between nurses and providers, and nurses feeling uninformed of discharge plans.

Conclusion/Significance: Gaps in interprofessional communication at the time of discharge provides a clear opportunity for improvement. Currently, providers have patients assigned throughout the hospital which requires communication with several nurses and limits face-to-face interactions. From surveys, providers were more comfortable than nurses with utilizing EMR to communicate discharge information through an After-Visit Summary, limiting 2-way communication. Rush is working towards 'geolocating' provider-patient assignments which could eliminate some of these barriers. Following this implementation, the next step is to introduce a standardized patient-centered discharge communication process and checklist. This involves bedside discharge rounds with provider, nurse, and patient, ensuring open communication and likely a safer transition of care. Limitations include the assumption that current communication practices are leading to poor patient outcomes which will be further investigated following implementation.

COMPLICATIONS POST PEDIATRIC SURGERY IN PATIENTS WITH CEREBRAL PALSY, IS THERE A HEALTH DISPARITY?

Presenting Author: Nicholas Skertich, MD

Co-Authors: Nicholas J. Skertich, MD, Martha Ingram, MD, MPH (Northwestern), Ethan Ritz, MS, Connie Rossini, MD, Srikumar Pillai, MD, Mary Beth Madonna, MD, Ami Shah, MD, Mehul Raval, MD, MS (Northwestern)

Introduction: Cerebral Palsy (CP) is a neurological disorder that affects a person's motor function. It has a prevalence of 2-2.5 cases per 1,000 live births and is the most common physical disability in childhood. Studies have revealed that patients with CP may have worse surgical outcomes.

Objective: Our aim was to assess whether a health disparity exists for pediatric patients with CP undergoing appendectomy or cholecystectomy and to identify potential targets for improvement.

Methods: Outcomes between patients with and without CP undergoing appendectomy and cholecystectomy from 2012 to 2017 were compared using the National Surgical Quality Improvement Program-Pediatric database. Chi-square tests and adjusted logistic regression analysis were used to determine significance.

Results: 76,814 patients, 319 (0.4%) with CP, 76495 (99.6%) without, were identified. CP patients had significantly more postoperative complications with an odds ratio (OR) of 3.01 (95% confidence interval (CI) 2.3-4.0, $p < 0.001$) on univariable analysis. CP patients were at greater risk of surgical site infections ($p = 0.026$), systemic sepsis ($p = 0.012$), catheter associated bloodstream infection ($p = 0.009$), pneumonia ($p < 0.001$), unplanned intubation ($p = 0.004$) readmission ($p = 0.005$) and reoperation ($p < 0.001$). However, on multivariable analysis, having CP did not increase the odds of morbidity (OR 1.0, 95%CI 0.7-1.4, $p = 0.88$). Higher ASA class, pre-operative oxygen use, steroid use, nutritional support, coagulopathy, sepsis, and having a congenital malformation did significantly increase the odds of morbidity, all of which were more common in CP patients.

Conclusion/Significance: CP patients have more post-operative complications than patients without CP, but this perceived disparity may be explained by their significantly greater pre-operative comorbidities.

DELIRIUM IN ELDERLY PATIENTS UNDERGOING OUTPATIENT SURGICAL PROCEDURES: A RANDOMIZED CLINICAL TRIAL OF AN AVOID DELIRIUM PROTOCOL**Presenting Author:** Micah Rubin, Bachelor of Arts**Co-Authors:** Yabtsega Moges MD (RUMC) & Arvind Rajagopal MBBS (RUMC)

Introduction: Patients ≥ 65 years of age account for greater than 1/3 of all inpatient and outpatient procedures in the US. Post-operative delirium (POD) occurs in up to 13% of elderly surgical patients following inpatient surgery and is associated with significant morbidity and mortality. Prior studies have suggested anesthetic management plans designed to reduce the incidence of POD, although these strategies have not been evaluated following outpatient surgery.

Objective: The purpose of this study was to assess the incidence of POD in patients ≥ 65 years undergoing outpatient surgery, the efficacy of an avoid delirium protocol (ADP) and determine risk factors for POD.

Methods: The study was approved by the IRB. In accordance to the American Geriatric Society's Clinical Practice Guideline for Postoperative Delirium in Older Adults, an ADP was developed- minimizing or eliminating intraoperative drugs that have been associated with POD. After informed consent, patients were randomized into the ADP group or standard of care. Patients were assessed preoperatively for risk factors for POD and received CAM-ICU screening prior to surgery and at 1h postoperatively. Medications administered intraoperatively were obtained from the medical record. Univariable analysis of risk factor between delirium and non-delirium patients was done using chi-square and the Mann-Whitney U test. Multivariate recursive partitioning was performed to assess interaction in risk factors with $P < 0.2$ on univariable analysis.

Results: 150 subjects provided informed consent and 146 were analyzed. 6 subjects had incomplete data. POD was present in 6/146, 4.1% (95% CI 1.5 to 8.7%) of subjects. 3 subjects randomized to the control and 3 in ADP group exhibited POD ($P=0.92$). ASA PS=2 and greater intraoperative mg morphine equivalents (MME) were observed in subjects with POD. Recursive partitioning identified MME, ASA PS and length of surgery as important split points for risk assessment.

Conclusion/Significance: The important finding was that greater opioid administration, rather than preoperative risk factors or the use of intraoperative vasopressors, benzodiazepines, anticholinergics, dexamethasone or ketamine, was associated with POD in elderly patients undergoing outpatient surgery. This data is significant for developing future guidelines to reduce the risk of POD in elderly outpatients, which should include limiting intraoperative opioid analgesics.

ANALYSIS OF PROVIDER SURVEY ADDRESSING RUSH'S ADVERSE CHILDHOOD EXPERIENCE INTERVENTION DELIVERY

Presenting Author: Morgan Sturgis, BS

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Introduction: Adverse Childhood Experiences (ACEs) refer to traumatic experiences that individuals encounter before the age of 18. Experiencing multiple ACEs is associated with poor behavioral and physical health outcomes that span generations. Beginning in July 2017, Rush sought to break this cycle through routine prenatal ACEs screening and patient navigator support to free community resources to build resilience. However, in the program's first year, only 30-32% of eligible patients were accessing them.

Objective: To provide education to Rush's prenatal providers regarding ACEs screening methodology and statistics while determining barriers to connecting patients to available resources.

Methods: After piloting content at a Pediatric Division Meeting, our team hosted Ob/Gyn grand rounds, focusing on 'Home Visiting Services and Resilience Building at Rush.' We administered an electronic survey pre-presentation, and one month post-presentation, to assess provider comfort, knowledge, and barriers regarding ACEs awareness and intervention delivery.

Results: In the pre-survey (n=16), providers endorsed concerns of limited time, responsibility allocation, screening scarcity, and lack of knowledge about available resources. 68.8% of respondents did not know about free resources available for patients, and 87.5% felt uncomfortable addressing interventions with mothers who qualify. Only 6.3% of providers took note of a patient's ACE score 'almost always', and 12.5% of respondents felt 'comfortable/very comfortable' discussing interventions with patients. The post-survey (n=12) revealed unanimous knowledge of Rush's free resources, and a dramatic increase in provider awareness about ACE screening and referrals. One month after the presentation, 50% of providers noted a patient's ACE score 'almost always', and 75% felt 'comfortable/very comfortable' discussing resources with patients.

Conclusion/Significance: This survey demonstrated that providers are dedicated to being steadfast advocates for their patients, but there is a need for continuous educational programming regarding provider-patient communication and support. Future directions of this work include expanding our sample size, and catering to departments, to continue to effectively reach busy providers while ensuring patients' access to health-equity-minded programming.

OCCUPATIONAL THERAPY UTILIZATION PATTERNS FOR PATIENTS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES IN THE ACUTE CARE HOSPITAL SETTING.

Presenting Author: Samantha Conrad, BS, OTS

Co-Authors: Samantha Conrad (Rush); Molly Bathje (Rush); Matthew Medick (Rush); Molly Ross (Rush); Lou Fogg (Rush)

Introduction: Adults with IDD represent a growing presence within the acute care setting. This is due to increased life expectancy, higher risks of chronic health conditions and increased prevalence of orthopedic trauma.

Objective: The objective of this research was to describe the population of adults with IDD in acute care hospital settings, and to explore how this population compares to adults without IDD and the related utilization of services and discharge placements.

Methods: With IRB approval, this retrospective study utilized descriptive and comparative analyses of acute care hospital medical records from a national database. Data was extracted for patients over 18 years of age admitted from 1/2017-1/2019 with a primary diagnosis of a lower extremity orthopedic condition. Using stochastic matching, a sub-sample of patients with an IDD diagnosis were identified by an age-matched sample using a 1:3 ratio of IDD vs non-IDD patients. Descriptive statistics were conducted on the sample of patients with IDD and included age, gender, diagnosis, length of stay (LOS), number of OT treatments, payer, and discharge environment. Independent sample t-tests compared the average length of stay and OT treatments between the IDD and non-IDD samples while chi-square analyses identified differences between samples for payer and discharge environments.

Results: Of 603,546 patients with orthopedic conditions, 2,118 patients also had a diagnosis of IDD (n = .35%) and 6,354 non-IDD patients were included in the matched sample. Within the IDD sample, the most common IDD diagnosis was unspecified intellectual disability (n = 1551). Comparison revealed that the IDD sample experienced longer LOS (t = -14.40, p < .01), were more likely to have Medicare coverage ($\chi^2(3) = 1170.38$, p < .01), more commonly discharged to skilled nursing facilities ($\chi^2(26) = 1099.8$, p < .01), and received fewer OT charges per day (t = 4.50, p < .01).

Conclusion/Significance: Findings indicate that there is a difference in utilization patterns of individuals with IDD related to orthopedic conditions in acute care hospitals. This study highlights the differences in utilization patterns for patients with IDD and the need for practitioners to be prepared to meet their needs in a variety of settings.

TEAM w.E.D.G.E. WORKING TO EVALUATE DISPOSABLE GRADE EQUIPMENT TO IMPROVE PATIENT OUTCOMES

Presenting Author: Lillian Hall, MSN, APRN, ACCNS-AG, CCRN-K

Co-Authors: Mary Carol Racelis MSN, APRN, ACNS-BC

Introduction: In March 2018, while preparing for a Hospital-Acquired Pressure Injury (HAPI) project in critical care, re-usable products were evaluated. Body fluid saturation was discovered on reusable positioning wedges in the surgical intensive care unit (SICU). Additionally, nurses voiced concern that the current wedge product was not effectively preventing HAPIs during turning and positioning. Nurses also requested a slide sheet transfer device that could remain in position underneath immobile patients to reduce friction and injury during boosting/lateral transfers.

Objective: The current state products/process held many practice issues such as: Reusable wedges not dated or monitored for shelf-life; no process or oversight of wedge integrity; environmental personnel cleaning wedges stockpiling in equipment rooms; when kept in patient room, wedges completely fill closet; re-usable wedges are ineffective in turning patients with inconsistent off-loading of patient pressure points for high risk populations.

Methods: Implementation of disposable grade equipment, compared to reusable grade equipment, will improve prevention of hospital acquired pressure ulcers. However, this new product would be a 350% increase in cost from current product costs. RUMC met HAPI goal in FY19, yet SICU sacral, buttock, coccyx skin break-down increased. During April 2018 a single Patient Use Wedge and Glide sheet 2-week trial with data collection was performed including pre- and post-data collection of staff satisfaction in SICU.

Results: Pre- and Post-pilot staff satisfaction results will be described. FY19 and FY20 HAPI data will be presented. Strategies used to expand metrics to overcome cost barrier in this project will be described. Approval and product went live at start of FY20 in SICU. Goal is to decrease sacral-coccyx-buttocks HAPIs in SICU by 20%. Additional data reveals cost avoidance gains exceed product cost.

Conclusion/Significance: This project demonstrates how to capture pilot data and expand metrics to overcome cost barriers to achieve new products that positively impact patient care outcomes.

A MULTISTEP QUALITY IMPROVEMENT PROJECT TO REDUCE HYPOGLYCEMIA THROUGH COORDINATION OF BLOOD GLUCOSE MONITORING, MEAL DELIVERY, AND INSULIN ADMINISTRATION

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Introduction: A large academic medical center in the Midwest experienced an increase in hypoglycemic events (glucose <70mg/dL) for inpatient adults in 2018. The hypoglycemic rate was 2.03% (bottom 15th percentile in the nation) in December 2018. The average time between point of care (POC) glucose and mealtime insulin delivery was 118.2 minutes for inpatient adults while evidence based best practice is less than 30 minutes. Hypoglycemia in hospitalized patients is directly related to increased length of stay, mortality, and morbidity. Poor coordination of POC glucose, meal delivery, and insulin administration contributed to patient hypoglycemia.

Objective: The purpose of this quality improvement (QI) project was to redesign patient care workflow to reduce hypoglycemia and improve patient outcomes.

Methods: This initiative was guided by the Institute for Healthcare Improvement (IHI) Plan DO Study Act (PDSA) model. Based on the results of a root-cause analysis, an interdisciplinary taskforce including nursing, pharmacy, physicians, dietary, information services, and patient safety, was established in January 2019 to address multiple opportunities to improve inpatient hypoglycemia rates. The taskforce revised POC glucose orders, standardized insulin administration instructions, and implemented improved communication to nursing staff when meals were delivered. New glucometers were purchased to standardize processes of wirelessly uploading POC results to the electronic medical record in real time and prevent transcription errors. A nurse-managed correction insulin protocol was piloted in two patient care areas.

Results: This multistep QI project reduced the time between POC glucose and mealtime insulin administration by 36.1 minutes within the first week of workflow change and maintained for 24 consecutive weeks. Hypoglycemic rates have decreased to 1.76% and the number of hypoglycemia events per month decreased from 473 to 382.

Conclusion/Significance: The taskforce work is ongoing and hypoglycemic rates are continuing to trend down. The expansion of the nurse-managed correction insulin protocol pilot to more inpatient care areas has further decreased POC glucose to mealtime insulin administration time and hypoglycemic rates.

IMPROVING THE HOSPITAL CONSUMER ASSESSMENT OF HEALTHCARE PROVIDERS AND SYSTEMS (HCAHPS) QUALITY MEASURE 'COMMUNICATION ABOUT MEDICINES' IN AN INPATIENT ORTHOPEDIC UNIT

Presenting Author: Kelli Williams, MSN

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Introduction: Implementation of a multimodal analgesia protocol in the inpatient orthopedic unit of an urban academic medical center was associated with an unexpected decline in the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) quality measure 'Communication About Medicines.' Improving this critical HCAHPS score is linked to reimbursement, quality patient experience, and safety.

Objective: The purpose of this evidence based project was to assess the patient perioperative medication education experience and develop recommendations to improve nurse-patient medication communication. Evidence from literature and healthcare quality organizations suggests that information provided about medicines is often insufficient to meet patients' needs and expectations, recommending improved patient medication education to promote their safe and effective use.

Methods: A scripted telephone survey was administered to a convenience sample of 50 former orthopedic inpatients completing HCAHPS surveys between 11/1/2018 and 5/1/2019; 25 patients who indicated Top Satisfaction were compared with 25 who indicated Low Satisfaction with medication communication. Survey measures of satisfaction with medication education were related to purpose, possible side effects, communication methods, and overall quality of information. Survey Likert scale responses underwent Chi-square testing to determine which aspects of medication education were perceived as insufficient. Participant comments were analyzed using a modified Grounded Theory approach to identify common themes possibly influencing patient satisfaction.

Results: Telephone survey participants were likely to 'Strongly Agree' that they understood their medication's purpose, but less likely to 'Strongly Agree' that they understood possible side effects. Patients in the Low Satisfaction group indicated less knowledge and were more likely to request additional information about medications compared to the Top Satisfaction group. Survey comments revealed themes related to dissatisfaction: perceived insufficient information, concerns with pain medications, and experiencing side effects.

Conclusion/Significance: Potential future interventions supported by these results include: 1) revising existing medication educational materials, 2) enhancing in-service training, and 3) creating a medication pocket reference guide for unit nurses, with the goals of improving patient satisfaction and HCAHPS scores, enhancing patient understanding of medications, and promoting medication safety.

REDUCING 30 DAY READMISSIONS IN LIVER TRANSPLANT RECIPIENTS

Presenting Author: Renee Evans, MSN

Co-Authors: Presenting Author: Doug Krysan and Renee Evans Co-Authors: Tanya Kidandi, Stephanie Hetrea

Introduction: Readmission following liver transplantation (LT) is a significant burden on the healthcare system and has serious consequences for patients. In a retrospective study of a large national cohort of LTs, patients with a 30-day readmission had worse graft and patient survival at a 2 year follow up interval. Rates of readmission following LT significantly vary from center to center even when adjusted for recipient, donor, and geographic region, with rates generally reported between 26% and 50%. The 30 day readmission rate at Rush University Medical Center (RUMC) for liver transplant recipients in July 2018 was 67%.

Objective: The aim of this project was to reduce the 30-day readmission rate for patients following LT to less than 35%.

Methods: Members of a readmission reduction committee reviewed patient records to identify common reasons for readmissions. The majorities of re-admissions occurred within the first week of discharge, and were more common for patients who were discharged on the weekends, had up-trending liver function tests prior to discharge, and had a prolonged time between their hospital discharge and first outpatient clinic appointment. It was also noted that some inpatient readmissions could have been avoided by placing the patient in 23-hour observation. Based on these findings, readmission prevention strategies included 1) focused on requiring home health nursing upon discharge, 2) expediting outpatient follow-up, and 3) utilization of observation status in place of inpatient admissions. Patients with up trending LFTs were not discharged.

Results: After these changes were implemented, there were no 30-day readmissions observed for the duration of the project (6 months) of the 28 patients that were transplanted. This finding was unprecedented as it was the longest time our program had gone without a 30-day readmission. At the end of our 7-month project, the 30-day readmission rate decreased to 27% which exceeded our goal of less than 35%.

Conclusion/Significance: This project demonstrated that having more strict discharge criteria, closing gaps between discharge and the first outpatient visit, and providing an alternative to inpatient admission through observation status were effective interventions in reducing 30- day readmission rates in patients receiving liver transplants.

CLINICAL VALIDATION OF TRI-AXIAL ACCELEROMYOGRAPHY AND ELECTROMYOGRAPHY

Presenting Author: Amanda Sremac, Bachelor of Science

Co-Authors: Micah Rubin, BA (RUMC), Alisha Bhatia, MD (RUMC), Yabtsega Moges, MD (RUMC)

Introduction: The Anesthesia Patient Safety Foundation Collaborative Panel on perioperative neuromuscular management recently recommended that 'quantitative monitoring should be used whenever a neuromuscular blocking drug is administered.' A review of current practices in neuromuscular reversal and monitoring reached the same conclusion. Our hospital has been relying on the use of qualitative peripheral nerve stimulators but recently acquired the neuromuscular monitor Stimpod™ NMS450 (Xavant Technology Ltd., South Africa) which utilizes tri-axial acceleromyography (AMG) with the goal of user-friendly quantitative monitoring. There have been no studies validating the efficacy of the Stimpod™ with known quantitative neuromuscular monitors (Q-PNSs). Previous studies have revealed that AMG devices experience more external disturbances and overestimation of neuromuscular recovery when compared with electromyography (EMG).

Objective: The purpose was to compare AMG with the intraoperative EMG monitors currently used at our hospital in our routine clinical setting.

Methods: Following IRB approval and written informed consent, patients (n=20) undergoing elective spine surgery who are monitored by EMG were included in this study. Prior to administration of muscle relaxant, baseline EMG and AMG recordings were made. AMG electrodes were placed on the ulnar nerve at the wrist with the accelerometer placed on the thumb. Muscle relaxation was allowed to wear off and a train of four ratio (TOF) was monitored after 30min, and subsequently every 15min until spontaneous recovery of a TOF ratio of 0.9 was observed by both AMG and EMG.

Results: 20 patients provided 233 paired datasets. BMI and duration of monitoring were 57y (52 to 66), 27.4kg/m² (24.2 to 36.9), and 115min (90 to 130), respectively. The median correlation between AMG and EMG twitch responses for individual patients was 0.79(0.75 to 0.83). Bland-Altman analysis demonstrated a bias of -0.75 (99% CI -0.64 to -0.87) twitches for TOF compared to EMG, with greater discordance at increased twitch counts.

Conclusion/Significance: The findings of our study suggest that Q-PNS neuromuscular monitoring according to the manufacturer's recommendations under typical clinical circumstances, has not proven to be a reliable tool for quantitative monitoring during elective spine surgery when compared with EMG. This data is significant for furthering the field of neuromuscular monitoring during surgery.

PERIOPERATIVE BLADDER MANAGEMENT: A QUALITY IMPROVEMENT INITIATIVE

Presenting Author: Mohammed Nabeel Hameed, DNP-AGACNP, RN

Co-Authors: First Author: Mohammed Nabeel Hameed, DNP-AGACNP, RN Co-authors: Antonella Mossa, MSN, RN, CPAN; MaryCarol Racelis, MSN, APRN, ACNS-BC; Denina McCullum-Smith, MSN, RN, CMSRN

Introduction: Peri-operative areas at Rush University Medical Center (RUMC) have variability with bladder management in patients undergoing ortho spine, neuro-spine, and orthopedic procedures. This places surgical patients at greater risk for Post-Operative Urinary Retention (POUR) and leads to extended urinary catheterization, increased risk of infection, length of stay, and cost of care.

Objective: The purpose of this project was to evaluate current bladder management practices in ortho spine, neuro-spine, and orthopedics patients in the peri-operative areas and propose a standard practice model to manage POUR.

Methods: Twenty patient charts audits were conducted in each of the following surgical categories: orthopedics, ortho-spine, and neuro-spine from September-November 2018. Over 40 variables were audited, based on the POUR risk factors and prevention practice points by the National Association of Orthopedic Nurses. This data was analyzed to understand the variability and the impact on patient outcomes.

Results: Surgical categories analysis showed: over 94% of patients had at least one risk factor for developing POUR. Over 90% of patients in the orthopedic and ortho-spine group and 70% in the neuro-spine group received an indwelling urinary catheter, pre-procedure. Orthopedic group averaged 467 minutes with an indwelling catheter, while ortho-spine and neuro-spine groups averaged over 1000 minutes. Documentation variability was also an issue, Epic was missing where to document preoperative void. Post-void residuals (PVR) showed variability and most concerning were the patients that urinated less than 100mL after catheter removal; the PVR's for orthopedics, ortho-spine, and neuro-spine were completed only in 50%, 66.7%, and 36.7% of cases respectively.

Conclusion/Significance: From the results we recommended several practice changes two were implemented as new quality improvement processes. The first was to include a place in Epic to document pre-operative void. The second was to implement POUR protocol that can be applied to all post-surgical patients.

PROTECT THE NARES: BECAUSE I CARE... REDUCING NARES ACQUIRED PRESSURE INJURIES IN ADULTS

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Introduction: In FY17, organizational data along with recent literature supported that device-related pressure injuries are a major patient safety concern. Nasogastric and small-bore feeding tubes are a frequent contributor to nares acquired pressure injuries (NAPIs). NAPIs cause pain and a potential for disfigurement. An innovative method for preventing device-related nares pressure injuries was needed, using not just a securement device, as literature commonly noted, but also adding an additional barrier to reduce pressure on the nares.

Objective: To identify an innovative solution to reduce nares pressure injury to reduce device related nares pressure injuries in adult populations.

Methods: A multidisciplinary task force of staff nurses, clinical nurse specialists, and quality improvement specialists developed a 'T'- shaped hydrocolloid protective barrier as a primary driver in reducing device injuries related to nasogastric tube or small-bore feeding tube. Thus, the 'T' shaped hydrocolloid protective barrier, in addition to a securement device was bundled in an effort to reduce pressure related injuries on the nares. The securement device and hydrocolloid barrier was changed every three days.

Results: This quality improvement project yielded positive and sustainable results. In FY15, the baseline NAPI incidence rate was 5.6%. The SICU pilot, effective January FY 16, confirmed design effectiveness and yielded a 70% NAPI reduction. In June FY16, the pilot expanded to all adult inpatient units leading to further reduction of NAPI (3.5%). Positive results sustained in FY17 as the organization exceeded targets, with reported reduced incidence rates of 1.6%.

Conclusion/Significance: A large academic medical center developed and implemented a creative approach to reduce device-related nares acquired pressure injuries (NAPI) from nasogastric tubes and small bore feeding tubes in the adult inpatient population with a significant reduction in incidence. This approach to reduction should be adopted by other facilities.

SUCCESSFUL MANAGEMENT OF NECROTIZING INFECTION EXTENDING TO BONE: A CASE SERIES

Presenting Author: Connor Wakefield, BS

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Introduction: Necrotizing Fasciitis (NF) is a devastating infection requiring prompt recognition and treatment. Debridement of associated necrotic tissue may result in exposure of bone. With limb involvement, the standard of care remains amputation for disease that threatens the life of the patient. However, limb salvage remains a controversial treatment option when bone is exposed. We describe a successful case series of the management of severe necrotizing infection resulting in exposed bone.

Objective: To describe the successful management of patients who present with necrotizing fasciitis requiring surgical debridement resulting in exposed bone.

Methods: We performed a retrospective review of nine patients suffering from NF at Rush University Medical Center between 2017 and 2019. Patients were included if: a) clinical findings of NF were confirmed by pathology at the time of debridement, and b) surgical debridement resulted in exposed bone. In each case, surgical debridement to bone was performed to clear the necrotizing infection.

Results: Nine patients were included; 3(33%) females, 6 (67%) males. The mean age was 42 (22-56), mean BMI was 30 kg/m² (18 -47.0 kg/m²), and most were diabetic (6 of 9; 67%). Anatomic regions of NF included: upper extremity in 1 patient (11%), lower extremity in 6 patients (67%), and trunk/pelvic in 2 patient (22%). All patients were treated with prompt surgical debridement and limb salvage therapy when indicated with success; 1 of 9 (11%) patients expired from unrelated illness. One patient (11%) required amputation of the affected limb at approximately 6 months follow-up for limb salvage failure.

Conclusion/Significance: NF can be a severe infection that threatens the life of the patient. There is controversy regarding the application of salvage therapy in NF, especially when debridement down to the bone is required to clear the infection. We present 9 cases of severe NF; most were managed successfully with multi-disciplinary salvage therapy, including aggressive serial debridement to exposed bone and subsequent reconstruction.

TRANSITIONING A NON-CLINICAL HOUSE ADMINISTRATOR TO A NURSE-LED HOSPITAL OPERATIONS ROLE

Presenting Author: Constance Shay-Hadley, MS, BSN, RN, NE-BC

Co-Authors: Constance Shay-Hadley (Rush), Michelle Ann Quigley (Rush); Shonda Morrow (Rush)

Introduction: Healthcare delivery has become increasingly complex requiring a higher level of competence amid daily operations. The evolution of healthcare has prompted senior level executives at a major academic medical center to transform and enhance the role of a non-clinical house supervisor to an all nurse leader role of Hospital Operations Administrator. The transformation and role redesign has been beneficial in highlighting the unique contributions of nurse leaders

Objective: With the increasing complexity of healthcare, senior executives identified there were opportunities to evaluate the role, related competencies, and level of engagement necessary to insure efficiency and effectiveness. Enhanced operational experience and a strong clinical background were identified to be a requisite to lead within a complex organization. The need to change the reporting structure from Security to Nursing Administration was evident.

Methods: As part of the role redesign, a leader was identified to guide the team in the identification and alignment of the role requirements with the hospital's strategic goals. Both educational and experiential attributes were developed in concert with the AONE competencies. Collaboration with the Human Resource team produced a newly defined role which focused on knowledge, skills, and behaviors. Senior nursing leaders partnered with the Department of Nursing and Security Administration to design and implement the transformation from an Administrator on Call to a Hospital Operations Administrator.

Results: The contributions of a nurse-led Hospital Operations Administrator team have positively impacted patient satisfaction and employee engagement. The team has demonstrated the contributions of nurse leaders in a complex and evolving academic medical center. Several performance improvement initiatives were noted and implemented as a result of the clinical focus of nursing leadership. Mentoring and role modeling have served to enhance the perception of nurse leaders.

Conclusion/Significance: The changing nature of healthcare and the nursing profession dictate the competencies and skills of the Hospital Operations Administrator play an important role in synthesizing core values and clinical operations. The importance of nursing leadership to maintain a global view of clinical and non-clinical issues is essential to maintain excellence in a quality-driven academic medical center.

SUPPORTING THE ROLE OF THE NURSE IN ADVANCE CARE PLANNING ON A HEMATOLOGY/STEM CELL TRANSPLANT INPATIENT UNIT

Presenting Author: Hazel Levine, RN, MSN, CNL, BS

Co-Authors: Hazel Levine (Rush University) and Arielle Niecestro (Rush University)

Introduction: Despite the Patient Self-Determination Act (PSDA) mandates of 1990, the benefits of advance care planning (ACP), and the ethical obligation of nurses to participate in ACP with patients, the completed advance directive (AD) rate for patients on a hematology/stem cell transplant inpatient unit at a large midwestern university medical center is 20%; this is 13% lower than the national average.

Objective: The purpose of this quality improvement project was to evaluate the feasibility of using an adapted, evidence-based flowsheet to support nurses in the ACP process. The evidence indicates that nurses require a user-friendly, efficient, and centrally located flowsheet to support their role in the ACP process. Investigators used heuristic principles to uncover flowsheet usability problems. These principles worked in tandem with Rogers' innovation-decision process to guide the adoption of a flowsheet that was compatible with the nurse workflow on the unit.

Methods: Investigators completed a comprehensive usability evaluation on an evidence-based ACP review flowsheet. All usability challenges were addressed and the flowsheet was modified accordingly. Investigators used the updated flowsheet to complete ACP review with 28 patients. As lack of time is cited throughout the literature as a barrier for nurses to effectively participate in the ACP process, investigators calculated the average time to complete the ACP review flowsheet from the 28 encounters. No individual identifying data were collected. All data were stored on investigators' password protected computers.

Results: The heuristic evaluation supports that the flowsheet is user-friendly. The average time to complete the ACP review flowsheet was 62.5 seconds. Use of the ACP review flowsheet supports the role of the nurse in the ACP process without impeding workflow.

Conclusion/Significance: The investigators recommend that the ACP review flowsheet be tested and evaluated with a larger sample in other patient care settings.

NEURODEVELOPMENTAL OUTCOME AT 20 MONTHS CORRECTED AGE IN EXTREMELY PRETERM INFANTS AFTER EXPOSURE TO HYDROCORTISONE AND DEXAMETHASONE IN THE NICU

Presenting Author: Cristina Foschi, BS

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Introduction: Extremely preterm (EPT; birth gestation < 28 weeks) infants are at high risk for neonatal morbidities and subsequent adverse neurodevelopmental (ND) outcome in childhood despite advancements in neonatal intensive care. Postnatal steroids such as hydrocortisone (HC) and dexamethasone (DEX) are used frequently in EPT to treat lung disease despite their known side effects. HC is thought to have less adverse effects on ND outcome as compared to DEX, but few studies have examined the impact of both HC and DEX on ND outcome in preterm infants. Understanding the association between steroid treatments in the NICU on childhood ND outcome would guide treatment decisions in the NICU.

Objective: To evaluate the association between HC and DEX exposure (age, duration and dose) in the NICU on ND outcome in EPT infants.

Methods: 264 EPT infants born in 2011 - 2016 of whom 221 survived (138 no steroid; 47 HC only; 36 DEX +/- HC) were compared in terms of morbidity and ND outcome at 20 months corrected age (CA). Outcome measures included the neurologic exam and results of the Bayley Scales of Infant and Toddler Development-III (BSITD-III). Multiple regression analyses were done to adjust for the effect of social and neonatal risk factors on outcome.

Results: There were no differences in HC duration or dose between the HC-only and DEX groups. In unadjusted analyses infants exposed to DEX had significantly lower Bayley index scores as compared to infants in the other two groups. In linear regression analyses, any exposure to DEX was associated with a 10-point reduction in cognitive ($p < .01$), language ($p < .05$), and motor ($p < .01$) index at 20 months CA. HC exposure, duration, and dose was found to not be associated with adverse neurodevelopmental outcomes.

Conclusion/Significance: Dexamethasone exposure was associated with adverse cognitive, language, and motor outcomes at 20 months CA. Conversely, HC exposure, dose, and duration was not associated with adverse ND outcome. In this cohort, DEX was primarily used as a rescue steroid in infants who had already been exposed to HC. Further research must be done to understand the cumulative effect of HC and DEX exposure in this vulnerable age group.

THE CERVICAL DYSPLASIA WORKSHEET (CDW): A LONGITUDINAL MAP OF CYTOLOGY AND HISTOLOGY OF CERVICAL DYSPLASIA TESTS AND PROCEDURES

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Introduction: The evolution of cervical cancer is a longitudinal process, taking years to manifest following initial dysplasia. Though cervical cancer was previously one of the most common causes of cancer for women in the United States, advances in cancer screening such as the Pap smear have led to drastic reductions in incidence. However, multiple challenges exist for both patients and healthcare providers in successfully navigating the cervical dysplasia process. Algorithms relating to dysplasia tiers and HPV typing are complex, making assessment of results and follow-up more challenging. To allow for improved visualization of patient dysplasia tests, procedures, and results over time, we designed the Cervical Dysplasia Worksheet (CDW).

Objective: Our objective is to present the Cervical Dysplasia Worksheet (CDW) and evaluate patient attitudes towards use of the tool in the setting of abnormal result follow-up.

Methods: The CDW augments the ASCCP guidelines for managing abnormal cervical cancer screenings by visually depicting cervical cytological and histological history along a color gradient showing severity. A cross-sectional pilot of the tool was performed to assess patient attitudes in the setting of either dysplasia or colposcopy clinic. Patients had their data graphed on the CDW and explained to them before their clinical encounter. They then gave general comments about the tool and filled out a short survey.

Results: Among the 30 patients who participated in our evaluation, almost all agreed (n=29; 96.7%) that the tool helped them understand their history and results and that they would use it again. The majority also reported that they had discussed cervical results and management with their doctors prior to the current visit (n=24; 80.0%). When asked about potential improvements to the CDW, multiple patients explicitly stated that they would not make any changes. One patient commented on a need for more explanation of the cytology and histology abbreviations.

Conclusion/Significance: The CDW is a novel tool to display a patient's cervical dysplasia history to enhancing patient-provider communication. Patient evaluation of the tool was largely positive, and suggestions will be taken into consideration for modification. Further evaluation of the CDW among healthcare providers is needed to analyze its efficacy in the clinical setting.

BODY MASS INDEX DOES NOT PREDICT THE SEVERITY OF NON-ALCOHOLIC FATTY LIVER DISEASE AT THE TIME OF CHOLECYSTECTOMY

Presenting Author: Timothy K. Lee, BA University of Pennsylvania 2015, MD candidate Rush Medical College 2021

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Introduction: Non-Alcoholic Fatty Liver Disease (NAFLD) shares risk factors with gallstones and obesity. A patient undergoing cholecystectomy for gallstone related disease may have an abnormal appearing liver at the time of surgery, which may be a manifestation of undiagnosed NAFLD. It remains unknown whether pre-operative body mass index (BMI) or aspartate aminotransferase (AST) and alanine aminotransferase (ALT) can accurately predict NAFLD.

Objective: To determine whether pre-operative BMI, AST, or ALT is correlated with NAFLD severity.

Methods: Between 2017 and 2019, patients who underwent concurrent cholecystectomy and liver biopsy at Rush University Medical Center were retrospectively reviewed. A single surgeon performed the liver biopsy at the time of surgery if the liver appearance was abnormal (diffusely yellow, rounded edges, or enlarged). The NAFLD Activity Score (NAS) was used to grade the severity of NAFLD, with NAS ≥ 4 representing clinically significant NAFLD.

Results: The mean BMI of the study group was 34.2 kg/m² (25 to 46 kg/m²). Fifteen biopsies were performed during the study period, confirming the suspicion of NAFLD in 11 subjects (73%). However, only 5 (33%) demonstrated clinically significant NAFLD with NAS ≥ 4 . There was no relationship between BMI and NAS. The pre-operative AST (but not ALT) correlated with NAS ≥ 4 ($p < 0.05$). An AST cut-off of 28 U/L or higher predicted NAS ≥ 4 .

Conclusion/Significance: Pre-operative AST, but not ALT, is a reliable predictor of NAFLD in obese patients who undergo cholecystectomy for gallstone disease. We advise surgeons to consider liver biopsy in obese patient whose pre-operative AST exceeds 28 U/L. There is no single BMI number over which all overweight/obese patients should be biopsied; rather, the notation of an abnormal appearing liver should prompt consideration for biopsy. Similarly, the severity of obesity did not appear to be directly related to the severity of NAFLD.

INTRODUCING THE BREAST-Q IN THE DEPARTMENT OF PLASTIC AND RECONSTRUCTIVE SURGERY AT RUMC: A QUALITY IMPROVEMENT INITIATIVE

Presenting Author: Shelby Graham, MHS

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Introduction: Breast reconstruction post-mastectomy has become a routine procedure for women with breast cancer. This has fueled research examining best surgical practices that continues to inform new approaches to managing the care of breast cancer and reconstruction. Research is limited regarding quality of life (QOL) outcomes among reconstructive patients. The BREAST-Q, developed by Dr. Andrea Pusic at Memorial Sloan-Kettering Institute for Cancer Research, provides an internationally validated assessment of patient satisfaction and health-related QOL for breast reconstruction patients. The BREAST-Q enables researchers to quantify and compare patient perspectives and use this evidence to improve both clinical and perioperative practices.

Objective: RUMC is the second largest breast cancer delivery unit in Chicago; however, useful QOL tools such as the BREAST-Q have not been implemented in clinical research efforts. A quality improvement (QI) initiative investigating current patterns of treatment and QOL outcomes for these patients at RUMC will identify optimal care practices with the goal of improving the quality of life in post-mastectomy breast-reconstruction patients. Through this QI we will improve data collection by adapting the BREAST-Q to REDCap and determine best practices for introducing the BREAST-Q into clinical practice.

Methods: The BREAST-Q will first be integrated into REDCap for electronic data collection. This allows for long-term data collection over multiple time points. Breast cancer patients at RUMC will complete questionnaires throughout their care. In addition to BREAST-Q, we will evaluate variables related to chemotherapy regimen, radiation, infection, need for additional surgery, and mortality. Collected data will be transferred into a database for statistical analysis.

Results: Designing and introducing a new tool in the setting of clinical practice with the intent of quality improvement is novel and exciting, albeit a great undertaking. The BREAST-Q was successfully integrated into the REDCap platform and further questions have been applied to the survey to evaluate additional variables and variables specific to Rush. iPads have been configured for REDCap data collection and are now being tested before the official roll-out of the QI initiative.

Conclusion/Significance: The BREAST-Q has been used internationally to improve peri-operative care practices. Its implementation at RUMC is the first QI initiative for patients undergoing breast reconstruction post-mastectomy.

SCREENING FOR INHERITED RETINAL DISEASE-ASSOCIATED GENE MUTATIONS IN PATIENTS OF A UNIVERSITY-AFFILIATED RETINA PRACTICE.

Presenting Author: Alyssa Coleman, BS, BA

Co-Authors: Alyssa Coleman (RMC), Mathew W MacCumber (RUMC), Sunny Patel (RUMC)

Introduction: The recent promising results of gene therapy for RPE65-associated Leber's Congenital Amaurosis (LCA) Type 2 and retinitis pigmentosa have led to the initiation of several gene therapy clinical trials. The expansion of the range of disease-causing mutations capable of being corrected through gene therapy has prompted the testing of patients for RPE65 in addition to other potentially significant gene mutations.

Objective: This study aimed to establish a protocol to screen patients previously diagnosed with degenerative retinal disorders for the presence of retina-associated gene mutations via two testing services: Blueprint Genetics (Foundation Fighting Blindness 'My Retina Tracker') and Invitae ('ID your IRD').

Methods: A query was made of the Illinois Retina Associates (IRA) and Rush University Eye Center Physicians (RU ECP) databases to identify patients with diagnoses representing degenerative retinal diseases that were possibly RPE65-mediated. Patients were contacted if they had functional vision and asked if they would like to have a dilated fundus exam and participate in free genetic testing. Samples were sent either to Blueprint Genetics ('My Retina Tracker') or Invitae ('ID your IRD') for comprehensive analysis and data reporting. Patients were then counseled on the results.

Results: 487 patients at IRA and 49 patients at RU ECP were identified to have diagnoses with appropriate ICD-10-CM codes H35.52, H35.50 or H35.53 between 1/1/2014 and 1/1/2020. Sixty-eight patients have been tested through Blueprint Genetics or Invitae to date. Fifty-eight patients had completed test results, and ten patients have pending results. 0/58 (0%) of patients had a positive result for RPE65. 43/58 (74%) of patients had positive results for heterozygosity in at least one implicated gene, and 47/58 (81%) of patients had positive results for variants of unknown significance.

Conclusion/Significance: With the continued discovery of novel gene therapies for inherited retinal degenerative disorders, it is becoming increasingly important to administer genetic testing to patients whose vision is or may become affected by these devastating diseases. By developing a clinical protocol that provides a comprehensive view of each patient's genetic profile, we will be able to provide prompt treatment upon the emergence of new therapies, while further expanding our knowledge of these genetically heterogeneous diseases.

BENEFITS OF A DIAGNOSTIC MANAGEMENT TEAM AT RUSH UNIVERSITY IN REDUCING LABORATORY COSTS

Presenting Author: Martin Kurczak, Bachelor of Science in Biology; Bachelor of Science in Psychology

Co-Authors: Martin Kurczak, Dr. Nadine M Lerret (Rush University), Dr. Nicholas Moore (Rush University Medical Center), Laurie Gillard (Rush University)

Introduction: Over the last two decades, the demand for laboratory services in patient diagnoses have significantly increased, yet studies suggest this large amount of test requests have contributed to inappropriate laboratory utilization. A recent emerging tactic hospitals use to help combat this issue is incorporating a Diagnostic Management Team (DMT) to oversee test utilization.

Objective: Therefore, we examined whether the integration of a DMT at Rush University Medical Center (RUMC) would improve the output efficiency while minimizing unnecessary send-out test requests and costs.

Methods: Using a retrospective analysis of clinical laboratory test requests from 2018-2019, three highly ordered test requests; Aspergillus Galactomannan Antigen (AGA), Blastomyces Antigen (BA) and Histoplasma Antigen (HA) were evaluated for inappropriate utilization at RUMC. Final result interpretation, request timeframe and orders per hospital unit were evaluated individually and concurrently for each of the tests. The analytes of interest are send-out tests, fulfilled by MiraVista Diagnostics. Results indicating a negative interpretation were deemed as an inappropriate request because they were not viewed as necessary towards the primary differential diagnosis.

Results: A total of 1,213 test orders were requested for the three analytes. Inappropriate lab test requests of each analyte were expressed as a percent value based from the ratio of negative interpretation values and their respective total per year. A notable increase of inappropriate utilization requests of AGA was observed (249 negative/ 282 total requests, 88.29%) in 2018 compared to 317 negative/ 321 total request, 98.75%) in 2019. A similar pattern was also observed with BA requests (23/29, 79.31%) in 2018 and 32/36, 88.89%) in 2019. HA expressed the least amount of variability (262/273, 95.97%) in 2018 and (264/272, 97.06%) in 2019. Currently, the request costs of AGA and HA are each \$95.00 and BA is \$97.00. Importantly, the RUMC has experienced a total financial loss of approximately \$109,075 with these three tests alone.

Conclusion/Significance: A DMT would have had the potential to significantly decrease the laboratory request amount and improve its utilization. If the requisition process remains unchanged at RUMC, the negative effects of this situation will continue to increase the facility's costs, time and valuable resource consumption.

HEALTHCARE UTILIZATION IN THE FIRST AND SECOND YEAR OF LIFE IN EXTREMELY PRETERM INFANTS EXPOSED TO HYDROCORTISONE AND DEXAMETHASONE

Presenting Author: Beau Hunsinger, MD

Co-Authors: Foschi, Cristina (Rush); Greene, Michelle (Rush); Welsh, Kristen (Rush); David, Jieun (Rush); Mantis, Stelios (Rush); Patra, Kousiki (Rush)

Introduction: Postnatal steroids such as hydrocortisone (HC) and dexamethasone (DEX) are used frequently in extremely preterm infants (EPT; birth gestation < 28 weeks) in the NICU to treat lung disease despite their known side effects. Although postnatal steroids, particularly DEX are associated with adverse neurodevelopmental outcome, less is understood about the impact of HC and DEX treatment in the NICU on healthcare utilization after NICU discharge. Further knowledge may allow NICU treatment modifications to help ameliorate healthcare burden after discharge.

Objective: To evaluate the association between hydrocortisone and dexamethasone exposure (duration and dose) in the NICU on healthcare utilization after NICU discharge.

Methods: 264 EPT infants born in 2011 - 2016 of whom 221 survived (138 no steroid; 47 HC only; 36 DEX +/- HC) were compared for rates of any hospitalization, emergency room visits, subspecialty care and therapy (physical, occupational, speech, developmental) in the 1st and 2nd year of life. Multiple regression analyses were done to adjust for the effect of social and neonatal risk factors on rates of healthcare use.

Results: Infants in both the HC-only and DEX groups were more likely to have bronchopulmonary dysplasia, retinopathy of prematurity, treated PDA, and hypotension compared to no-steroid infants. DEX-exposed infants had higher rates of intestinal perforation and were discharged home on oxygen more frequently compared to infants in the other groups. There were no differences in HC duration, total, or mg/kg dose between the HC only and DEX groups. Infants in the DEX group had higher rates of hospitalization and therapy use in the 1st and 2nd year of life and higher subspecialty care in the 2nd year of life compared to infants in the no steroid group. In regression analyses, DEX infants had significantly higher rates of hospitalization as compared to infants in the no-steroid and HC only groups.

Conclusion/Significance: DEX exposure in the NICU is associated with higher rates of hospitalization in the 1st and 2nd year of life. Conversely, HC exposure was found to not significantly be associated with healthcare utilization. Further research must be done to understand the etiology behind the disproportionate healthcare utilization in infants exposed to DEX.

CELLULAR MITOCHONDRIAL PROFILE IN HUMAN RENAL CELLS FOLLOWING suPAR TREATMENT

Presenting Author: Ravi Patel, IBS MS

Co-Authors: Mehmet Altintas (Rush University); Yashwanth Sudhini (Rush University); Onur K. Polat (Rush University)

Introduction: CKD is a debilitating condition that often leads to patients being placed on dialysis. In recent years, suPAR has shown to be an important player in assessing kidney diseases by our group.

Objective: It is recognized that suPAR interacts with podocytes in the glomerulus and plays a role in focal segmental glomerulosclerosis (FSGS), which is one of the primary glomerular disorders. However, there is little to no insight into the role of suPAR and the other cells in the nephron of the kidney.

Methods: Four human renal cell lines derived from different sections of the glomerulus (podocytes, mesangial cells, endothelial cells) and the renal tubules (proximal tubular cells) will be cultured in the presence of suPAR. Mitochondrial bioenergetic profiles of these cells and their responses to suPAR will be obtained by using Seahorse XF24 Extracellular Flux Analyzer, which simultaneously measures the oxygen consumption rate (i.e., mitochondrial respiration) and extracellular acidification rate in live cells.

Results: When suPAR is present, proximal tubular (HK-2) cells have significantly higher energetic demand under baseline conditions and mitochondrial ATP production to meet their energetic needs. suPAR also stimulates HK-2 cells to achieve a significantly higher maximum rate of respiration. Accordingly, the spare respiratory capacity, which is potentially needed by cells under the conditions of increased work or stress to respond to higher energy demand, was also improved when the cells are incubated with suPAR protein. These effects were not seen in any of the other cells exposed to suPAR. Nevertheless, all these effects observed in HK2 cells are alleviated by uPAR antibody, which is added to the culture medium at the same time as HK-2 cells received suPAR.

Conclusion/Significance: Renal Proximal Tubule cells showed a significant response to SuPAR treatment. They showed both elevated levels of mitochondrial respiration and signs of oxidative stress.

TURN TEAMS: MAKING A DIFFERENCE ONE TURN AT A TIME

Presenting Author: Vera Clinton, DNP

Co-Authors: Rhea Hanchett (RUMC);Margaret Coyle (RUMC); Marisa Streelman (RUMC);Vera Clinton (RUMC) and Brittany Nacsa (RUMC)

Introduction: In FY17, a 32 bed general medicine unit in an urban academic medical center observed the number of hospital acquired pressure injuries (HAPIs) was 1.8% which was above the NDNQI benchmark of 0.9%. Also, the nursing staff noticed inconsistent care for patients who required turning every two hours. The unit advisory committee (UAC) reviewed data on pressure injury prevention and observations of staff and voted to approve a turn team pilot in November of 2017.

Objective: The goal for this project was to decrease hospital acquired pressure injuries (HAPIs) on the unit.

Methods: Plan, Do, Study, Act (PDSA) was the methodology used to implement this project. During the plan phase the literature was reviewed, nursing observations, and HAPI rates were examined. Also,a pre-survey for nurses and patient care technicians was sent out to the unit to identify how often turns were completed, how often turns were documented, and the feeling of teamwork on the unit. The UAC worked through November and December 2018 on education and project materials for project implementation. They created a turn team, which was comprised of either 2 RNs or 2 PCTs, or 1 RN and 1 PCT. In-services and education was provided to staff on the unit via email and face-to-face training with check-off. The pilot was initiated in January 2018 using a turn team approach.

Results: A post survey was completed in April of 2018, 2 months post implementation. It revealed Q2 hr turns completed-improved from 94% to 100%, Q2 hr turns documented-improved from 68% to 100%, and unit morale and satisfaction improved. Also, 84% of staff wanted to keep the turn teams.

Conclusion/Significance: Turn teams take effort and organization to implement. Staff on the unit created the process which was essential to buy in and participation from all team members. Sustaining the turn teams have been successful with positive results on prevalence day.

CARE MANAGERS' KNOWLEDGE OF AND CONFIDENCE IN HEART FAILURE MANAGEMENT

Presenting Author: Margaret Gladman, DNP, BSN

Co-Authors: Laura F. Zimmerman BSN, RN Rush University Medical Center Population Health

Introduction: In fiscal year 2019, hospital readmission rates for HF failed to meet the goal of 18.29% at RUMC. HF readmission rates for the medical center were 23.39%. The Population Health department at this medical center provides outpatient Care Management (CM) services to adult patients and created several interventions to address HF in keeping with the medical center's goals.

Objective: To determine the change in knowledge and confidence of outpatient Care Managers regarding heart failure after implementing structured inter-department collaboration, providing content-area lectures, and standardizing patient education materials.

Methods: Responding to the increased readmission rate for HF in this academic center, a 5 point Likert scale survey was created to address care manager's knowledge and confidence in three categories: collaboration with outpatient cardiology services, confidence and knowledge on HF self-management, and knowledge of and confidence using internal resources used for patient education. The survey results revealed low confidence and knowledge of CM staff in all areas. Based on survey results, a multifaceted intervention will be implemented in first quarter 2020. A monthly WebEx will be completed between CM staff and outpatient cardiology to discuss patients at risk of readmission for HF to increase collaboration. CM staff will be provided a curated group of lectures from internal, interdisciplinary content-area experts in the form of 'lunch and learns' to address the knowledge gaps and low confidence regarding HF self-management. Lastly, written patient education materials will be standardized between departments to address knowledge of and confidence using internal resources. Following this intervention, the 5 point Likert scale survey will be completed by CM staff a second time directly following the interventions.

Results: Post survey will be distributed to staff are the proposed interventions are implemented. Further information will be available at time of conference, following end of first quarter 2020.

Conclusion/Significance: We anticipate an increase in the knowledge and confidence of CM staff to provide services to patients with HF following our intervention.

DEVELOPMENT OF A NOVEL EMERGENCY MEDICINE PHYSICIAN TRAINING TO IMPROVE CARE FOR SURVIVORS OF SEXUAL ASSAULT: A PRELIMINARY SURVEY

Presenting Author: Melissa Prusky, ScB

Co-Authors: Presenting/First Author: Melissa Prusky, Chloe J. E. Solomon, MS, Kaitlynn P. Tracy Co-Authors (in order): Jaclyn Rodriguez, BSN, BS, RN, SANE-A, Maria Balata, Madeline Mangiaracina, Sloane York, MD, MPH, Vanessa Tirone, PhD, Dino P. Rumoro, DO, MPH

Introduction: In the United States, one in three women and one in six men experience sexual violence in their lifetime. While emergency medicine nurses and social workers undergo continuing education in caring for survivors of sexual assault, physicians typically do not receive ongoing training in this area beyond that provided in their residency. Training for emergency physicians is imperative to achieve a sustained level of competence and confidence in care for survivors.

Objective: Our objective in this work was to create and provide a course for board prepared emergency physicians that involved three core components: two didactic portions followed by one practical simulation portion during which physicians were able to practice the skills they learned. Pre- and post-surveys were administered to assess knowledge and confidence levels related to communication skills, gynecological exam techniques, and evidence collection methods.

Methods: Thirty-nine Rush University Medical Center (RUMC) board certified or board eligible emergency physicians underwent a novel four-hour CME-accredited comprehensive training on trauma-informed care for survivors of sexual assault and completed pre- and post-surveys to assess training efficacy. The training was developed by experts, consisting of two didactic portions focused on communication skills and forensic evidence collection techniques and a simulation portion with standardized patients to practice genital examinations and evidence collection. Pre- and post-surveys consisted of 18 knowledge-based multiple-choice questions and 11 Likert scale questions focused on physician comfort level.

Results: RUMC emergency physicians showed significantly improved performance ($p < 0.05$) on 12 of the 18 knowledge-based questions focused on neurobiology of trauma, communication skills, legal considerations, and evidence collection technique. Physicians also showed significant improvement ($p < 0.001$) on all 11 Likert scale questions that assessed physicians' confidence level communicating with survivors and employing trauma-sensitive techniques during medical and forensic examination.

Conclusion/Significance: Emergency physicians require specialized, ongoing education in areas of trauma-informed care, including care for survivors of sexual assault. RUMC emergency physicians who received a newly developed comprehensive training course significantly improved their knowledge base and comfort level with these patients.

ANESTHETIC MANAGEMENT OF PEDIATRIC PATIENTS WITH NIEMANN-PICK DISEASE TYPE C FOR INTRATHECAL 2-HYDROXYPROPYL- β -CYCLODEXTRIN INJECTION

Presenting Author: Lauren Kret, Bachelor of Arts (B.A.)

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Introduction: Niemann-Pick disease Type C is a rare autosomal recessive lysosomal storage disorder with variable age of onset and a heterogeneous clinical presentation with neurological, psychiatric, and visceral findings. An industry-sponsored (Vtesse/Mallinckrodt) multi-center clinical trial as well as an expanded clinical access program evaluating the safety and effectiveness of serial intrathecal injections of 2-hydroxypropyl-beta-cyclodextrin (HP β CD) are underway Rush University Medical Center. A subset of these patients required anesthesia for this procedure. We hypothesized pediatric patients receiving serial intrathecal injections of HP β CD, and anesthetized utilizing mask general anesthesia would demonstrate similar perioperative complications compared to patients undergoing tympanostomy tube placement.

Objective: The objective of this study was to evaluate the safety and efficacy of anesthesia provided for patients undergoing intrathecal injection of 2-hydroxypropyl-beta-cyclodextrin.

Methods: Retrospective data on pre-operative comorbidities, demographics, vital signs, intraoperative anesthesia course, airway management technique, venous access, PACU course, and perioperative complications from December 2015 to October 2018 were reviewed. In total, 17 unique patients were identified and 279 unique anesthetic encounters were reviewed. The primary outcome was perioperative adverse events (AE) and secondary outcome was intra-operative changes in anesthetic plan. This data set was analyzed as pooled group data and compared to historical data of perioperative complications for mask general anesthesia without for tympanostomy tube placement.

Results: Among 279 anesthetic encounters for HP β CD administration, we observed 2 (1.9%) major (aspiration, arterial desaturation) 1.9% and 21 (7.5%) minor (emesis, delirium, hypotension, seizure, airway obstruction) adverse events. The AE's in our study were not different than rates for major events 1.9% and minor events 8.8% reported by Hoffman et al. in pediatric patients undergoing mask general anesthesia for tympanostomy tube placement. (1) Changes in anesthetic plan during the anesthesia encounters for HP β CD administration were not found.

Conclusion/Significance: NP-C can present challenges for anesthesiologists, requiring special consideration for potentially altered drug metabolism, neurological involvement, psychological diagnoses, aspiration risk, difficult airway, and the possibility of abnormal ventilation. This review supports our hypothesis and delineates a viable anesthetic care option for this population. Our findings suggest mask general anesthesia without intravenous access is suitable option for pediatric patients with NP-C undergoing serial intrathecal injections of HP β CD.

MOBILITY COACH PILOT STUDY

Presenting Author: Maura Waldron, BA, MSN

Co-Authors: Maura Waldron (RUMC); Jessica Margwarth (RUMC); Nicole Gleisner (RUMC); Melissa Gerona (RUMC).

Introduction: An adult medicine unit at a medical center in the Midwest was designated as a Nurses Improving Care for Healthsystem Elders (NICHE) unit with the goal of educating staff on older adult specific interventions and care to provide the optimal care to patients 65 and older. Although research has shown the negative effects of immobility in the inpatient setting, patients on this medical unit do not get mobilized at a regular cadence.

Objective: Increase mobility in older adults to prevent complications and improve outcomes.

Methods: The NICHE unit nursing staff completed a series of online geriatric based modules. Three nursing champions completed additional learning modules, maintained a bulletin board with NICHE related information, and to create an older adult focused mobility program. After a literature review of mobility programs in both acute and outpatient care in a variety of patient populations, a mobility coach program was developed in which a patient care technician (PCT) mobilizes patients three times a week. The mobility coach is scheduled for an eight hour shift and with the sole role of mobilizing patients 65 and older and will begin at the end of January 2020. Patient mobility level is determined by nursing staff ranging from ambulation in the hall, ambulation to chair, and sitting at side of bed. Data from epic for LOS, case mix index, HAPI, and falls for patients 65 and older will be aggregated over the course of the pilot program and will be compared to the four weeks prior to the program. If the case mix index varies significantly, data from the same time frame 1 year previous will be compared. The mobility coach will record the MRN of each older adult patient and will log the ambulation level of those patients. For comparison, PCTs on non mobility coach shifts will log the ambulation level of their older adult patients.

Results: Awaiting pilot study completion to compile data.

Conclusion/Significance: Conclusion pending data. As this institution continues to educate staff as an age friendly institution, our need for innovative programs tailored towards the older adult population will be necessary.

CO-OCCURRENCE OF VESTIBULAR PATHOLOGIES. A CASE OF MENIERE'S DISEASE AND BPPV.

Presenting Author: Akmaral Arman, B.A.

Co-Authors: Akmaral Arman, B.A. Amy Winston, AuD.

Introduction: This is a presentation of a clinical case study observed at RUSH Audiology Clinic in 2017. The objective is to review the rate and the incidence of co-occurrence of vestibular pathologies as well as theorize and identify the underlying etiology of co-occurring peripheral vestibular insults.

Objective: There are three primary questions. 1. What is the underlying etiology of symptom presentation for Benign Paroxysmal Positional Vertigo and for Meniere's disease? 2. Compare and contrast differences in typical clinical cases for these patients. 3. Present current literature of theories of co-occurrence of two peripheral vestibular pathologies.

Methods: A thorough retrospective review of the patient medical file prior to seeing the patient in the clinic has been performed. The patient's history of vestibular symptoms has been authenticated and a battery of vestibular tests was conducted.

Results: The patient's medical history, presentation of symptoms and vestibular test battery is positive for both Meniere's disease and BPPV. The patient has undergone serial repositioning maneuver treatments for BPPV and was prescribed vestibular suppressants for Meniere's disease along with other traditional courses of treatment.

Conclusion/Significance: A recurrent insult to the system due to membranous labyrinth distention seen with Meniere's disease patients is possibly a culprit for the displacement of otoconial debris into the semicircular canal of BPPV patients. Understanding the etiologies of diseases may inform clinicians about the possibilities of disease co-occurrence. Current literature search has not yielded significant results for prevalence and etiology of co-occurring diseases in vestibular end-organs as this is a novel topic and not many clinical cases have been presented or published. Co-occurring pathologies in vestibular end organs are possible and are more prevalent than it is often assumed. It is essential for both physicians and clinicians to be better informed on possibilities of vestibular disease co-occurrence to be able to correctly identify, treat and guide patient's vestibular rehabilitation.

DETERMINATION OF ACCEPTABLE L INDEX CUT OFF VALUE TO DETECT LIPEMIA INTERFERENCE IN SODIUM CONCENTRATION MEASUREMENT USING THE ROCHE COBAS 6000

Presenting Author: Haydee Avila, Bachelor of Science in Biology

Co-Authors: Haydee Avila, BS (Rush) Brenda Suh-Lailam, PhD (Lurie Children's)

Introduction: Sodium measurement is important in the evaluation of varying patient conditions. Typically, this is via an indirect ion-selective electrode (ISE) method, where the specimen is pre-diluted, tested, and plasma composition of 93% water, 7% proteins and lipids are assumed. Hyperlipidemia can falsely decrease the water fraction leading to falsely decreased sodium results or pseudohyponatremia. This does not happen with direct ISE methods. Lurie Children's uses the Roche Cobas 6000's Indirect ISE which includes an automated detection of lipemia using the lipemic (L) index at a cutoff of 2000. At L-indices ≤ 2000 , sample results are held, sample is ultracentrifuged and retested. Despite this process, suspected pseudohyponatremia has been reported. Our goal was to determine a more appropriate L-index where all cases of pseudohyponatremia can be detected.

Objective: Intralipids are commonly used to determine lipid interference and L-index cutoffs for lipemia interference, we therefore performed an interference study using intralipid-spiked patient samples to determine what L-index will cause pseudohyponatremia.

Methods: Since some reports suggest that using intralipids to set the L-index for determining lipid interference is not optimal as the triglyceride composition in intralipids differs from that of patient samples, we evaluated 68 plasma specimens for the possibility of pseudohyponatremia, paying attention to the triglyceride concentrations and L-indices at which pseudohyponatremia occur. Samples were tested for sodium on the COBAS and NOVA (Direct ISE), centrifuged and retested on the COBAS. We also evaluated if a correlation exists between triglycerides and the L-index to help in the easy identification of samples at risk for pseudohyponatremia.

Results: No pseudohyponatremia was observed with the intralipid study, supporting the set L-index cutoff. However, 19 out of 68 (28%) (L-index, 47 -1703) specimens showed pseudohyponatremia at L-indices lower than the manufacturer set cutoff. Also, no significant correlation was observed between triglycerides and L-index.

Conclusion/Significance: Since interference occurred at both low and high L-indices, a more appropriate L-index cutoff could not be determined. This together with a lack of correlation between triglycerides and L-index indicate that other factors besides triglycerides contribute to the L-index and so the L-index alone cannot be used to determine samples at risk for pseudohyponatremia.

COMMUNICATING WITH INTENTION: FAMILY-CENTERED CARE IN EARLY INTERVENTION THROUGH THE INTERPERSONAL LENS

Presenting Author: Evguenia Popova, PhD

Co-Authors: Evguenia S. Popova, PhD, OTR/L, Rush University, Department of Occupational Therapy

Introduction: The family context plays an important role in the child's overall development and occupational participation. Occupational therapists can support the child's participation by fostering positive parent-child interaction during family routines. Parents frequently struggle with managing challenging behaviors of children, leading to increased parental stress. The relationship between parental stress and child's behavioral difficulties is bidirectional (Yorke et al., 2018), and may be mediated by the quality of the parent-child interaction (Sanner & Neece, 2018). Interventions aimed at parent-child interaction have been shown to improve positive parenting behaviors, decrease externalizing behaviors, and improve child compliance (Ward, Theule, & Cheung, 2016).

Objective: The aim of this study was to evaluate the feasibility of clinical application of the Intentional Relationship Model (IRM; Taylor 2008) for promoting positive parent-child interaction in Early Intervention. Qualitative research findings and the theoretical application the IRM are examined.

Methods: Parents of children receiving Early Intervention were invited to participate in a five-week IRM workshop. Each participant completed three in-person and two online sessions. Participants completed a series of reflection assignments that asked them to reflect upon: 1) their child's interpersonal characteristics, 2) challenging interpersonal events that they frequently experience during the everyday routine, and 3) their own use of the IRM communication modes (advocating, collaborating, empathizing, encouraging, instructing, and problem-solving). Additionally, participants completed a one-month follow-up interview with the first author.

Results: Six parents completed the course and experienced themselves as ineffective in responding to their child's: 1) resistance toward adult directed activities, and 2) expression of strong emotion (screaming, crying, hitting). Three themes emerged from analysis: 1) mindful empathy, 2) interpersonal flexibility, and 3) awareness of ineffective communication. Participants felt the IRM framework helped them better cope with challenging behaviors and remain mindful and empathic of their child's experience. The participants felt that they frequently got 'stuck' in the instructing mode, and felt increased capacity to remain flexible in their communication and shift toward empathizing and collaborating modes following completion of the course.

Conclusion/Significance: Occupational therapists can use the IRM to support parent's interpersonal capacity for increased mindfulness and empathy toward their child's challenging behavior.

UTILIZATION AND COST OF LABORATORY TESTING IN VERY LOW BIRTH WEIGHT INFANTS

Presenting Author: Megan E. Gross, BA

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Introduction: Laboratory testing (labs) is a primary contributor to anemia in very low birth weight (VLBW; < 1500 g) infants in the neonatal intensive care unit (NICU), frequently resulting in blood transfusions. We explored the relationship between the frequency of labs, the number of blood transfusions, and the associated cost.

Objective: Describe the frequency and cost of labs and transfusions during the NICU stay for VLBW infants.

Methods: A secondary analysis of a prospective cohort study of VLBW infants admitted to the NICU in 2008-2012. Frequency of labs, transfusions, and their associated costs were obtained from the study database. Data were analyzed by week of life (WOL), birth gestational age (GA), birth weight (BW), gender, and race. Data are reported as mean \pm SD and frequencies (percentages). All statistical analyses were conducted using SPSS 22 (IBM SPSS Statistics, Armonk, NY). Parental informed consent was obtained.

Results: This study included 430 VLBW infants with a mean NICU length of stay of 75 ± 42 days. A mean of 342 ± 270 labs per infant were obtained. By the end of WOL 4, 70% of labs were completed. The number of labs tapered to almost none by WOL 10. The most frequent labs were blood gas (22%), glucose (11%), bilirubin (8%), hematologic panel (7%), and metabolic panel (6%). Overall, 76% of the infants received at least 1 blood transfusion with a mean of 6 transfusions per infant. The majority (63%) of transfusions occurred in WOL 1-4 with almost none by WOL 10. Significant differences in the number of labs and transfusions by WOL, BW, GA, and gender were noted. The mean cost of labs for each infant was \$6,526 (2016 USD) with 66% of costs generated in WOL 1-4.

Conclusion/Significance: These data suggest that limiting labs may be a promising strategy to reduce number of transfusions and their cost. These data will serve as pre-data for a QI checklist which was implemented during daily rounds to identify potential wasteful practices, such as unnecessary lab orders, and to optimize resource utilization. Further research will be conducted comparing these data to post-data.

OPTIMIZED WORKFLOW AND STAFF ROLES TO IMPROVE THE MANAGEMENT OF PATIENTS WITH PREDIABETES**Presenting Author:** Keegan Marz, DNP-FNP**Co-Authors:** Keegan Marz (RUMC)

Introduction: Prediabetes (pre-DM) affects nearly $\frac{1}{3}$ of the U.S. population. Without preventative action ~40% of those individuals will progress to diabetes (DM) within one year. A diagnosis of DM significantly increases one's likelihood of developing additional comorbidities such as heart, kidney, and neurologic diseases, effectively reducing overall patient outcomes and increasing healthcare costs. One suburban hospital (SH) has DM prevention programs offered by their Endocrine Clinic (CDEC), though there is a gap in the amount of pre-DM patients seen in their primary care (PC) clinics referred to these programs and no referral process. Furthermore, no follow up protocol for made-referrals exists and patients are only enrolled into the preventative programs if they, themselves, take the initiative to follow up. Currently, only the CDEC's advanced practice nurses (APRNs) take these scheduling calls, pulling them away from patient care and billable clinical hours.

Objective: -75% of referred patients will receive a follow up call within two weeks -60% of follow up phone calls will be made by support staff at CDEC rather than APRNs -10% increased enrollment of pre-DM patients into preventative programs

Methods: An EMR-based referral was created to trigger for patient's meeting pre-DM criteria. The referral feeds into a work queue, to trigger and to track follow up with referred patients, facilitating program enrollment. Resource materials were created and clinic support staff were trained to work this queue and to manage referral follow up, freeing the APRNs from this task.

Results: Data collection is ongoing. Preliminary results evidence the EMR-referral is increasing the rate of referrals to DM-preventative programs and that nearly 100% of referred patients receive follow up within one week, and that support staff are completing over 75% of those phone calls, rather than the APRNs.

Conclusion/Significance: Increasing the enrollment of pre-DM individuals into preventative programs will reduce the disease burden and associated costs. The CDEC APRNs have more available time to see patients, contributing to improved provider satisfaction, provider availability and financial efficiency.

READING MIND IN THE EYES: THEORY OF MIND ASSESSMENT IN INDIVIDUALS AT CLINICAL HIGH RISK FOR PSYCHOSIS

Presenting Author: Alexa Castillo, BA in Applied Psychology

Co-Authors: Alexa Castillo, Briana N. Galindo, Kristen M. Haut, Sarah Pridgen, Christine I. Hooker, University of Illinois at Chicago, Department of Psychiatry, Rush University Medical Center

Introduction: Individuals diagnosed with developmental disorders such as schizophrenia or autism, show social cognitive impairments when inferring the intentions or mental states of individuals, which is known as theory of mind (ToM). Some studies have suggested that individuals in the clinical high-risk (CHR) population also show a decreased ability in theory of mind. The Reading Mind in the Eyes (MIE) task is a theory of mind task created for individuals to infer mental states based solely on eye regions.

Objective: The purpose of this study was to investigate the relationship between MIE accuracy and symptomatology in the CHR population.

Methods: The MIE Task was administered in 90 CHR individuals and 20 healthy controls (HCs). Participants were assessed for verbal IQ, prodromal symptoms (Structured Interview for Psychosis-Risk Syndrome (SIPS), and social and role functioning using the global assessment scale.

Results: No group differences were made between CHR and HCs. However, there were differences on functioning within the CHR and HC groups. Social functioning and accuracy were statistically significant in both groups for the MIE task ($p < .01$). Role functioning and accuracy were also statistically significant ($p < .01$) for both groups.

Conclusion/Significance: Accuracy on the Mind in the Eyes Task is not related to CHR status or symptoms; however, it is related to the scores on role and social functioning scale.

NORAMAL VARIATION IN DLCO BIOLOGIC CONTROL MEASURES IN A MULTI-CENTER GLOBAL SUDY

Presenting Author: Ellen Moran, MS

Co-Authors: Ellen M. Moran (RUMC), Susan B. Blonshine (TechEd), Ellen A. Becker (RUMC), Jason Blonshine (TechEd)

Introduction: One step for assuring accuracy of pulmonary function laboratory (PFL) equipment is performing a biologic quality control (BioQC). The American Thoracic Society (ATS) and European Respiratory Society's (ERS) 2017 standard for DLCO BioQC requires weekly performance with a coefficient of variation (CV) of 12% based upon a study using 8 individuals

Objective: The objective of this study was to assess the DLCO BioQC %CV results from a large clinical trial.

Methods: This study received institutional review board approval from Rush University Medical Center, ORA# 19032007. A DLCO BioQC program was developed for an inhaled medication study that spanned over 42 months ending in 2018. Onsite training was provided to 114 PFLs from North America, Europe, and Israel using equipment from five different manufacturers. Results were sent to a central repository for expert review. The annual DLCO %CV was based upon a minimum of 10 DLCO values separated by at least 5 days with no control for diurnal variation. Each BioQC had to be technically satisfactory according to ATS/ERS 2005 DLCO standards without failure of other mechanical quality control tests. Descriptive statistics were computed. Paired t-tests were conducted to compare the rate of %CV changes between years and tested at $\alpha = .05$ using SPSS.

Results: Of 217 BioQCs, 168 participants met the inclusion criteria for DLCO BioQC tests the first year of the study with fewer in subsequent years. Over 90% of %CV values were < 8% and the %CV decreased with experience. There was < 1% change in %CV across the 2-year time span.

Conclusion/Significance: The DLCO BioQC %CV standard could be reduced to < 8%. This could improve precision of this important diagnostic test by 33% without impairing the function of PFLs. The PFL BioQC staff do not need to recalculate their %CV more frequently than every two years based upon the low variation of < 1%.

UV-ACTIVATED FLUORESCENT LIGHTING IMAGES AS A PRACTICAL SCREEN FOR NIGHT BLINDNESS

Presenting Author: Rhona Ke, Bachelor of Science

Co-Authors: Rhona Ke (Rush); Mathew MacCumber, MD, PhD (Rush); Jason McAnany, PhD (UIC)

Introduction: An easy in-office test for night blindness to detect inherited retinal disease or vitamin A deficiency is currently unavailable. Current testing requires dark adaptometry or electroretinography (ERG); the former is impossible and the latter requires anesthesia for young children. Development of a screening tool consisting of fluorescent ink activated by a low-power UV light source has demonstrated sensitivity specific to rod photoreceptors in the retina. Careful measurements of luminance, the intensity of light perceived by the eye as brightness, given off by differing densities of fluorescent ink has led our research team to develop a screening tool that we predict may accurately measure function of photoreceptors, especially those used when we are forced to see in the dark.

Objective: The goal of this study is to develop and test an easy in-office screening tool for night blindness, particularly for children.

Methods: 20 normal controls and 20 participants with known inherited retinal diseases involving rod photoreceptor abnormalities will be recruited from patients at Rush Medical Center. Study participants must be older than 6 years of age and must be neurologically capable of image recognition and have normal limb coordination for their age. The study will extend over the span of 2 visits and last upwards of 2 months. The study participant will undergo dark adaptation, testing with the screening tool, and a confirmatory test of dark adaptometry.

Results: Results are ongoing, clinical testing at Rush is pending optimization of the screening device at the UIC Lions of Illinois Eye Research Institute.

Conclusion/Significance: Based on the screening and confirmatory test with study participants, our screening test should be able to detect rod function and test patients for nyctalopia, or night blindness. Such a test may be able to identify children at young ages with night blindness due to inherited retinal disease or vitamin A deficiency. Earlier detection could mean earlier initiation of treatment, which would be vital in the management and prevention of progressive vision loss.

DEVELOPING AN ONLINE COMMUNICATION PLATFORM TO PROMOTE CULTURAL HUMILITY WITHIN A COLLEGE OF NURSING

Presenting Author: Jen'nea Sumo, PhD, RN

Co-Authors: Jen'nea Sumo (Rush), Kirsten Warner (Rush), Beth A Staffileno (Rush), Kate Webster (Rush), Ilse Salinas (Rush), Maryan Arrieta (Rush)

Introduction: Within the ever changing healthcare arena, nursing faculty have the responsibility to cultivate a culturally responsiveness environment. However, faculty often lack the resources to promote such an environment. Encouraging cultural humility, a process of continual self-reflection, discovery, and recognition of power imbalances, is one way to create a culturally responsive and welcoming community. To foster cultural humility, a communication platform has been developed that provides a designated space where faculty (onsite and offsite) are able to promote cultural humility while interacting with College of Nursing (CON) members (i.e., staff, students and other faculty).

Objective: To provide an online community for CON members to reflect on their values and beliefs and to foster an academic environment promoting cultural humility and respect.

Methods: Kotter's model guided the development of the online interactive communication platform. This platform allows CON members access to diversity, inclusion, and equity learning opportunities such as discussion boards, journal clubs, diversity and inclusion terminology, diversity events, and online trainings.

Results: Within the communication platform, the discussion board allows members to communicate with one another and share reflections. The journal club includes monthly articles with guided discussions from CON members. The expansive D&I dictionary, events, and online trainings create greater awareness within the CON.

Conclusion/Significance: The communication platform provides nursing faculty a continual opportunity to promote their own and others' cultural humility. Engagement within the platform has the potential to positively impact faculty development and nursing education by cultivating a welcoming, respectful, safe, and engaging culture of inclusion.

INTERVENTIONS TO PROMOTE & SUPPORT DEVELOPMENT OF CLIENT SELF-ADVOCACY: A NARRATIVE REVIEW OF THE LITERATURE

Presenting Author: Theresa Guzaldo, OTS

Co-Authors: Theresa Guzaldo (Rush), Abraham Kim (Rush), Kimberly Lieberman (Rush), Erin Thrasher (Rush), Laura VanPuymbrouck (Rush)

Introduction: Despite occupational therapy's focus on optimizing participation in society for individuals with disability, self-advocacy has only recently (2008) become a recognized client factor in the Occupational Therapy Practice Framework (OTPF) for practitioners to address. Currently, there is a significant lack of research in regards to interventions provided by occupational therapy practitioners on the development of these self-advocacy skills.

Objective: This study examined the current evidence in allied health professions addressing client development of self-advocacy. This systematic review specifically examines the quality, characteristics, and effectiveness of occupational therapy interventions addressing client development of self-advocacy. The study aims to determine the key characteristics of occupational therapy interventions designed to promote and support client self-advocacy.

Methods: For the literature search, multiple electronic databases were used, including: PubMed, Ebscohost, PsycINFO, Google Scholar, and Sagepub. Select professional journals were also searched. Key words used in literature search: Self-advocacy, self-determination, occupational therapy, advocacy, empowerment, interventions, and allied health. Inclusion criteria included peer-reviewed journals published from 2005 to present, involved either occupational therapy or an allied health profession, and focused on interventions addressing self-advocacy. Exclusion criteria included languages other than English, dissertations, and interventions related to self-determination. The Feasibility, Appropriateness, Meaningfulness, and Effectiveness (FAME) scale (Pearson et al., 2007) was used to determine the quality of current self-advocacy interventions.

Results: Preliminary findings suggest that successful self-advocacy interventions had shared characteristics such as being conducted in a group setting, being research-based, and allowing for peer support. In studies that were successful, participants reported an increase in their perception of their ability to self-advocate. They also had marked increase in their ability to successfully engage in desired occupations or roles such as being a student or being employed.

Conclusion/Significance: Self-advocacy skills have been shown to positively affect clients' quality of life, participation, well-being, and occupational justice. Our study indicates that through time, more literature has been introduced to medical and scientific writing; however, occupational therapy and self-advocacy literature that target assessment effectiveness of self-advocacy interventions is still lacking.

PERCEPTION OF VOWELS AND CONSONANTS IN COCHLEAR IMPLANT USERS

Presenting Author: Melissa Malinasky, BS

Co-Authors: Melissa Malinasky (Rush) Aaron Moberly (OSU) Kara Vasil (OSU) Valeriy Shafiro (Rush)

Introduction: Although cochlear implants (CI) improve speech intelligibility, they introduce distortions of the sensory input to the auditory system, and modify the transmission of acoustic cues.

Objective: This study evaluated perception of consonants and vowels in experienced postlingual adult CI users.

Methods: Twenty-five experienced CI users were tested with The Modified Rhyme Test (MRT) of consonant perception (word-initial and word-final) and a closed-set vowel test containing 12 vowels in the /hVd/ context.

Results: Overall consonant perception accuracy was 80%. No significant difference was observed in identification of word-initial or word-final consonants. There was significant variation in consonant accuracy in terms of place and manner, but not voicing. For place, alveolar consonants had the lowest accuracy. For manner, nasals were the least identifiable. Overall vowel identification accuracy was 76%. Vowels showed higher accuracy for front vowels, and less accuracy in back vowels. The three most accurately identified vowels were (/i/), (/I/), and (/U/). The three least accurately identified vowels were (/a/), (/ɔ/), and (/u/).

Conclusion/Significance: A considerable variation in perception of specific consonant and vowel sounds across CI users was also observed. The pattern of consonant and vowel confusions can inform the design of rehabilitation programs to improve speech perception.

ASSOCIATION BETWEEN VOCAL EMOTION IDENTIFICATION AND QUALITY OF LIFE IN ADULT COCHLEAR IMPLANT USERS

Presenting Author: Stephanie Strong, B.A.

Co-Authors: Stephanie Strong (Rush University), Aaron Moberly (Ohio State University), Kara Vasil (Ohio State University), Valeriy Shafiro (Rush University)

Introduction: Self-reported quality of life questionnaires, such as the Nijmegen Cochlear Implant Questionnaire (NCIQ; Hinderink et al., 2000), are traditionally paired with speech intelligibility tasks to assess outcomes for cochlear implant (CI) recipients. However, few studies have examined quality of life in relation to prosodic skills, including the listener's ability to accurately identify a talker's emotions. Luo et al. (2018) found that identification of vocal emotions was positively correlated with each of the subdomains on the NCIQ and that responses on the social and psychological NCIQ categories had the strongest ties to vocal emotion identification. Although encouraging, Luo's findings were obtained with a small sample size with only 12 CI users. Given the large variability in CI users' outcomes, they provide only a tenuous evidence-base for the relationship between emotion identification abilities and CI users' quality of life.

Objective: The goal of the current study was to replicate and corroborate previous findings. It followed a procedure similar to Luo et al. (2018), with a new sample of CI listeners and using a similar but separately constructed test of vocal emotions.

Methods: Seventeen postlingually experienced implanted adults completed the NCIQ and the vocal emotion identification test (adapted from Chatterjee et al., 2015).

Results: Pearson correlations with Holm-Bonferroni correction for familywise error revealed that emotion identification scores were significantly positively associated with the Advanced Sound Perception subdomain of the NCIQ, but not with other NCIQ subdomains. This result diverged from Luo et al (2018), who found that emotion identification scores were associated with all six of the NCIQ subdomains.

Conclusion/Significance: These results provide partial support for the previous findings and suggest that emotion identification tasks have clinical utility to assess CI patients' perception of music and other complex signals.

HOMELESSNESS AND MENTAL ILLNESS: CONSIDERATIONS FOR IMPROVING ACCESS TO HEALTHCARE

Presenting Author: Theresa Sherar, BS, BChE

Co-Authors: Authors: Tea Sherar (Rush University), Jose Herrera (Rush University), Kailey Lavine (Rush University), Kenny Aspurez (Rush University), John Wunderlich (Rush University)

Introduction: The number of homeless persons with mental illness continues to rise, despite the prevalence of housing strategies and treatment services. This population must overcome numerous obstacles in order to receive health care, which are often only partially addressed by existing interventions. This contributes to a mortality rate significantly higher than that of the general population, reduced life expectancy, and decreased quality of life. Homeless persons with mental illness increasingly access care through emergency rooms or during imprisonment, leading to fragmented care. The unique and intricate factors that influence health care access and use for homeless persons with mental illness are still not fully understood. Furthermore, most research studies evaluate the outcome of a single intervention, which may only address one of these factors.

Objective: The purpose of this poster is to review existing literature for factors which influenced the development and outcomes of interventions aimed at increasing access to health care among homeless persons with mental illness and identify considerations for designing future evidenced-based interventions.

Methods: Three major databases were used to identify relevant literature. Articles from peer-reviewed journals were chosen based on relevance to the topic and restricted to publications within the past 15 years.

Results: Interventions aimed to address numerous barriers, which we classified under three domains: 'system barriers' 'provider barriers'; and 'internal barriers'. Several successful models were identified including integrative models like housing first or intensive case management, and intermediate or transitional care models providing care at a level between inpatient and outpatient.

Conclusion/Significance: Successful interventions addressed all three domains by offering cost-effective care tailored to individuals' needs. A multi-factorial integration of housing support, orientation to clinic services, and outreach are imperative for a successful intervention. Multiple successful models of care have been identified, but no single intervention will meet the needs of the entire population. It is necessary to fund a wide selection of programs tailored to identified barriers and staffed with primary and specialty care providers who understand the unique needs and perspectives of their clients.

THE FREQUENCY AND BARRIERS TO CODING FOR MALNUTRITION

Presenting Author: Ashley Gousios, Bachelor of Science, Currently completed Masters of Science in Clinical Nutrition

Co-Authors: Ashley Gousios (Rush); Sharon Foley, PhD, RDN (Rush); Kelly Roehl, MS, RDN-AP, LDN, CNSC (Rush); Debra Levin, RN, MS, CCM, CCDS, CDIP (Rush); Janet Mryan, RN, BSN, MSN, CNP, CCDS (Rush); Linda Gavlin, RN, BSN, CCRN, CCDS (Rush)

Introduction: Malnutrition frequently occurs in hospitalized patients but is often undiagnosed. Malnutrition can impact length of hospital stay, increase risk for mortality and morbidity and decrease function and quality of life. Proper documentation and coding of malnutrition ensures sufficient resource allocation and reimbursement for a hospital stay. Electronic queries are sent to notify providers at RUMC that malnutrition has been identified by clinical dietitians. However, providers often do not respond to these queries and/or fail to document malnutrition which can lead to insufficient reimbursement for allocated resources associated with malnutrition.

Objective: To determine the frequency in which providers are responding to malnutrition queries and the type of responses they are providing.

Methods: A Knowledge Management (KM) report was obtained from the Associate Chief Medical Informatics Officer at RUMC that included NoteReader CDI query responses over three months. The query asked providers to clarify the patient's nutritional status, identified by a registered dietitian as being mildly, moderately or severely malnourished. The five possible provider responses to these queries included agree, ask later, decline, disagree, clinically undetermined. A frequency distribution was used to analyze the five possible provider responses to the NoteReader CDI queries.

Results: Responses to the queries over March 1-May 31, 2019 (n = 1720) showed that the majority of providers simply read the query (n = 764, 44%,) and less than a quarter agreed with the suggested malnutrition diagnosis (n = 413, 24%,). However, few disagreed (n = 36, 2%) or deemed the diagnosis clinically undetermined (n = 14, < 1%).

Conclusion/Significance: Results indicate there are noncompliance issues with the query responses and provider EMR documentation of the patient's nutritional status. Follow up investigation into frequency of actual documentation of malnutrition in the medical record and type of barriers that providers are faced with when prompted with the NoteReader CDI query is ongoing. Improved documentation of malnutrition will result in proper allocation of resources to treat these patients and improved hospital reimbursement.

'ALGO NUEVO': INTRODUCING A PARENT-CHILD EXECUTIVE FUNCTIONING PROGRAM IN A BILINGUAL-MULTICULTURAL COMMUNITY SETTING

Presenting Author: Jordyn Irwin, BA

Co-Authors: Jordyn Irwin, BA (Rush), Allie Baron, MA (Rush), Georgia Bozeday, Ed. D (Rush)

Introduction: Executive Functioning Skills allow the brain to interpret, organize, and manipulate information; early development of these skills is linked to positive outcomes throughout the life course. The Rush Neurobehavioral Center has partnered with Chicago schools for over a decade to implement evidence-based Executive Functioning curricula in academic settings for school-aged students, however, a curriculum for children aged 0-3 was early in development. It had never been tested in a bilingual, primarily Latino community setting.

Objective: The aim of this project was to increase access to Executive Functioning learning resources by providing a bilingual 5-workshop series for children aged 0-3 and their parents at Centro Romero, a family center serving Latino immigrant and refugee communities of North Chicago. The program was evaluated for child engagement and appropriateness and parent engagement, accessibility, and buy-in.

Methods: Based on the pre-existing Babies, Toddlers, and Tots curriculum, parent-facing materials were translated into Spanish, and activities were adapted for age and cultural appropriateness. Data collected included participant observation, an evaluation form, and a parent focus group

Results: 5 workshops and a focus group were conducted at Centro Romero during July 2019. Parent and child attendance were consistent across the 5 workshops, however, different levels of child engagement were observed depending on the activity. Parents were receptive to the concepts taught yet hesitant to ask questions about the material. Parents reported gaining knowledge and skills that they did not have previously which they would continue to implement with their children at home.

Conclusion/Significance: Providing these workshops in a community setting in a bilingual manner allowed skill-building in the areas of Executive Functioning to reach families who would otherwise have not had access to such programming. Parents reported enjoying and valuing the program and continuing to use skills they'd learned with their children at home. Partnering with an already existing and well-trusted organization and family program allowed for consistent attendance and buy-in from parents. Challenges to address for future similar programs involve encouraging parent engagement and comfort asking questions, to ensure the richness and effectiveness of the program in order to provide the maximum benefit to participants.

PORTRAITS OF JOY: UNLOCKING THE LIVED EXPERIENCES OF ADULTS WITH AUTISM USING PHOTOVOICE**Presenting Author:** Hannah Dau, OTS**Co-Authors:** Hannah Dau (Rush); Mallory Schrier (Rush); Eleanor Sweeney (Rush); Mackenzie Traub (Rush); Paula Costello (Rush)

Introduction: The majority of adults with Autism Spectrum Disorder (ASD) experience poor functional outcomes related to independence, social relationships, employment status and living arrangements (Gray et al, 2014). Despite the increased availability of evidence-based interventions provided by occupational therapy and legislation to support services for the school-aged population, the majority of young adults and adults with ASD remain dependent upon family or support services (Levy & Perry, 2011), even among higher functioning adults living in independent or semi-independent situations (Howlin, Moss, Savage, & Rutter, 2013). Despite the prevalence of dependence, there is a reported desire for independence (Cheak-Zamora, Teti, Maurer-Batjer & Halloran, 2016). This mismatch between reality and desire highlights how the majority of research on ASD focuses on other people's accounts of the disorder, with much less evidence reporting the perspective of those living with ASD (DePape & Lindsay, 2016). Research reporting the firsthand experience of those with autism is increasing, but there is still a need to focus on the lived experience of adolescents transitioning from high school to post-secondary education and employment (DePape & Lindsay, 2016).

Objective: The purpose of this research study was to gather perspectives of young adults with ASD through photos regarding the benefits of their community-based independent living group home in supporting their quality of life.

Methods: The PhotoVoice qualitative research method was utilized to identify and share the individual's experiences. A group session was provided for instruction followed by two individual interviews with each client to further discuss the photos taken. Six-step thematic analysis (Braun & Clarke, 2016) was performed to determine common themes among the participants' photos.

Results: Results indicate that from 16 interviews and 160 photos, the data from the participants related to 5 themes: work, creative outlets, social choice, healthy living, and accomplishment.

Conclusion/Significance: The five themes indicate an importance for active participation and engagement for individuals with ASD. Though they may communicate or engage differently, young adults with ASD value similar things in life and express them around themes similar to their neurotypical peers.

PREDICTING APPOINTMENT NO-SHOW IN A COMMUNITY CLINIC PARTNERSHIP

Presenting Author: Jordan Rudman, BA

Co-Authors: Jordan Rudman BA (Rush Medical College), Brittney Lange-Maia PhD MPH (Rush Dept. of Preventative Medicine), Neha Patel MHA (Rush Population Health), and Vidya Chakravarthy MS-HSM (Rush Population Health)

Introduction: Rush Population Health (RPH) maintains a partnership with CommunityHealth, a free clinic on the west side of the Chicago, in order to provide primary care for uninsured patients. While the program has been successful in reducing ED recidivism, it has yet to meet its goal of 50% appointment attendance for referred patients.

Objective: This study aimed to identify factors related to appointment no-show via a retrospective chart review in order to inform efforts to improve appointment attendance.

Methods: As a quality improvement project, this study was IRB exempt. Demographic, clinical, and appointment specific data from January 2016-June 2019 were collected from Epic and RPH databases. Logistic regression was used to model predictors of no-show status.

Results: In total, 782 patients out of 1,113 referrals in the study period were included in analysis. Out of 16 predictor variables studied, 8 met criteria for model inclusion ($p < 0.20$ in univariate analysis). In final adjusted models, only two variables were found to be significant predictors of no-show status: age (OR=0.97, 95% CI [0.96, 0.98]) and lead time-elapsed number of days between patient referral and appointment date (OR=1.02 95% CI [1.01, 1.04]). From this model, when comparing the 25th and 75th percentiles of age (29 and 51 years, respectively), a 29 year old patient would be 16% more likely to no-show compared to a 51 year old patient, holding all other factors constant. In addition, with all other factors held constant, a patient with a two-week lead time would be 2.3% more likely to no-show compared to a patient with a lead time of one week.

Conclusion/Significance: This study was limited by its use of data available in the EHR that may be inconsistently collected, inaccurate, or incomplete. In addition, patients who could not be contacted for referral were excluded from analysis. The finding that lead time predicts patient no-show is consistent with existing literature on this topic and will allow RPH to target future program improvements toward reducing lead time. We have also identified younger individuals as a high-risk group for no-show that may benefit from focused pro-attendance efforts.

SPORTS MEDICINE HEALTH EDUCATION FOR HIGH SCHOOL STUDENTS WITHOUT ACCESS TO ATHLETIC TRAINERS

Presenting Author: Maricristal Chan, B.S.

Co-Authors: Maricristal Chan (Rush University Medical Center)

Introduction: Although high school athletics allow students to remain physically active and learn to cooperate in a team setting, participation is intrinsically risky and can lead to injury. While access to a consistent athletic trainer has been shown to reduce injury, the majority of Chicago public high schools do not currently provide this resource.

Objective: This community service project aimed to develop and implement a curriculum that educates high school students on applicable sports medicine and health topics in order to overcome the current lack of athletic trainers.

Methods: The curriculum was divided into six different hour-long sessions that each focus on a particular health topic applicable to high school students. Each session includes a pre-survey that serves as the talking points for a group discussion. Following the group discussion are interactive activities, a post-survey and session evaluation, and the highlighting of career pathways to related healthcare professions.

Results: Since its development, the first session has been administered to 17 student-athletes at one high school in the Near West Side neighborhood of Chicago, Crane Medical Preparatory High School. Based on the session evaluations (with 10 being the highest rating on a 0 to 10 scale): students' average rating of the session topic was 9.3, session pre and post-survey questions were 9.1, session activity was 9.4, discussion of the career pathways was 9.1. Positive written comments were also provided.

Conclusion/Significance: Although there have been fewer in-full sessions than initially planned with available data, this community service project has helped educate high school athletes on applicable sports medicine and health topics. Scheduling weekly sessions consistently during the active sports season posed as the biggest challenge throughout the project. To combat this, an alternative activity was designed that randomizes the questions from each of the six different surveys following a brief discussion, which achieved the same objective.

ADDRESSING HEALTH CARE LITERACY: A PRE-TRAINING SURVEY OF COMMUNITY YOUTH**Presenting Author:** Adam Korte, B.S**Co-Authors:** Adam Korte

Introduction: Engaging with community members in order to increase health literacy is an integral part in improving health care outcomes in low income communities. An effective way to ensure both community involvement and sustainability is through providing resources to young community members.

Objective: The objective for this project was to understand in what areas of financial literacy high school students may need additional training in order to engage in financial medical literacy discussions with their community, specifically family and older community members.

Methods: A pre-survey with 10 questions with a 10-point Likert scale response on general health care knowledge surrounding health insurance and accessibility was developed after a literature review. The project began with a pre-survey to gauge the students' confidence in engaging in discussions on general health care knowledge surrounding health insurance and accessibility. A total of 31 high school students involved in a summer internship program at the Lincoln Methodist Church in the Pilsen neighborhood completed the survey (89% of all students in the program).

Results: Students completing the survey had the most confidence in delivering messages around the mortality gap between low income and affluent communities (mean:8.8, SD:3.4, range:5) and in advocating against health inequities in Chicago (mean:8.5, SD:3.8, range:5). Students felt less confident in discussing health care structures such as Medicaid (mean:3.3, SD:1.9, range:6) and explaining the nuances of health care delivery and payment such as deductibles, copays, and premiums (mean:3.1, SD:2.2, range:4).

Conclusion/Significance: Based on the pre-training survey questions, a training program to build youth capacity in informing their community about financial health literacy requires less information surrounding information on health inequity, and more on health care administration topics. Subjects that will require more training will include the topics that the students are less confident in such as medical terminology and navigating the complexities of Medicaid and Medicare. While a limitation to this project includes the small sample size in a single community, these findings, if expanded with surveys of youth in other communities, can result in the design and delivery of more impactful health literacy training programs.

BENEFITS OF A SUSTAINABLE, STUDENT-LED SCREENING PROGRAM FOR SOCIAL DETERMINANTS OF HEALTH IN AN URBAN PRIMARY CARE PRACTICE

Presenting Author: Leah Petrucelli, BS

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Introduction: Patients at Rush University Internists (RUI) experience high rates of chronic diseases influenced by social factors. Social factors are rarely stressed during clinical training, and are subsequently not addressed during health appointments.

Objective: The project aims to identify if social determinants of health (SDoH) screening during medical appointments is warranted, feasible, sustainable, and beneficial to patients and screeners in a large, urban, outpatient clinic.

Methods: In 2018, medical students piloted a SDoH screening protocol at RUI, a primary care practice on Chicago's West Side. The SDoH questionnaire contained items addressing food security, housing, transportation, health insurance, and PCP access. Patients screening positive for 1 SDoH were provided resources through a community resource database, and those screening positive for housing, transportation, or 2+ SDOH items were escalated to licensed social workers. Sustainability was ensured by the creation of a student-run service learning program, which trains new student leaders and volunteers to conduct SDoH screenings. Average screening time, number of positive screens, and patient feedback to screening was assessed. Student volunteer competency in SDoH screening was gauged via pre-training likert-scale questionnaires.

Results: Between March-May of 2018, 43 initial patients were screened by six students. Average screening time was 5 minutes; 26 (56%) patients screened positive for one or more SDoH: 17 (40%) for food insecurity, 14 (33%) for utilities interruptions, 9 (21%) for transportation issues, 5 (12%) for lacking insurance, 2 (5%) for housing instability. Twelve patients (28%) were referred to social work. Patients supported the inclusion of SDOH questions. Since 2018, 88 SDoH student screeners were trained. At baseline, students placed high importance on SDoH and SDoH screening in impacting health outcomes, reported varied comfort in asking patients about SDoH, and low knowledge of local resources.

Conclusion/Significance: High chronic disease prevalence and SDoH positive screens suggest the need for continued SDoH screening and resource provision. SDoH screening is feasible and sustainable, and student screening can offset the workload of other staff. Yet student schedules limit large-volume screening. Patients support SDoH screening and relevant resource provision, and students may benefit from increased exposure to local SDoH barriers and resources via SDoH screening.

YOUTH MENTAL HEALTH: PROMOTING HEALTH EQUITY THROUGH MENTAL HEALTH EDUCATION IN PILSEN MIDDLE SCHOOLS

Presenting Author: Eleanor Battino, BA

Co-Authors: Clara Ledsky (Rush) Laura Hurley (Rush)

Introduction: Youth in Chicago's under-invested neighborhoods are disproportionately likely to face mental health concerns. The community organization 5+1=20 promotes health equity through health education in public schools in Chicago and has the ability to improve delivery of mental health knowledge to youth.

Objective: We aimed to create a participatory and informative mental health curriculum for middle schools participating in 5+1=20 and compare its performance to the current mental health curriculum in 5+1=20.

Methods: We performed a literature review of youth mental health education programs in order to create a three day curriculum for 5+1=20. We piloted the curriculum in two Pilsen middle schools, Whittier and Irma C. Ruiz, and administered a KAP (Knowledge, Attitudes, and Practices) survey before and after. We administered the same survey to a control group of middle and high schoolers that were taught the previous 5+1=20 curriculum.

Results: 22 students participated in the new curriculum (10 from Ruiz and 12 from Whittier), and 11 students participated in the control. 9 students from the new curriculum (41%) and 7 from the control (64%) filled out the survey. On the pre survey (score range 0 to 100, where higher scores represent more understanding), the intervention students had a mean score of 62.7 (SD = 18.0) and the control students had a mean score of 61.9 (SD = 15.4). Students that participated in the new curriculum saw a mean improvement of 13.4 points (SD = 19.8, range = -15.4 to 43.6), while the control group saw an average improvement of 4.8 points (SD = 19.8, range = -30.8 to 30.8).

Conclusion/Significance: Comparing KAP improvement scores showed that students participating in the new curriculum may have had greater gains in mental health knowledge, attitudes, and practices. Limitations of the analysis were a small sample of survey completion within schools in one neighborhood. However, the KAP findings and the qualitative feedback resulted in changes to the way the 5+1=20 mental health curriculum will be delivered this year and in the future.

PICTURING COMMUNITY: USING PHOTOVOICE AS AN EMPOWERMENT TOOL WITH THE YOUTH HEALTH SERVICE CORPS

Presenting Author: Clara Ledsky, BA

Co-Authors: Clara Ledsky (Rush); Eleanor Battino (Rush); Oswaldo Becerra (YHSC); Sujae Valesco (YHSC)

Introduction: The Youth Health Service Corps (YHSC) is a youth empowerment program in Chicago's Pilsen neighborhood, created to address the barriers to healthcare access faced by the Latinx immigrant community. The majority of their programming operates in conjunction with the school year, so we collaborated with YHSC youth coordinators to facilitate Photovoice, a community-based participatory research tool, as a summer project to maintain engagement and ignite interest for the coming year.

Objective: Photovoice is a widely used tool to empower community members and identify community needs. Participants use photos to answer a research question, giving community members an opportunity to show their perspective in an accessible medium, leading to community-driven change. The aims of this project were to adapt Photovoice for the YHSC by collaborating with youth leaders to create a curriculum, train facilitators, and cofacilitate a group of YHSC in a Photovoice project.

Methods: Approval was obtained from the IRB and informed consent was obtained from all participants and their legal guardians. Interested participants were recruited from the YHSC. We partnered with two leaders from the YHSC to create and facilitate a two-day Photovoice curriculum. Day 1 focused on Photovoice methodology - developing a research question and taking ethical photos. On Day 2, the youth analyzed the photos using the SHOWeD methodology and developed an action plan related to identified themes.

Results: Two YHSC youth leaders collaborated on the creation of a Photovoice curriculum and cofacilitated the Photovoice project. Six members of the YHSC participated in Photovoice. They developed the research question 'This is How I See My Community,' and during photo analysis, the youth identified common themes around safety, green space, and respect for common spaces. These findings led to the creation of an action-plan to organize a neighborhood cleanup.

Conclusion/Significance: Photovoice was an effective means of engaging the youth and allowing them to share their perspectives. Given the high level of participation of the cofacilitators, we hope that this program could be repeated as an entirely youth-led project in the future. Such a continuation would allow us to better measure Photovoice as an empowerment tool and the sustainability of such a program.

NEIGHBORHOOD BARRIERS ASSOCIATED WITH CERVICAL CANCER SCREENING IN CHICAGO, IL

Presenting Author: Karina Oelerich, BA

Co-Authors: Karina Oelerich (Rush); Davina Oshomuvwe (U of C); Karen Munoz, Nita Lee (U of C); Anne Marie Murphy (Rush); David Ansell (Rush) and Summer Dewdney (Rush)

Introduction: Cervical cancer is the third leading cause of gynecologic cancer in women in the United States. Disparities have been shown in cervical cancer based on minority and socioeconomic status. While studies have demonstrated that certain characteristics of a woman's neighborhood, including socioeconomic status and clinical resources, put her at a greater risk for developing different types of cancers, this link is yet to be studied in cervical cancer incidence and mortality in Chicago.

Objective: This study was designed to assess health care facilities in Chicago that perform pap smears and colposcopies to better understand geographical gaps in accessibility. Then, to compare these possible gaps to incidence and mortality of cervical cancer in neighborhoods with barriers such as: socioeconomic status, race and geographic location.

Methods: An analysis of 76 healthcare facilities was performed in Chicago, IL. Brief interviews were conducted with each health care facility, including Federally Qualified Health Centers, physician's offices and hospitals. Information obtained included: ability to perform pap smears and colposcopies, insurance accepted and where referrals were sent. The data collected from these interviews was mapped alongside population data from the Chicago Health Atlas evaluating socioeconomic status, race, cervical cancer mortality and incidence.

Results: The analysis of the facilities show that 89% conduct pap smears, while only 56% perform colposcopies. In the review of the Chicago Health Atlas from 2012 to 2016, the highest rates of cervical cancer occur in Hispanic and African American women compared to Non-Hispanic white patients at an incidence of 12.1, 11.7 and 7.3 per 100,000 respectively. Initial geographic overlay of incidence rates showed higher cervical cancer incidence in regions without screening resources for colposcopy.

Conclusion/Significance: While pap smears are available throughout Chicago, the availability of colposcopies is limited. This is likely another barrier to screening and treatment for cervical cancer. Our review suggests that the neighborhood of residence and accessibility to screening resources play a role in the disparities in cervical cancer diagnosis and treatment in Chicago. The results of this study will provide a framework for improving healthcare access for women with cervical dysplasia and cancer, primarily in regions of Chicago without adequate health facilities.

CHRONIC DISEASE SELF-MANAGEMENT WITH FORMERLY INCARCERATED PERSONS IN CHICAGO

Presenting Author: Ella Mathieson, DNP

Co-Authors: Ella Mathieson, DNP, RN Marcia Murphy, DNP, ANP, FAHA, FPCNA (Rush) Angela Moss, PhD, RN, APRN-BC (Rush) Hugh Vondracek, MSc (Rush)

Introduction: Individuals with a history of incarceration have an increased incidence of developing chronic conditions and increased odds of having multiple conditions resulting in poor health outcomes. At a residential agency for formerly incarcerated persons (FIPs) in Chicago, over 70% had at least one chronic condition and 25% had two or more chronic conditions. Considering the complex socio-economic factors, this population is at increased risk of poor health outcomes. Self-management is recognized as a cornerstone of successful management of chronic medical conditions. This project aimed to increase residents' self-efficacy in their ability to manage their own health.

Objective: The Chronic Disease Self-Management Program (CDSMP) is an evidence-based program centered in Bandura's Theory of Self-Efficacy. The program was developed to help people better manage their chronic medical problems. Self-efficacy, health status, and health behaviors are among the outcomes frequently measured.

Methods: Two trained leaders facilitated the program for 20 FIPs (17 men, 3 women). The program was implemented in weekly sessions of 2.5 hours for 6 consecutive weeks, per the program guidelines to maintain fidelity. A pre and post intervention design was used to evaluate outcomes utilizing validated surveys. Five criteria were evaluated for change; 1) self-rated health 2) confidence 3) number of days physical health was poor 4) number of days mental health was poor and 5) number of days poor physical or mental health restricted usual activities.

Results: Pre-intervention confidence rating median was 8 (IQR 7-10) and post-intervention was 10 (IQR 9.75-10), with a percent change of 25% ($p=0.03$). Number of days where physical health was not good over the last month pre-intervention was 4.53 days, post-intervention was 2.14 days with a 52% reduction ($p=0.358$). The number of days mental health was not good, number of days poor health affected usual activities and self-rated health did not demonstrate significant change.

Conclusion/Significance: CDSMP can increase FIPs confidence in their ability to manage their health and improve their physical health. This has the potential to improve health outcomes of FIPs with chronic conditions and improve their quality of life.

TOILETING BEHAVIOR QUESTIONNAIRE: A RASCH ANALYSIS OF VALIDITY

Presenting Author: Samantha Souza, BS, OTDS

Co-Authors: Samantha Souza OTD Student, Lauren M. Little, PhD, OTR/L, Evguenia S Popova, PhD, OTR/L

Introduction: Independence in toileting is a vital skill. When children are independent in toileting, they have more opportunities for participation in the community, which positively influences developmental trajectories over time (Cicero & Pfadt, 2002; Richardson, 2016). However, many children with developmental conditions, including those with autism spectrum disorders (ASD), show significant delays in toileting independence (Dalrymple & Ruble, 1992; Richardson, 2016). The paucity of intervention approaches to address toilet training may be partially due a lack of validated measures to gauge mastery over the skills necessary to gain toileting independence.

Objective: Therefore, the purpose of this study was to use Rasch analysis to validate a measure of the developmental sequence of toilet training skills among children with typical development as well as those with developmental conditions.

Methods: Participants included n=160 children with typical development (Mean = 40.64 mos., SD=13.02 mos.) and n=139 with developmental conditions (Mean=60.223 mos., SD=18.30 mos.). Using Winsteps 4.4.2 (Linacre, 2002), we used Rasch analysis to examine the developmental trajectory of toilet training skills across children.

Results: Differential Item Functioning. There were no significant difficulty differences between males and females across items. However, there were significant difficulty differences on 13 items between those with typical versus atypical development. Dimensionality. The raw variance explained by the measure was 49.5%, slightly below the expected value. An additional 5.4% of unexplained variance remaining on the 1st contrast. Item and Person Fit. Less than 5% of items and < 10% of people are expected to demonstrate inappropriate fit to the Rasch model. Twenty-one people demonstrated misfit (7.0%) and 4 items (10.8%) showed misfit, or greater than expected variance. Internal Reliability. Person separation was 2.65 and person reliability was 0.87. Item separation was 8.81 with reliability of 0.99. In terms of person separation, an index of 1.50 is acceptable, 2.00 is good, and 3.00 is excellent (Duncan, Bode, Lai, & Perera, 2003).

Conclusion/Significance: The current study evaluated the psychometric properties of the Toileting Behavior Questionnaire using the Rasch rating scale model. The measure showed good item and person separation and reliability, had minimal differential item functioning, and excellent targeting.

PHYSICIAN KNOWLEDGE OF UNDOCUMENTED HEALTHCARE POLICY WITHIN RUSH UNIVERSITY MEDICAL CENTER

Presenting Author: Osvaldo Palomares, BA

Co-Authors: Osvaldo Palomares (Rush), Rush Immigrant Health Working Group, Jose Rodriguez (U of Illinois)

Introduction: There are 10.4 million undocumented individuals living in the US, with 455,000 individuals in the state of Illinois alone. This population has limited access to insurance options and faces barriers such as fear of deportation and cost. Consequently, undocumented patients often avoid going to the hospital or accessing resources.

Objective: In order to help RUMC become more immigrant friendly it must educate its physicians on how to provide comprehensive and culturally-competent care. By understanding where Rush physicians are regarding treating this population, the Immigrant Health Working Group (IHWG) and allies can create tools specifically tailored to where the gaps in knowledge are in the institution.

Methods: A survey using SurveyMonkey and approved through Rush IRB (ORA#: 19071103-IRB01) was distributed to physicians within five Rush departments (Internal Medicine [IM], Emergency Medicine [EM], Family Medicine [FM], Obstetrics and Gynecology [OBGYN], and Pediatrics). A total of 182 Rush physicians responded to the survey consisting of ten questions assessing knowledge of undocumented healthcare policy, three assessing self-reported confidence or knowledge on a scale of 1 to 5 regarding resources available, referral services, and advocacy for this population, and one referring to any past training regarding this topic.

Results: Average 'knowledge' scores were as follows: EM - 58.64%; FM - 58.57%; IM - 66.47%; OBGYN - 66.54%; and Pediatrics - 65.59%. Among all respondents, 59.34% responded low (1 or 2) to knowledge of available resources, 40.11% responded low on comfort towards referring undocumented patients to needed resources, and 23.08% responded low on comfort towards advocating for this population. Only 15 of 182 respondents stated having had past training regarding this topic.

Conclusion/Significance: Knowledge scores show that there is a need for educational material regarding how to best serve this population. While the majority of respondents feel confident in advocating for this population, they report lacking knowledge in available resources and referral services. It is difficult to know where Rush stands as other medical centers in the area have not completed similar surveys. However, this information can be used to create the tools needed for physicians to better address health outcomes in this population and ultimately make Rush more immigrant friendly.

THE RUSH HEART CENTER FOR WOMEN - TWO BIG HEARTS PROJECT: DESIGN AND BASELINE OVERVIEW

Presenting Author: Leigh Dairaghi, BA

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Introduction: Cardiovascular disease (CVD) remains the leading cause of mortality for women in the United States and in a city as segregated as Chicago, the prevalence of and mortality due to cardiovascular disease and stroke varies widely across neighborhoods.

Objective: The current project aims to 1) characterize the cardiovascular health of women across Chicago and 2) monitor the health of participants in order to identify novel cardiovascular risk factors that could improve screening methods for asymptomatic women with CVD.

Methods: In order to raise awareness of the leading cause of death in women, the 2 Big Hearts Screening Project recruited women across the Chicago region to receive cardiac screenings in 2008. Participants received lipid panel, fasting glucose, electrocardiogram and transthoracic echocardiogram screenings at Rush University Medical Center. Participants also completed health surveys regarding demographics, past medical history, and lifestyle factors. Atherosclerotic cardiovascular disease (ASCVD) risk scores were calculated from information collected in these surveys.

Results: There were 355 women who participated in the screening from 146 separate zip codes across Chicago, the surrounding suburbs, and neighboring states. Participants' ages ranged from 18 to 89 years with an average of 53 ± 13 years. 60% of participants self-identified as Caucasian, 24% as African American, 7% as Hispanic, and 4% as Asian. Over half of participants reported having at least one cardiac-related condition upon entering the study and almost 90% of participants reported a family history of at least one cardiac-related condition. Using the pooled cohort equation, ASCVD 10-year risk scores were calculated in 283 women. The average ASCVD risk scores were as follows: African Americans, 7.5%; Asians and Hispanics, 5.7%; Caucasians, 4.6%. A follow up study showed that a baseline ASCVD risk score of $>7.5\%$ was associated with 10-year ASCVD outcomes ($p=0.003$).

Conclusion/Significance: CVD not only affects men and women differently but races and ethnicities as well. Considering that this community-based study has effectively highlighted CVD characteristics and that the city-wide risk of CVD and stroke is known to vary greatly among Chicago neighborhoods, it is worthwhile to replicate this screening program in other racial populations and neighborhoods.

IMPROVING ACCESS TO CARE FOR PEDIATRIC PATIENTS WITH HYPERTENSION

Presenting Author: Lauren Gregory, MSN

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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.

Objective: 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: 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/Significance: 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.

EXPLORING DISPARITIES IN MATERNAL MORTALITY IN THE UNITED STATES

Presenting Author: Kirsten Hendrickson, BA

Co-Authors: Kirsten Hendrickson (Rush), Steven Wimer (Rush), Beatriz Acosta (Rush), Mallory Dixon (Rush)

Introduction: The United States is the only country in the world with an increasing maternal mortality rate. There are significant disparities in the rates of maternal mortality where race and residence are concerned. Maternal mortality is closely linked to infant mortality, which is a leading indicator of a nation's health status. It is a modifiable cause of mortality in women. It is 76 times more expensive to save a woman's life when complications arise than to provide adequate prenatal care.

Objective: The objective is to describe the disparities in maternal mortality in the United States based on race and residence. Only by understanding the disparities that exist can we create interventions to address the issue.

Methods: Data from the US census, CDC Morbidity and Mortality reports, and the World Health Organization was collected and compared.

Results: The maternal mortality rate has increased in the United States over the last 15 years. Maternal mortality worldwide has decreased over the same time frame. The US is the only nation of its peer countries that has seen an increase in the maternal mortality rate. Black women are 3 to 4 times more likely to die in childbirth than white women. Within the US, maternal mortality varies greatly from state to state, with one of the highest being Georgia (46.2 per 100,000) and one of the lowest being California (4.5 per 100,000).

Conclusion/Significance: There are significant disparities in maternal mortality between the races and between locations. This analysis is limited in that the WHO and CDC define maternal mortality differently. In addition, not every country keeps detailed records of the causes of maternal mortality. Within the US, however, data collection is consistent. This research illustrates a need for evidence-based interventions. A greater understanding of the existing disparities provides medical professionals the opportunity to better help those women and increase the safety of childbirth in the United States.

EXPOSURE TO COMMUNITY VIOLENCE

Presenting Author: Susan Panek, Biological Sciences, Chemistry

Co-Authors: Susan Panek (UIC)

Introduction: Exposure to Community Violence is exposure to intentional and/or unintentional acts of interpersonal violence committed in public and private areas by individuals who are and/or are not related to the victim. Community Violence is a community and public health issue affecting 7 million females and 5.6 million males every year in the United States.

Objective: The purpose of this project is to explore and assess the prevalence and level of community violence, patients in an Emergency Department of an urban hospital, are exposed to.

Methods: Patients in the Emergency Department of John H. Stroger Jr. Hospital of Cook County were asked about their exposure to different forms of community violence and their bearing witness to different forms of community violence. Subsequent to this, patients were offered and subsequently educated on a resource handout that encompassed an array of resources including, but not limited to, shelters, coalitions, hotlines, centers and many more in the city of Chicago.

Results: Observing the level of emotional and physical violence that patients in the Emergency Department experience significantly increased understanding about the exposure to community violence endured by the patient population in the ED as well as contributed to a deeper understanding of the resource needs by the patient population in the ED of an urban hospital.

Conclusion/Significance: The findings obtained from English, Polish and Spanish speaking patients highlights the high rate of patients exposed to community violence collectively as victim and witness, the similarity in resource needs among different speaking patient populations and the importance of understanding the patient population in the hospital in order to provide effective resources that can allow for patients to receive proper care and that can allow for the development of an intervention program for those exposed to community violence.

RUSH EMPLOYEE VOLUNTEER PROGRAM

Presenting Author: Julia Bassett, MBA, MHSM

Co-Authors: Julia Bassett, MBA, MHSM Thomas Molina, MSRA, CRA Tiffany Vazquez, M.Ed

Introduction: The Rush Employee Volunteer Program (EVP) supports volunteer activities that enhance and serve the communities where Rush system employee's work and live. As an anchor institution on Chicago's West Side, Rush has made a highly visible commitment to working closely with the communities near Rush University Medical Center and Rush Oak Park Hospital to address social conditions that contribute to poor health outcomes for residents. Part of our strategy includes providing a way for Rush system employees to volunteer in these communities.

Objective: This program creates service and community engagement opportunities that are meaningful, purposeful and help those in need to align with our organizational strategy and Community Health Implementation Plan. We specifically seek to address issues that improve health, well-being and quality of life for our neighbors, and to provide volunteer opportunities that enrich and inspire our employees.

Methods: Benefits of EVP include: 1) Providing needed services in our neighboring communities 2) Helping employees become more familiar with these communities and their residents 3) Strengthening Rush's culture of giving back – Boosting employee engagement and retention

Results: Volunteer Experience Feedback 1) How satisfied were you with your overall volunteer experience? 2) How likely are you to volunteer again? 3) How much of an impact do you think your volunteer work had?

Conclusion/Significance: Now that Rush and ROPH has made a highly visible commitment to working closely with our catchment communities, we will now have ongoing volunteer opportunities for employee (hourly, salaried) on a quarterly basis.

BONE AND JOINT WELLNESS PROGRAM

Presenting Author: Alicia Martinez, BSN

Co-Authors: Alicia Martinez, RN, BSN, Quintin C. Kelley BA, Samantha Fried, MSN, APN, FNP-C

Introduction: The Bone and Joint Wellness program (B&JWP) was developed to assist surgical/non-surgical joint and spine patients who have risk factors of obesity, smoking and diabetes.

Objective: The program was designed for specific patient population with joint and spine pain to lose weight, stop smoking or assist with lowering A1C

Methods: Upon the detection of a patient who has surgical risk factors that the B&JWP is designed to address, High BMI; Tobacco Use; and/or Uncontrolled Diabetes, the patient is invited to participate in the program via physician referral or the creation of an order set in Epic. The program seeks to address each patient's risk factor/s by setting up appropriate appointments and engaging patients on a regular basis to provide support. To evaluate the B&JWP's impact, we conducted a retrospective review of physician referrals and patient participation between November 2018 and December 2019.

Results: A total of 342 referrals were received from FY19 November to FY20 YTD December. Of those 342 referrals, 88 patients declined to participate. The highest referred program was weight management with a total of 292. Smoking cessation had a total of 53 referrals and diabetes with 16 referrals. The outcomes of the referrals were tracked after completing chart reviews or outreach calls to discuss progress. Completely engaged status was determined if completed 4+ office visits with medical weight loss physician, decreased smoking intake or compliant with PCP visits to work on plan to lower A1C. Consult only status was determined if patient was seen for only one appointment with the medical weight loss office or agreed to participate with a smoking program without response of progress. We also found during the chart reviews, patients who were unable to lose weight were referred to the Bariatric team. Seventeen were referred to the Bariatric Surgeon for consults. Of those bariatric consult referrals, 11 are pending bariatric surgery.

Conclusion/Significance: In conclusion, the results indicate this patient population is eager to participate in a program that will benefit from weight loss, smoking cessation and diabetes control not only to optimize the wellness of their joints spine but overall wellness of life.

ADVERSE CHILD EXPERIENCES AND MATERNAL-INFANT HEALTH: AN ANALYSIS OF MATERNAL-INFANT PERINATAL HEALTH OUTCOMES AMONG WOMEN OF THE RUSH ACE-HOME VISITING INITIATIVE

Presenting Author: Victoria Buckman, B.A.

Co-Authors: Dr. Gina Lowell (Rush), Victoria Haro (Rush), Jordyn Irwin (Rush), Morgan Sturgis (Rush), Taylor Sullivan (UMD)

Introduction: Adverse Childhood Experiences (ACEs) negatively impact long-term behavioral and physical health outcomes, and have been shown to negatively impact perinatal health outcomes. Beginning in July 2017, Rush began screening pregnant and parenting women for their own ACEs in order to link them with parent support services that build resilience. The Rush ACE-HV Initiative sought to understand 1) the capacity of the prenatal and postpartum clinical settings to screen for ACEs, 2) the burden of maternal ACEs, and 3) their impact on maternal-infant perinatal health.

Objective: To compare maternal-infant perinatal health outcomes of women with high and low ACE scores, and to compare women who declined ACE screening with both groups to determine if they constitute a high or low risk population. We hypothesize there will be greater adverse maternal-infant health outcomes associated with high vs low ACE scores.

Methods: Retrospective chart review was conducted for 609 women who were screened prenatally for ACEs during a prenatal visit at Rush University Medical Center's main OB/GYN clinic, which primarily serves a Medicaid population from Chicago's West and South Side community areas. Perinatal health outcomes including maternal depression, hypertension, preterm birth and low birthweight were evaluated. Univariate analysis was conducted to assess the correlation between women with low, high, and declined ACEs and these outcomes.

Results: Of 609 women, 507 accepted screening, of which 92 (18.1%) scored 3 or higher and 415 (81.9%) scored less than 3. The average highest depression screening score was 8.8 for high maternal ACEs compared to 4.4 for low maternal ACEs. Gestational hypertension was more common for high (12.6%) vs low (6.4%) maternal ACEs. No differences were detected in preterm birth or low birthweight between the groups. Data were compromised due to inconsistent documentation and variable patient follow-up.

Conclusion/Significance: This analysis of maternal ACEs and perinatal health outcomes demonstrated the large burden of maternal ACEs experienced in our population and confirmed the association between high ACEs, maternal depression and gestational hypertension. Further analysis to assess interaction of variables on perinatal health outcomes may serve to improve care for pregnant women with high ACEs.

THE RELATIONSHIP BETWEEN ADIPOSE AND MUSCLE DEPOTS AND CIRCULATING T3 AND T4 LEVELS AMONG EUTHYROID INDIVIDUALS

Presenting Author: Olivia Nass, Bachelor of Science

Co-Authors: Olivia Nass (RUMC), Sarah Peterson PhD, RD, LDN (RUMC), Sandra L. Gomez-Perez, PhD, RD, LDN (RUMC), Jackie Hankins, MS, RD, CSR, LDN (RUMC)

Introduction: Thyroid hormones, both the pro-hormone thyroxine (T4) and the active form triiodothyronine (T3) are crucial for many actions in the body. Type I and type II deiodinase (D1 and D2) convert T4 to T3. Theoretically, the volume of adipose and skeletal muscle may influence T3 levels since the D2 enzyme is found within both tissues. However, the relationship between thyroid hormones and body composition among euthyroid individuals is uncertain.

Objective: The objective of this study was to examine the relationship between thyroid hormone levels with adipose and muscle depots measured via bioelectrical impedance analysis (BIA) among euthyroid individuals using a nationally representative sample from the National Health and Nutrition Examination Survey (NHANES) 2001-2002 cycle.

Methods: Subjects greater than 18 years of age with normal TSH levels (defined as 0.24-5.40 mIU/L), without a history of thyroid disease were included. All data including age, sex, race/ethnicity, height, weight, BMI, smoking status, thyroid lab data, fat mass and fat-free mass were collected from NHANES 2001-2002 cycle. Categorical and continuous variables were reported as percent and median (interquartile range: 25th and 75th percentile), respectively. Linear regression analysis was used to determine a relationship between thyroid hormones with fat and fat-free mass while controlling for age, sex, and smoking status.

Results: A total of 553 subjects were included (46% female); the median age was 31 years (22, 39), the majority were Non-Hispanic White (41%) and 25% reported smoking. The median BMI was 25.7 kg/m² (22.5, 29.7), the median estimated fat mass was 21 kg (16, 28), and the median estimated fat-free mass was 52 kg (16, 28). There were no significant relationships between measures of body composition and thyroid hormones observed in both men and women when controlling for age and smoking.

Conclusion/Significance: In conclusion, there was no significant relationship between measures of body composition and thyroid hormones when controlling for age and smoking in both men and women. Limitations include the inability to control for confounders including insulin resistance and physical activity. More research is needed to support these results.

ADHERENCE TO ACS GUIDELINES IN WOMEN WITH METASTATIC BREAST CANCER

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Introduction: The American Cancer Society (ACS) publishes nutrition and physical activity (PA) guidelines for all cancer survivors to support primary and secondary cancer prevention; however, the section on metastatic disease is limited. To date, little is known regarding diet and PA behaviors in women with metastatic BC, a rapidly growing survivorship population.

Objective: To evaluate if a subset of women with metastatic BC is adherent to the ACS nutrition and PA guidelines.

Methods: Diet, PA and anthropometric data were collected from a convenience sample of women (n=47) with metastatic BC. Adherence to ACS guidelines was determined using a scoring system for a healthy diet, alcohol consumption, body mass index (BMI) and PA. ACS scores were classified as 'worst' (0-3), 'middle' (4-5) and 'best' (6-7). A subset analysis was conducted (n=22) to examine the differences between total ACS score, body composition parameters including BMI, waist circumference (WC) and waist-to-hip ratio (WHR), and self-reported health quality.

Results: Average age and BMI were 55.7 (± 11.8) years and 29.5 kg/m² (± 7.5). Most women were White (53.2%) or African American (34.0%). Overall mean total ACS score was 3.9 (± 1.4), with the highest proportion of women classified as having middle adherence (44.7%), followed by worst (38.3%). Mean healthy diet score was 3.3 (± 1.9); 38% had worst diet adherence, followed 34.0% middle adherence, though 83% reported no alcohol intake. 36.2% had worst score for BMI. The majority reported insufficient PA (74%) and 36.2% were obese (BMI ≥ 30 kg/m²). From the subset analysis, those with middle to best adherence (ACS score ≥ 4) had a significantly lower BMI ($p=0.002$), WC ($p=0.001$), and WHR ($p=0.005$) compared to those with worst adherence (ACS score < 4). No differences were observed in self-perception of overall health ($p=0.304$).

Conclusion/Significance: Our sample of women with metastatic BC has moderate to poor adherence to the ACS nutrition and PA guidelines. Further research is needed to assess awareness of ACS guidelines and to establish strategies to improve diet quality and overall adherence to nutrition ACS guidelines in a larger and more diverse sample of women with metastatic BC.

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

Presenting Author: Meghan Garland, MSN CNM

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Introduction: 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 in 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 either 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 accelerometer) 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 accelerometer 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.

Conclusion/Significance: Outcome expectations/realizations and self-efficacy may be important constructs to consider when designing interventions for midlife African American women.

ADDRESSING GAPS IN TRAINING AND EDUCATION TO IMPROVE CARE FOR PATIENTS WITH INTELLECTUAL OR DEVELOPMENTAL DISABILITIES: A PRELIMINARY SURVEY

Presenting Author: Julie Kurek, Medical Student

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Introduction: Despite nearly 1 in 5 individuals identifying as having a disability, providing adequate and sensitive care for individuals with disabilities in the United States remains a challenge. Training plays a key role in allowing medical professionals to provide care. However, U.S. medical schools are not required to provide training for disability competency for accreditation or receipt of federal funding. In addition, hospitals are not required to provide any such training either to participate in federally funded medical student internships and residency programs. Consequently, there is a dearth of institutionalized opportunities for medical students to gain experience and skills in caring for patients with disabilities.

Objective: The objective of this project is to assess the need for more education and training when caring for patients with disabilities from the perspective of medical students. This work will help establish the need for improved competency and instruction of medical students in order to provide better care for patients with disabilities.

Methods: An anonymous survey assessing comfort with pertinent clinical scenarios was distributed to all medical school classes (M1-M4). It also asked participants to rate the perceived need for further training for these scenarios on a scale of 1-5 (no need - definite need). Questions were drawn from the Disability Situations Inventory, a diagnostic tool developed by the Human Development Institute out of the University of Kentucky. Survey was created via Google Forms and distributed to the student body via repeat postings on the year-specific Facebook page.

Results: Preliminary data displayed that sixty-four medical students at Rush University responded to the survey. Responses were obtained from the M1 (29.7%), M2 (48.4%), and M3 (21.9%) classes. Responses indicated significant student discomfort when interacting with patients with hearing and intellectual disabilities as well as a professed need for students for more instruction.

Conclusion/Significance: Data collection is ongoing. However, preliminary responses to our survey showed a variety of gaps in the Rush Medical School education in regards to interacting and caring for patients with disabilities and the need for curricular change to address these learning gaps.

THE 'SIMTENDING': A NOVEL MODEL FOR SIMULATING THE ATTENDING ROLE IN SENIOR RESIDENTS

Presenting Author: Kimbia Arno, MD, MFA

Co-Authors: Kimbia L Arno, MD, MFA (RUMC); Sara M Hock, MD (RUMC)

Introduction: The transition from resident to attending is a stressful and difficult period, due to the new challenges of final responsibility for patient care and educating residents. Very few medical education interventions address this transition.

Objective: The 'Simtending' model seeks to address these elements via the simulated supervision of junior residents during high acuity cases.

Methods: This study included data from residents in a three-year residency program at a tertiary academic center in Chicago, Illinois. The 'Simtending' model placed a PGY-3 resident in the role of attending, working alongside junior residents who would staff the case as appropriate. Juniors and faculty provided the 'Simtending' feedback. These cases occurred in half of the twice monthly simulation sessions within the curriculum. Data was extracted from anonymous satisfaction survey information from six distinct sessions. Survey responses were compared between 'Simtending' and traditional sessions with respect to feedback quality, realism, and achieving objectives. Average scores on each topic were compared using independent samples T-test.

Results: Feedback was collected from six distinct events for a total n of 74. Of these, 44 (59%) were from the Simtending simulation events and the remaining were traditional. On a scale out of 7, residents rated the sessions similarly regarding fulfilling goals and objectives (6.75 +/- 0.61 simtending compared to 6.50 +/- 1.14 traditional, $p=0.27$), realism of scenarios (6.77 +/- 0.52 simtending compared to 6.70 +/- 0.47 traditional, $p=0.53$); and quality of feedback (6.73 +/- 0.62 simtending compared to 6.67 +/- 0.55 traditional, $p=0.66$).

Conclusion/Significance: This data shows that residents evaluate the 'Simtending' model similarly compared to traditional simulation sessions in terms of realism, meeting goals and objectives, and quality of feedback. Future work will include assessment of whether senior residents deem this model to be helpful in their transition to the attending role.

REDUCING IMPLICIT BIAS IN MEDICAL EDUCATION AND TRAINING: USE OF RACE IN STEP 1 QUESTION BANKS

Presenting Author: Asantewaa Ture, BA (Chemistry)

Co-Authors: Jeremy Chapman, MD (Medical College of Wisconsin) Paul Kent, MD (Rush University Medical Center)

Introduction: Medical education is multidimensional with formal, informal, and hidden aspects. Hidden curriculum, the attitudes conveyed implicitly via the practices and culture of an institution, usually reinforces the stated curriculum and program objectives. However, it can exert a powerful countervailing influence even in the face of evidence to the contrary. Thus, hidden curriculums can facilitate re-enforcement or creation of implicit biases. We hypothesize that evidence of a hidden curriculum, specifically implicit bias, may be found in question banks used to prepare for United States Medical Licensing Examinations (USMLEs).

Objective: We hypothesize that there will be a statistically significant disparity in the portrayal of patients based on race in question banks used to prepare for USMLEs.

Methods: Temporary access was purchased to three widely used question banks. We scored positive characteristics (+1) and negative characteristics (-1) before assigning a 'Social Stigma Score' (SSS), equal to the sum of positive points and negative points. We chose to focus on socially stigmatized traits. T-tests were used to compare the averages of SSS with $p < 0.05$ representing statistical significance.

Results: 3,713 questions were scored with 158 questions including race (4.25%). Average SSS from lowest to highest were: AA men (-0.18), AA women (-0.136), W men (-0.11), Asian men (-0.083), Hispanic men (0), W women (0.1739), and Asian women (0.375). There was no statistically significant difference between the SSS of W and AA patients ($p = 0.2148$).

Conclusion/Significance: Medical students are highly encouraged to use practice questions for USMLEs. Question stems contain behavioral attributes, the focus of this study, as they have the potential to perpetuate implicit biases about certain demographic groups. Although not statistically significant, there was a difference in SSS for patients based on race and gender. This replicates our 2017 study of UWorld Step 1 question bank, which revealed that African-American patients were portrayed more negatively than White patients. This study cannot provide direct evidence of what students learn from question banks, however, it is known that race shapes public beliefs. Therefore, at best, mention of race reinforces existing biases, and at worst, introduces new biases to student-doctors.

CREATION OF A MEDICAL STUDENT TRAINING TO IMPROVE CONFIDENCE PROVIDING TRAUMA-SENSITIVE CARE TO SEXUAL ASSAULT SURVIVORS

Presenting Author: Kaitlynn Tracy, MD Candidate

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Affiliation/Institution: Daniel Gore (M2, RMC), Melissa Prusky

Introduction: Sexual assault is a significant public health concern in the United States, affecting one in three women and one in six men during their lifetime. Yet few medical training programs provide education on trauma-sensitive communication or patient care for those who disclose sexual assault. Medical schools should include education that prepares students to engage with survivors of sexual assault, including methods students can use to relieve patients' distress and empower patients to feel in control of their care.

Objective: The goal of this intervention is to develop a training module that improves medical student understanding of providing trauma-sensitive care to sexual assault survivors. This module will focus on appropriately addressing survivors' emotions, collecting pertinent medical information, and avoiding retraumatization.

Methods: Second-year medical students attended an hour-long lecture that provided background information on sexual assault and trauma-sensitive care. This lecture was followed by a two-hour workshop where medical students practiced communication skills via role plays with subsequent class debriefs. Students anonymously completed identical pre- and post-educational session surveys, featuring 5-point Likert questions that assessed students' comfort level performing aspects of trauma-sensitive care. Statistics were performed between pre- and post-surveys to evaluate the usefulness of the lecture and workshop in improving students' confidence. IRB approval was granted by Rush University.

Results: Study results indicate that second-year medical students felt more comfortable communicating with survivors of sexual assault following the lecture and workshop. In particular, students showed the greatest improvement in comfort level to 1) Communicate medical care options to patients using trauma-sensitive practices, 2) Help survivors feel in control of their care, and 3) Understand what to say and what not to say to survivors.

Conclusion/Significance: This study found that the educational intervention is associated with improvement in students' perceived confidence in providing trauma-sensitive care across all measured metrics. Considering the preliminary data, medical schools should consider incorporating educational trainings on trauma-sensitive care into their curriculum in order to positively impact patients' treatment following a sexual assault.

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

Presenting Author: Michelle High, MSN

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Introduction: 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.

Objective: The purpose of this integrative review was to synthesize the evidence about the effectiveness of parent education programs for CMC.

Methods: 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 is documented to have one or more characteristics of medical complexity; 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: 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. The final sample of 20 included randomized controlled trials, quasi-experimental and non-experimental studies.

Conclusion/Significance: 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. 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.

THE EFFECTIVENESS OF EDUCATION ON CARBOHYDRATE KNOWLEDGE IN ADULTS WITH TYPE 2 DIABETES

Presenting Author: Theresa Caputo, B.S.

Co-Authors: Theresa Caputo, B.S. (IU), Janette Cino, B.S. (U of I), Sarah Peterson, PhD, RDN, LDN, CNSC (RUMC)

Introduction: Diabetes education may have an impact on overall diabetes control in individuals with type 2 diabetes (T2DM).

Objective: The purpose of this project was to describe carbohydrate knowledge using the Adult Carb Quiz (ACQ) in adults with T2DM.

Methods: Demographic (age, sex, race/ethnicity) and clinical data (body mass index (BMI), length of T2DM diagnosis and medication use) were obtained through medical records. Patients who had not previously received DM diet education were asked to complete the ACQ during an Endocrinology clinic visit. The ACQ includes five components: carbohydrate food recognition (26 questions), carbohydrate food content (6 questions), nutrition label reading (4 questions), hypoglycemia treatment (4 questions), and appropriate carbohydrate content of meals (4 questions). Each correct answer was scored 1-point, incorrect answers and responding "don't know" were given 0-points. A total of 44 points were available. Categorical and continuous variables were reported as percent and median (interquartile range (IQR): 25th, 75th percentile), respectively. Mann Whitney U tests were used to determine a difference in ACQ scores by demographic and clinical characteristics. Significant levels were set at $p < 0.05$.

Results: To date, 12 patients have completed the ACQ. The median age and BMI 62 years (IQR: 35, 70) and 36.7 kg/m² (IQR: 28, 42); 58% were female and 58% were non-Hispanic African American. The median total ACQ score was 24 (IQR: 21, 27) which represents 53% correct. Individuals diagnosed with DM <5 years had a higher median carbohydrate food recognition (17 [IQR: 16, 20] versus 11 [IQR: 11, 14], $p=0.004$) total ACQ score (26 [IQR: 24, 30] versus 21 [IQR: 17, 24], $p=0.02$) compared to those who have had DM for ≥ 6 years. Additionally, individuals <65 years of age had a higher median hypoglycemia treatment (5 [IQR: 4, 5] versus 2 [IQR: 1, 3], $p=0.004$) total ACQ score (28 [IQR: 24, 32] versus 22 [IQR: 17, 24], $p=0.02$) compared to those ≥ 65 years.

Conclusion/Significance: In the small sample of patients that completed the ACQ, carbohydrate knowledge was low, indicating the importance of comprehensive diabetes education. More research should be conducted to strengthen these findings.

MASTERS VS BACHELORS IN MEDICAL LABORATORY SCIENCE

Presenting Author: Jasmin Banegas, MS in Medical Laboratory Science

Co-Authors: Jasmin Banegas Dina Batlivala Laurie Guillard Nadine Lerret

Introduction: The work done by medical laboratory scientist (MLS) is crucial towards the diagnosis of diseases such as cancer and diabetes as well as detecting heart attacks and identifying bacterial and viral infections. Towards becoming a certified MLS, individuals can choose between a bachelors or an entry level master's degree in the field. Whether or not receiving an advanced degree in MLS creates the opportunity for quicker advancement or more complex roles in the field is currently unknown.

Objective: The aim of this study was to determine if a master's degree from Rush University propelled career outcomes towards those which are more complex and resulted in higher responsibility.

Methods: We conducted a qualitative survey of Rush MLS alumni who obtained a master's degree or a bachelor's degree from the Department of Medical Laboratory Science over the last five years. Individuals shared their current career title, outlook, and earnings and those who obtained a bachelor's degree versus those who obtained a master's degree in MLS were compared.

Results: Data showed all of alumni were working as MLS regardless of their degree level. Importantly, 3/27 (11%) of alumni with a master's degree were currently employed as supervisors or were working on obtaining a higher degree in the medical field. While the majority of participants who held jobs with a bachelor's degree work as MLS and felt that their jobs were appropriate to their level, none were currently at a supervisor or higher level. Additionally, 10/27 (40%) of alumni who held masters degrees indicated their jobs were beneath their level while 16/27 (60%) indicated their job was appropriate to their level. Finally, both bachelor's and master's degree holders averaged between \$50,000-60,000 per year in income.

Conclusion/Significance: Although both degrees lead to similar salaries, obtaining masters in MLS provides more opportunities for supervisory positions. Interestingly, obtaining an entry level master's degree in the field of MLS led to some individuals feeling their job was beneath them in skill level. This opens the door for future investigations into whether those with a master's degree in MLS could be challenged more in the workplace.

WRITTEN REFLECTION AS A TOOL FOR PERSONAL GROWTH IN HEALTH EQUITY-ORIENTED MEDICAL STUDENTS

Presenting Author: Amy Napleton, MA, MEd

Co-Authors: Amy Napleton, MA, MEd (Rush) Elizabeth Davis, MD

Introduction: LCME guidelines mandate medical schools to educate future physicians 'to recognize and appropriately address gender and cultural biases in health care delivery.' Reflection learning has been shown to foster self-awareness and enhance competency in cross-cultural communication, confront biases, and improve wellness. Within the context of the four-year Health Equity and Social Justice Leadership Program (HESJLP) at Rush Medical College, a critical self-reflection curriculum was designed and implemented to present an opportunity for personal growth and bias confrontation among the class participants.

Objective: To create a reflection learning curriculum and meta-reflection evaluation plan for implementation in the HESJLP at Rush Medical College.

Methods: Research was conducted on existing reflection learning curricula within medical education and graduate medical education using Med Ed Portal. Conversations were conducted with experienced physician writers regarding progression of reflection prompts and appropriate peer and faculty feedback. In partnership with the faculty of the HESJLP and student leaders, a curriculum and evaluation plan was formed.

Results: Individual monthly reflection prompts were written, peer reflection groups with discussion prompts were formed, and faculty evaluation guidelines were outlined. The first iteration of the reflection learning curriculum is currently in progress.

Conclusion/Significance: The HESJ curriculum in the first year includes site visits to community organizations and projects in partnership with community. First-year students are encouraged to reflect upon the site visit experiences and begin to orient themselves within a health equity mindset. As students progress in medical school and the HESJLP curriculum, the prompts encourage students to reflect on mistakes they've made in working towards equity with patients and communities, learning from their mistakes. As reflection writing is a skill that is developed with practice, this curriculum is designed to provide practice opportunities and constructive feedback to HESJLP students. In peer groups, students choose to share from their own reflections and learn to offer feedback rooted in a growth mindset regarding equity work. On each reflection, faculty mentors will validate something specific that resonates with them and ask one question to push the student's thought process further. The reflection curriculum will be modified as the course continues beyond this first iteration.

EFFECTIVENESS OF ART-BASED TRAINING PROGRAMS IN OCCUPATIONAL THERAPY EDUCATION

Presenting Author: Clarissa Stanhope, Bachelor of Science in Community Health

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Introduction: Art-based training programs impact healthcare education increasing students clinical observation skills, acceptance of ambiguity, and communication skills (Klugman, Peel, & Beckmann-Mendez, 2011). These programs are unique because they focus on nontechnical skills (NTS) like communication, observation, and mindfulness. All healthcare practitioners utilize NTS, but these skills can be difficult to teach in the classroom. Evidence shows that art-based training programs close this gap in healthcare education programs. They reinforce NTS and clinical reasoning through interpretation of art beyond an initial observation (Coppola & Miao, 2017). Research has yet to be completed to examine the effectiveness of art-based training programs on clinical reasoning among occupational therapy doctoral (OTD) students. Therefore, this study will investigate the extent to which OT students' NTS are impacted by an art-based training program.

Objective: This study is a retrospective analysis investigating the extent to which art-based training program impacts NTS development in OTD students.

Methods: Approval from Rush University Medical Center's Institutional Review Board was obtained. Quantitative measures were analyzed through a paired samples t-test. Study participants completed pre-/post-tests of the Kentucky Inventory of Mindfulness Skills (KIMS) before and after participating in an art-based training program. Qualitative analysis of students' reflections incorporated a case study design that analyzes the impact of the art-based training program using thematic analysis.

Results: Qualitative analysis is in the final stages of review (n=32) and final results will be presented. Quantitative results of participants' (n=72) KIMS results were found to be significant ($p=0.011$; 0.013).

Conclusion/Significance: This study provides information on the art-based training program curricula, the effectiveness of the program as a teaching methodology, and how other programs could implement a similar program to bolster the learning of NTS. The study may be limited by sample size, removal of surveys completed by the researchers as subjects, and access to less qualitative data than quantitative. The lack of supportive research regarding development of NTS through an art-based training program in healthcare professionals necessitates this study as a basis for educational improvement within healthcare fields.

EFFECT OF OCCUPATIONAL THERAPY INTERDISCIPLINARY EDUCATION ON PLAN OF CARE AND ADHERENCE TO BATHING IN LEAST RESTRICTIVE ENVIRONMENT: AN ACUTE CARE INTERVENTION

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Introduction: Hospital Acquired Infections (HAIs) affect one out of every 20 patients, with catheter-acquired urinary tract infection (CAUTI) being the most prevalent and expensive. CAUTI prevention standards cite routine bathing as preventative care, but this does not account for variation in patients' abilities. The purpose of this study is to determine if the use of a standardized electronic communication tool would result in an increased number of individuals bathing in less restrictive environments.

Objective: Participants will be able to describe the importance of interdisciplinary communication and how effective use of the same terminology results in best practices for patients.

Methods: Participants in the quasi-experimental study were adults in an urban midwest academic medical center on the general surgical unit. OTs provided education to interdisciplinary team members on the unit, consisting of an introduction to an interdisciplinary field in the electronic health record (EHR) to document bathing recommendations using common language established. EHR data from the intervention and control groups included the following categorical variables: 1) independent or needs assistance; 2) intervention or control group; 3) bathing location (bathroom, chair, or bed). We used SAS Studio 5.1 to conduct a multinomial logistic regression.

Results: We are 95% sure patients in the intervention were 2.7 times more likely to bathe in the bathroom than the chair (95% CI 1.390-5.395). Independent patients were 2.1 times more likely to bathe in the bathroom than the chair (95% CI 1.035-4.317). We also tested the interaction between independence level and intervention group, which showed there was no significant difference in independence between the intervention and control groups $X^2(1, N=414)=0.62, p=.43$.

Conclusion/Significance: The intervention group were significantly more likely to bathe in the bathroom than the chair. These results are important because patients who are generally independent are bathing in unnecessarily restrictive environments. While this study did not directly address CAUTI incidence, transitioning bathing practices to less restrictive environments has implications for a case-control trial that could measure CAUTI incidence. OTs play an integral role in interdisciplinary team education on bathing recommendations in alignment with a patient's current level of function.

EVALUATING AND IMPROVING THE TEACHING OF MEDICAL LABORATORY SCIENCE MATERIAL IN MEDICAL, NURSE PRACTITIONER, AND PHYSICIAN ASSISTANT PROGRAMS

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Introduction: Laboratory testing is a vital component of patient care, impacting approximately 70 percent of medical decisions. Because of the significance of laboratory tests, ordering clinicians must have adequate coverage of laboratory diagnostic principles and theory during their medical education.

Objective: This study aims to evaluate the amount of medical laboratory material in Rush University's medical, advanced practice registered nurse (APRN), and physician assistant (PA) programs as well as who is presenting this material. Where there is room for improvement, an intervention method will be proposed.

Methods: A list of course objectives was collected from each program. The number of medical laboratory science (MLS) related objectives were counted. Nutrition related objectives were counted as well, in order to compare with another discipline taught at Rush. A list of faculty members who teach this material and their credentials was also compiled and evaluated.

Results: Of the 3,979 objectives for the Rush Medical College, 144 (3.6%) were explicitly MLS related and 50 (1.3%) were nutrition related. These objectives were integrated throughout multiple courses. The APRN and PA programs had a distinct class that covered diagnostics. The diagnostic course for the APRN and PA programs was the only course evaluated. The APRN diagnostic course listed 7 course objectives, and 7 (100%) were MLS related, while 0 (0%) were nutrition related. Finally, the PA diagnostic course had a total of 63 course objectives, 34 (54.0%) of which were MLS related and 0 (0%) were nutrition related. The faculty within the medical college consisted of PhDs and MDs, while the faculty administering the content in the PA program consisted of PAs. The APRN program had primarily APRNs and Doctor of Nursing Practice (DNP) teaching their material, though the course also listed MLS, PhD, and MD as guest lecturers.

Conclusion/Significance: Laboratory material is being covered in each program, but it is rarely taught by laboratory professionals. A continuing education program is proposed that would allow MLSs to learn to effectively teach material from their discipline. By completing this educator designed program, practicing laboratorians interested in teaching could do so. That will ideally improve the teaching of MLS material in other programs.

THE EVALUATION AND MODIFICATION OF INTERPROFESSIONAL EDUCATION OF MEDICAL LABORATORY SCIENCE STUDENTS AT RUSH UNIVERSITY

Presenting Author: Morgan Lohr, MS in MLS

Co-Authors: Morgan Lohr (Rush); Maribeth Flaws (Rush), Mary Jo Guglielmo (Rush), Nadine Lerret (Rush), Jan Odiaga (Rush)

Introduction: Collaboration among healthcare professionals has been shown to decrease clinical errors, conflicts, and mortality rates, thus improving patient safety. One way to achieve a collaborative workforce is through interprofessional education (IPE). There have been several studies demonstrating the positive impact that IPE has on healthcare student's confidence and learning experience. When evaluating medical laboratory science (MLS) students' however, studies have not indicated the same benefits. At Rush University, MLS students have expressed feeling underrepresented and still did not understand their role within an interprofessional team even after participating in IPE.

Objective: We hypothesized that preparing MLS students prior to starting IPE will result in students having an improved outlook towards IPE and a better understanding of their role within interprofessional teams. We also hypothesized that changing IPE to better incorporate MLS will result in students having a better understanding of their role within interprofessional teams and feel better represented in the course.

Methods: This study was conducted at Rush University examining the MLS class of 2021 (n=15). First a presentation was provided prior to starting IPE to inform the students of the importance of collaboration in healthcare and specifically as an MLS. After reviewing preliminary data, changes were implemented to IPE workshops to better represent MLS. To assess the students' attitudes towards these changes, surveys were conducted over three different time periods.

Results: After being given the presentation, there was a 13% increase in the number of students who understood their role within an interprofessional team. Students also felt that their self-confidence increased and had a more open mindset going into IPE. After participating in IPE, 71% of the MLS students felt well-represented and were confident that other students understood their role.

Conclusion/Significance: From the results, MLS students felt more confident, knowledgeable, and were openminded going into IPE. The changes made throughout this study increased MLS students understanding of the role they have within interprofessional teams and increased their representation within IPE. However, there are still more changes needed to be made within IPE in order to better reflect the diversity of healthcare professions and their role on the interprofessional team.

EVALUATING UNCONSCIOUS BIAS REDUCTION IN THE 'HEALTH EQUITY AND SOCIAL JUSTICE' FOUR-YEAR PROGRAM

Presenting Author: Rishi Jaswaney, Medical

Co-Authors: Rishi Jaswaney, RUMC M2 Elizabeth Davis, RUMC, MD Amy Napleton, RUMC M2

Introduction: In 2017, one medical student and Rush faculty created the Health Equity and Social Justice Leadership elective, designed to enrich students' knowledge and skills while integrating them into local community work focused on health equity. The elective instills a real understanding of the pillars of social medicine by exposing students to the different neighborhoods, community groups, and nonprofit organizations of Chicago. The success of the elective over the past two years has positioned Rush to expand the program into a four-year longitudinal program.

Objective: We propose to develop a comprehensive curriculum within the four-year elective focused on unconscious bias in medicine along with an evaluation tool to assess unconscious bias over the four years, tracking student progress and recognizing a greater impact of the new curriculum.

Methods: A series of healthcare specific cases were developed related to unconscious bias. These scenarios are intended to prepare students to notice and navigate unconscious bias when it presents itself during the clinical years and beyond. For each case, medical students will be tasked with making decisions regarding patient-provider interactions, treatment decisions, treatment adherence, and expected health outcomes. Once developed, the set of strategies and evaluation tool will be compiled into a single product for dissemination.

Results: The unconscious bias curriculum was piloted in the first session of the M2 Health Equity course. The two-hour session required students to reflect on their own personal experiences with bias in medicine, respond to questions regarding Implicit Association Tests (IAT), navigate cases, and develop interventions to address bias. Results from evaluations are being compiled and will be analyzed after these sessions have been repeated with future cohorts.

Conclusion/Significance: In a cross-sectional study of health care professionals across the US, results showed that implicit bias was significantly related to patient-provider interactions, treatment decisions, treatment adherence, and patient health outcomes. Unconscious bias manifests not only in the relational component of the patient-provider interaction, but also with the administration of treatment regimens. Ultimately, this curriculum will provide a concrete medium to encourages students to look inward and confront realities regarding their unconscious biases at the earliest stage in their medical training.

SEVERE THROMBOCYTOPENIA PREDICTS LOWER SURVIVAL RATE AND HIGHER TRANSPLANT RATE IN PATIENTS WITH LIVER CIRRHOSIS**Presenting Author:** Andrew Moore, MD**Co-Authors:** Andrew Moore (Rush), Donald Jensen (Rush), Nancy Reau (Rush)**Introduction:** Thrombocytopenia (TMP) is often seen in patients with chronic liver disease and cirrhosis. We hypothesized that severe TMP would have a significant impact upon survival.**Objective:** Since the current MELD-Na score does not factor TMP, we sought to compare 'marked' (25K-50K) and 'severe' (<25K) TMP with MELD-Na score and 90 day survival.**Methods:** A retrospective study was conducted and identified 131 patients between 7/1/2016 and 7/1/2018 with a diagnosis of cirrhosis and platelet count < 50K. Patients were then divided as 'marked' TMP or 'severe' TMP based on the lowest platelet count. Age, BMI, sodium, creatinine, total bilirubin, INR, hemoglobin, and white blood cell count at the time of the lowest platelet value were also recorded and compared. Mortality between the two groups was compared using Kaplan-Meier curves, and survival models were created using multivariate proportional hazard models with an endpoint of death/transplant at 90 days.**Results:** Of the 131 patients identified with a platelet count of <50K, 107 were included in the study (24 were excluded; 6 received transplant prior to lowest platelet count and 18 were lost to follow-up at 90 days). 74 were identified as 'marked' TMP and 33 were identified as 'severe' TMP. In the 'marked' TMP group, there were 22 deaths (29.7%) at 90 days, while in the 'severe' group there were 23 deaths (69.7%) at 90 days (HR 2.56, 95% CI 1.87-3.24, P = 0.0078). In the <25K group, 3 patients (9.1%) had a transplant prior to 90 days. In the 25-50K group, one patient (1.4%) underwent transplant prior to 90 days. The survival rate between the two groups at 90 days was statistically significant (P < 0.0001). MELD-Na score was not significantly different between the two groups (21.84 vs 23.61, P = 0.12).**Conclusion/Significance:** Despite similar MELD scores, patients with severe TMP had a significantly decreased survival probability and higher rate of transplant at 90 days. Platelet count was a better predictor of mortality than MELD score among this subgroup of patients.

SAFETY OF HIGH-VOLUME, DOSE-ESCALATED SINONASAL MOMETASONE IRRIGATION IN REFRACTORY CHRONIC RHINOSINUSITIS

Presenting Author: Hannah Brown, BS

Co-Authors: Hannah Brown (RMC); Mike Eggerstedt (RUMC); Pete Batra (RUMC); Bobby Tajudeen (RUMC)

Introduction: Medically refractory chronic rhinosinusitis (CRS) is treated with functional endoscopic sinus surgery (FESS) and subsequent steroid administration. While budesonide is the current first-line high-volume intranasal steroid irrigation additive for this indication, mometasone has a superior pharmacokinetic profile. However, its safety and efficacy at higher concentrations for treating refractory CRS following FESS has yet to be explored.

Objective: To evaluate the potential for hypothalamic-pituitary-adrenal (HPA) axis suppression by high-volume, dose-escalated mometasone nasal irrigations in the treatment of patients with CRS following FESS.

Methods: Patients were recruited from a tertiary level rhinology clinic between June 2018 and August 2019. Inclusion criteria were as follows: 1. Adult (>18 years); 2. CRS diagnosis; 3. Previous FESS; 4. Normal pre-treatment morning cortisol level, 5. Minimum of twice daily high-volume sinonasal mometasone irrigations (concentration 2 mg per irrigation; total daily dose of 4mg); 6. 12-week duration; 7. Post-treatment morning cortisol value measured a maximum of two weeks after treatment. Patients with the potential for endogenous or exogenous disruption of the HPA axis were excluded.

Results: 12 patients fulfilled inclusion criteria and were enrolled in this prospective cohort study. All patients demonstrated normal pre- and post-treatment morning cortisol levels. Following an uninterrupted 12-week treatment course, no evidence of HPA axis suppression was found ($p=0.813$). No patient compliance issues or adverse effects were reported.

Conclusion/Significance: High-volume 4mg sinonasal mometasone irrigations did not cause HPA axis suppression in a representative sample of patients with CRS post-FESS. Mometasone is a safe steroid to use in this patient population.

BILOTHORAX: AN UNCOMMON COMPLICATION FOR A COMMON PROCEDURE**Presenting Author:** Agnieszka Maniak, MD**Co-Authors:** Camille Hawkins, MD (RUMC)

Introduction: Bilious pleural effusion, termed bilothorax, is a rare type of exudative pleural effusion. It is most commonly seen as an isolated right-sided pleural effusion, and case reports describing etiologies range from sequelae of liver transplant¹, direct biliary-pleural fistula formation from biliary stent migration², biliary manipulation with subsequent biliary peritonitis and pleuritis^{3,4}, and more. Our patient developed bilateral bilious pleural effusions after percutaneous transhepatic biliary drain (PTBD) placement.

Objective: A 51 year old female with a history of sclerosing cholangitis status post biliary stent placement ten days prior presented with abdominal pain and vomiting. Imaging showed stent malpositioning, and PTBD was placed; she clinically improved and was discharged home.

Methods: n/a

Results: One week later, she returned with abdominal pain and dyspnea. She was hemodynamically stable. Labs showed alkaline phosphatase 253, ALT 21, AST 63, total bilirubin 7.5, and WBC of 6.4K. CT scan of abdomen/pelvis with contrast revealed a properly positioned biliary drain and trace fluid in the falciform ligament. Her chest x-ray showed bilateral pleural effusions, worse on right (figure 1). Right-sided thoracentesis yielded 1 liter of green exudative fluid notable for bilirubin of 7.4mg/dL, consistent with bilothorax (figure 2). She was treated with ceftriaxone and metronidazole for seven days for bile pleuritis. Given the concern for a biliary-pleural fistula, a cholangiogram was performed, which showed a patent common bile duct draining into duodenum. The PTBD was removed without recurrence of her pleural effusion; her dyspnea and abdominal pain improved.

Conclusion/Significance: PTBD placement is a fairly common procedure. Common complications of PTBD are bleeding and tube dislocation⁷. The safety profile of PTBD is not benign; it has more complications than ERCP or EUS-guided biliary drainage⁵ for malignant obstruction. Bilothorax, although rare, does occur after PTBD placement, as shown in this case. Thus, bilothorax should be considered for a patient with recent biliary manipulation and abdominal pain or dyspnea. Bilothorax is a life threatening condition, as bile salts can cause chemical pleurodesis and infection,⁸ and has even progressed to ARDS and death³. Timely recognition, investigation, and treatment with thoracentesis and removal of PTBD are essential for avoiding further complications of bilothorax.

CIRCADIAN MISALIGNMENT IN INFLAMMATORY BOWEL DISEASE IS ASSOCIATED WITH A MORE AGGRESSIVE DISEASE PHENOTYPE, INCREASED INTESTINAL PERMEABILITY, AND DYSBIOSIS

Presenting Author: Nicole Kochman, BA

Co-Authors: Garth R. Swanson (RUMC), Nicole Kochman (RUMC), Vijit Chouhan (RUMC), Wesley Yim (RUMC), Maliha Shaikh (RUMC), Shohreh Raeisi (RUMC), Erika Davis, Laura Tran (RUMC), Phil Engen (RUMC), Ankur Naqib (RUMC), Jaimin Amin (RUMC), Ali Keshavarzian (RUMC)

Introduction: Patients with inflammatory bowel disease (IBD) - Crohn's disease (CD) and ulcerative colitis (UC), have poor sleep quality. We recently reported that a later chronotype of the circadian clock was associated with worse IBD specific outcomes.

Objective: The goal of this study was to determine if circadian misalignment is associated with markers of subclinical inflammation.

Methods: Total of 47 patients with inactive but biopsy-proven CD or UC participated in this prospective cohort study. Subjects were defined as having an aggressive IBD disease history (AGG) [steroid dependence, use of biologic/immunomodulator, and/or surgery] or non-aggressive history (NON). Participants completed a demographic form and validated disease activity index - Harvey-Bradshaw Index (HBI) or modified HBI. Subsequently, participants did two weeks of wrist actigraphy followed by measurement of intestinal permeability and stool microbiota. Wrist actigraphy was used to calculate markers of circadian misalignment (CM) by rest-wake activity - interdaily stability (IS), intradaily variability (IV), and relative amplitude (RA). All statistics were done in R version 3.5.3.

Results: By disease history, AGG IBD had a decrease in IS (\uparrow CM) compared to NON IBD at 0.41 ± 0.12 vs 0.50 ± 0.15 ($P < 0.05$). There was not a significant difference in IV or RA by IBD disease history. Increased intestinal permeability and increased TNF- α levels correlated with an increase in IV (\uparrow CM) at $R=0.35$, $P < 0.05$ and $R=0.37$, $P < 0.05$, respectively. Analysis of intestinal microbiota showed a significant decrease in anti-inflammatory commensal taxa bifidobacterium longum and odoribacter splanchnicus with increased CM in both UC and CD.

Conclusion/Significance: Increased intestinal permeability, inflammatory cytokines, and changes in intestinal microbiota are established risk factors for a disease flare in IBD. Different components of circadian misalignment were associated with a more aggressive IBD disease course, increased intestinal permeability, increased pro-inflammatory cytokines, and decreased anti-inflammatory and short chain fatty acid producing microbiota suggesting alterations in circadian rhythms could be a risk factor for a disease flare in IBD. Further prospective controlled studies are needed to establish circadian misalignment as risk factor for disease flare in IBD, and determine the mechanisms through which alterations of the central and peripheral circadian rhythms disrupt intestinal barrier homeostasis.

THE IMPACT OF THE INTESTINAL MICROBIOME ON MICROGLIAL INFLAMMATION

Presenting Author: Dulce M. Frausto, Bachelors in Science

Co-Authors: Dulce M Frausto, Christopher B. Forsyth, Ali Keshavarzian, Robin M Voigt-Zuwala (Rush)

Introduction: Alzheimer's disease (AD) is a devastating neurodegenerative disorder associated with aging. While genetics have been shown to be important in the development of AD, environmental and lifestyle factors contribute significantly to the development and progression of AD. It is proposed that microglial inflammation leads to neuronal dysfunction in the brain and may be a driving factor promoting the development of AD. Although microglial inflammation increases with age, there are a number of lifestyle factors that can promote and/or ameliorate microglial dysfunction. These lifestyle factors include established modulators of the intestinal microbiota community structure and function, one of which is alcohol. Chronic alcohol consumption is associated with a greater risk of all types of dementia, especially vascular dementia and AD. Recently, alcohol has been found to promote AD progression in both animal and human studies. We propose alcohol influences microglial inflammation and dysfunction via a mechanism including secreted bacterial products.

Objective: The objective of this study is to investigate the ability of bacterial-derived products to influence microglial gene expression and inflammation. Specifically, we investigated the ability of bacterial products to influence alcohol-induced microglial activation.

Methods: In this study, microglia with and without alcohol exposure will be treated with supernatant from bacteria that are known to be altered following alcohol consumption or shown to be beneficial in blunting inflammation. Microglia will be analyzed for NLRP3 inflammasome activation and IL-1 β production.

Results: The results of this study demonstrate that secreted bacterial products modulate alcohol-induced microglia activation including NLRP3 and IL-1 β .

Conclusion/Significance: The proposed research is significant because it suggests that bacteria found in the mammalian intestine can influence microglia in the brain and therefore may critically influence neurodegenerative disease such as AD. Identification of the intestinal microbiota as a factor that promotes microglial inflammation and dysfunction will lay the groundwork for the development of therapeutic approaches that target the microbiota (i.e., consumption of prebiotics or probiotics) to prevent and treat age-associated diseases, such as AD.

THE DEEP NASAL MICROBIOTA IN PARKINSON'S DISEASE

Presenting Author: Vivian Ramirez, IBS MS

Co-Authors: Vivian Ramirez (Rush); Ankur Naqib (Rush); Phillip A. Engen (Rush); Stefan J. Green (UIC); Gian Pal (Rush); Maliha Shaikh (Rush); Christopher B. Forsyth (Rush); Ali Keshavarzian (Rush)

Introduction: Parkinson's disease (PD) is a neurodegenerative disease that affects over 6 million people world-wide and is expected to rise to 8.7-9.3 million people by 2030. PD cause is still unknown, however aggregates of α -synuclein protein within dopaminergic neurons of the substantia nigra (SN) of PD subjects may be one critical driver of neuron loss, ultimately leading to rigidity, bradykinesia, and resting tremor. About 95% of PD patients experience early dysfunction of non-motor symptoms including the olfactory system, causing loss of smell (hyposmia). Increasing evidence supports the nasal cavity may be a potential route of entry for toxins/organisms in PD, causing alterations in the nasal microbiome and inflammation, possibly leading to the formation of SN α -synuclein aggregates.

Objective: To investigate whether the nasal microbiome may play a role in PD pathogenesis, we compared the deep nasal sinus microbiota of healthy and PD subjects. Additionally, to evaluate whether environment can play an additional role in PD progression, we also analyzed nasal microbiota of healthy household controls living with the 11 PD subjects.

Methods: Bacterial composition of the deep nasal samples from 30 PD patients and 32 healthy controls (including 11 spousal controls), were assessed by 16S V1-V9 r-RNA amplicon sequencing. Differential analysis and PD clinical characteristics related to demographics, olfactory function, motor severity, and PD progression were analyzed in relation to the nasal microbiome composition using univariate and multivariate analysis.

Results: Differential abundant nasal microbes such as *Ralstonia insidiosa* and *Moraxella catarrhalis* were observed in PD compared to healthy controls. Univariate analysis and multivariate analysis confirmed a higher relative abundance of Proteobacteria in accordance with a reduction in olfactory function and a higher severity of motor severity. Household subjects shared more nasal microbiota in comparison to non-household subjects. Significantly, PD subjects still had differential abundant nasal microbes than their household partner such as *Moraxella catarrhalis*.

Conclusion/Significance: Our study reveals differential abundance of nasal microbiota in PD, healthy controls and spousal healthy controls and supports a role for nasal microbiome as a potential player in PD pathogenesis. Data from these studies could therefore provide new microbiota-based avenues and biomarkers to assess and or treat PD patients.

CHRONOTHERAPY IN INFLAMMATORY BOWEL DISEASE

Presenting Author: Hannah Raff, BA

Co-Authors: Hannah Raff, Mary Biglin, Erika Carrasquilla, Thayer Hamoudah, Faraz Bishehsari, Ali Keshavarzian, Garth Swanson (Rush)

Introduction: Azathioprine (AZA), a prodrug of 6-mercaptopurine (6-MP), is effective in treating inflammatory bowel disease (IBD), but is often discontinued due to side effects including bone marrow and liver toxicity. Relative levels of AZA/6-MP metabolites, 6-thioguanine (6-TG) and 6-methylmercaptopurine (6-MMP), are correlated with medication efficacy and toxicity. Chronotherapy has been successfully used to optimize treatment of hyperlipidemia and rheumatoid arthritis, but has yet to be evaluated in IBD.

Objective: Our goal was to determine if altering AZA/6-MP timing could improve metabolite levels, and if improvement was dependent on host's circadian rhythms.

Methods: This was a single center, 10 week prospective crossover trial involving 26 subjects with inactive IBD on a stable dose and time of AZA or 6-MP therapy. Metabolite levels were measured at baseline before switching to the opposite delivery time (6AM-12PM or 6PM-12AM). Subjects completed a Munich Chronotype Questionnaire before intervention and the Harvey Bradshaw Index (HBI) or modified HBI before and after intervention. The Wilcoxon Signed Ranks Test and Hotelling two sample F test were used for comparison of the repeated measures.

Results: Amongst 26 subjects, 20 subjects had Crohn's disease and 8 subjects had ulcerative colitis. Comparing AM to PM, 6-TG was 225.7 ± 155.1 vs 175.0 ± 106.9 ($p < 0.01$) and 6-MMP was 825.1 ± 1023.3 vs 2395.3 ± 2880.3 ($p < 0.01$). Eighteen subjects (69%) had better metabolite profiles in the morning in addition to an earlier chronotype by corrected midpoint of sleep (MSFc) compared to those with optimal PM dosing (2:34 vs 3:42; $F=4.2$, $p < 0.05$). No subject had a disease flare or significant change in white blood count or liver function tests during the study.

Conclusion/Significance: In most subjects, morning dosing of AZA/6-MP significantly increased 6-TG levels and decreased 6-MMP levels, which should increase efficacy and decrease side effects. The host's chronotype may help determine optimal timing of AZA/6-MP. Circadian regulation of thiopurine methyltransferase (TPMT) activity is the likely cause of these differences, and future studies should examine the role of chronotherapy in IBD to optimize treatment.

SINGLE-ARM, NON-RANDOMIZED, TIME SERIES, SINGLE-SUBJECT STUDY: FECAL MICROBIOTA TRANSPLANTATION IN MULTIPLE SCLEROSIS

Presenting Author: Phillip Engen, BA, MS

Co-Authors: Phillip Engen (Rush), Antonia Zaferiou (Stevens Institute of Technology), Heather Rasmussen (U of Nebraska-Lincoln), Ankur Naqib (Rush), Louis F. Fogg (Rush), Stefan J. Green (UIC), Christopher B. Forsyth (Rush), Ali Keshavarzian (Rush)

Introduction: There is emerging evidence that commensal microbiota has a role in the pathogenesis of multiple sclerosis (MS), an autoimmune disease of the central nervous system. Recent studies of both MS humans and experimental autoimmune encephalomyelitis, an animal model of MS, have shown the gastrointestinal microbiota is increasingly being seen as an important environmental risk factor modulating the host's immune and nervous system function. These animal and human 'microbiota-immunity' regulation data provide scientific rationale for microbiota-directed intervention, like fecal microbiota transplantation (FMT), for a therapeutic potential treatment of MS.

Objective: This study aimed to determine if FMT would significantly alter the MS subject's overall microbial diversity, community structure, and functional gene pathways to promote the growth of beneficial short-chain-fatty-acids (SCFA)-producing bacteria.

Methods: This single-arm, non-randomized, time-series, single-subject study evaluated the FMT interventions (administered outside the United States) effects with a Relapsing-Remitting-MS (RRMS) subject over the course of one year. Biological samples and clinical data were collected at six time points during the longitudinal study. Primary outcomes measured shotgun metagenomics to determine the impact on the RRMS subject's fecal microbiome biodiversity, community structure, and functional gene pathways across time. Secondary outcomes measured fecal targeted SCFA metabolomics, blood markers of systemic inflammation and brain-derived-neurotrophic-factor plus gait metric activity, MS walking scores, along with gastrointestinal, diet, and sleep questionnaires. This trial is registered with ClinicalTrials.gov: NCT03975413.

Results: The RRMS subject data indicated significant increased shifts across time in both bacteria and fungi alpha-diversities, abundances of SCFA butyrate-producing bacterial species *Faecalibacterium prausnitzii* and *Eubacterium rectale* and abundances of both SCFA and metabolic functional gene pathways, plus elevated SCFA metabolites across time. In addition, the RRMS subject indicated significant improvement in gait metrics, MS walking scores, brain-derived-neurotrophic-factor production, inhibited inflammation progression, and enhanced sleep/rest over time.

Conclusion/Significance: In this proof-of-concept study, this is the first clinical trial examining a number of new primary and secondary outcome measures across time to determine if FMT improved or alleviated MS symptoms. Additional clinical trials of larger sample size will be needed to study the potential of FMT for the treatment of MS and to examine the long-term effects.

MECHANISM FOR INTESTINAL MICROBIOME, LPS, and NLRP3 MICROGLIAL ACTIVATION IN PARKINSON'S DISEASE

Presenting Author: Aeja Jackson, B.S. and M.S.

Co-Authors: Aeja Jackson (RUMC), Christopher B. Forsyth (RUMC), Maliha Shaikh (RUMC), and Ali Keshavarzian (RUMC)

Introduction: Parkinson's disease (PD) is the second most common neurodegenerative disease. PD patients suffer from substantia nigra (SN) neuroinflammation and dopaminergic neuronal loss, but the cause is unknown. Abnormal alpha-synuclein (α -syn) protein preformed fibrils (PFF) aggregation in SN neurons has been implicated in promoting neuroinflammation in PD. Over 80% of PD patients also exhibit non-motor symptoms such as gastrointestinal dysfunction, olfactory dysfunction, and sleep disorders, which precede motor symptoms by years. PD patients display a dysregulated microbiome and an increase in intestinal permeability. Currently, it is unclear why PD patients experience gastrointestinal dysfunction years before the onset of motor symptoms, and if the systemic release of intestinal-derived microbial products, such as lipopolysaccharide (LPS) and lipoteichoic acid (LTA) contributes to neuroinflammation. Recent studies in multiple PD models support a key role for microglial NOD-, LRR- and pyrin domain-containing protein 3 (NLRP3) inflammasome activation in PD neuroinflammation. LPS is an activator of NLRP3 by a two-step process that results in the activation and release of the pro-inflammatory cytokines interleukin (IL)-1 β and IL-18.

Objective: Investigate mechanisms of NLRP3 activation in microglial cells

Methods: Primary mouse microglia and the SIM-A9 murine microglia cell line were treated with increasing doses of LPS and LTA alone and in combination with DAPT (a Notch1 inhibitor) and/or α -synuclein pre-formed fibrils (PFF). Outcome measures included western blot analysis, immunostaining, and PCR analysis.

Results: PFF and LPS, but not LTA, induced a dose-dependent increase in NLRP3, Notch1, and MHC-II in SIM-A9 cells. There was an LPS-induced increase in pro-IL-1 β , the inactivated form of IL-1 β . NLRP3 activation was also measured by the presence of the cleaved activated form of IL-1 β . NLRP3 activation (measured as IL-1 β activation) was blocked by pretreatment with the DAPT Notch1 inhibitor.

Conclusion/Significance: Initial LPS-induced microglia activation was measured with increased NLRP3 inflammasome, Notch1, and pro-IL-1 β protein expression. LPS stimulation also resulted in the second step of NLRP3 activation and IL-1 β activation that was Notch1 dependent. The decrease in total as well as active IL-1 β expression/activation when Notch1 was inhibited, tells us that Notch1 has a key role in promoting NLRP3 inflammasome activation in microglial cells.

PERIPHERAL GASTROINTESTINAL CIRCADIAN DISRUPTION ASSOCIATED WITH COLITIS SEVERITY IN RODENT MODEL

Presenting Author: Sarah Jochum, MD

Co-Authors: Sarah B. Jochum MD (Rush); Maliha Shaikh MS (Rush); Sherry Wilber (Rush); Frank Ko PhD (Rush); Zoe Post MD (Rush); Dana M Hayden MD, MPH (Rush); Robin Voigt PhD (Rush); Christopher Forsyth PhD (Rush); Ali Keshavarzian MD (Rush); Garth R Swanson MD, MS (Ru

Introduction: Inflammatory bowel disease (IBD) is a chronic condition that is worsened by a variety of factors, including disrupted circadian rhythms. Central circadian disruption has been associated with more severe colitis; however, the effect of disrupted peripheral circadian rhythms of the colon yet to be studied in IBD models.

Objective: We hypothesize that disruption of the circadian clock by knocking out a key circadian gene, BMAL1, in the colon epithelium is sufficient to promote and worsen colitis pathology in a rodent model of dextran sodium sulfate (DSS) colitis.

Methods: TS4Cre and TS4Cre-BMAL1lox (cBMAL1KO) mice were given 5 days of 2% DSS. Disease activity index (DAI), colon length, mortality, and myeloperoxidase (MPO) were measured and compared to non-DSS mice. DAI was defined by percent body weight loss, stool consistency, and hematochezia. Colon length was reported as percent difference from non-DSS mice per mouse group.

Results: 20 TS4Cre mice and 20 cBMAL1KO mice were included in the experiment. All mice were 5-7 weeks old. The DAI for TS4Cre mice was significantly lower than that of cBMAL1KO mice on days 4-7 ($p < 0.05$), as seen in Figure 1. In examining the individual components of the DAI, there were no significant differences in daily weight loss, however, cBMAL1KO mice had more severe diarrhea and on cBMAL1KO mice had worse hematochezia ($p < 0.05$). cBMAL1KO mice had more colon shortening compared to TS4Cre mice ($p = 0.03$). The mean percent difference for TS4Cre mice with DSS compared to non-DSS was $87.46 \pm 9.03\%$ ($p < 0.01$), and for cBMAL1KO mice with DSS compared to non-DSS mice was $70.97 \pm 23.3\%$ ($p < 0.01$) (Figure 2). The mortality rate for cBMAL1KO mice (7/14, 50%) was significantly lower than that of TS4Cre mice (0/9) who received DSS ($p = 0.01$).

Conclusion/Significance: Mice with disrupted colon circadian rhythms but a normal central circadian clock in an IBD model developed worse colitis and increased mortality. Further investigation needs to focus on the impact of colonic circadian rhythms in IBD and into the mechanisms through which the circadian clock controls colonic barrier homeostasis. The results of these findings may allow for novel targets in the treatment of IBD.

A CASE REPORT ON A BASEBALL-SIZED LIVER MASS

Presenting Author: Priya Patel, MD

Co-Authors: Priya Patel, MD; Megan Kraemer, DO; Paul Severin, MD

Introduction: Entamoeba histolytica infections are uncommon in the United States, but cause approximately 100,000 deaths annually worldwide.

Objective: To describe a case of possible amebiasis in a pediatric patient.

Methods: A 5-year-old male with a history of asthma, eczema, ADHD and behavioral issues presented with fevers for 5 days, emesis, anorexia, oliguria, and right upper quadrant abdominal pain. Labs demonstrated leukocytosis, normocytic anemia, transaminitis, hypoalbuminemia, and hyponatremia. Urinalysis was notable for proteinuria, ketonuria, and increased urobilinogen. An abdominal ultrasound demonstrated a 'complex, heterogenous avascular lesion measuring 8.2 x 6.2 x 7.3 cm' consistent with an abscess and a chest x-ray demonstrated elevated right hemidiaphragm with a right-sided pleural effusion. Blood culture, stool culture, HIV, tuberculosis, ova and parasite, and Bartonella hensalae screenings were negative. The abscess fluid culture grew Aggregatibacter species and Fusobacterium nucleatum. The initial E. histolytica screen was equivocal; however, the repeat was positive, suggesting current or previous infection. His stool E. histolytica antigen was negative and biopsy of the abscess wall was negative for any parasites or fungi with PAS and trichrome stains.

Results: He underwent surgical drainage and was treated with IV Zosyn before transitioning to oral antibiotics. It remains unclear if the abscess was caused by E. histolytica or the oral flora that grew on the original cultures.

Conclusion/Significance: There is a bimodal distribution of amebiasis with most cases occurring between ages 2-3 years and then after age of 40. Most infected individuals are asymptomatic, although they may shed cysts in their stool for years, which are then ingested by subsequent hosts and become trophozoites in the colon. Intestinal disease may manifest with bloody diarrhea, necrotizing enterocolitis, toxic megacolon or an ameboma. Extraintestinal disease includes, but is not limited, to hepatic abscesses, brain abscesses, or cutaneous amebiasis. Hepatic abscesses, particularly located in the right lobe, are the most common extra-intestinal manifestation. The gold standard for diagnosis is visualization of trophozoites on biopsy of the abscess wall. Although amebiasis and hepatic abscesses are not frequently encountered in clinical practice, it is important to include such diagnoses on the differential for fevers and abdominal pain.

EFFECT OF A SLEEP/CIRCADIAN FRIENDLY PROTOCOL ON THE OUTCOMES OF PATIENTS ADMITTED TO THE MEDICAL INTENSIVE CARE UNIT: A RANDOMIZED CONTROL TRIAL

Presenting Author: Joseph Morrow, Bachelors of Science

Co-Authors: Joseph A. Morrow (RUMC); Connor J. Wakefield (RUMC); Fadi Hamati (RUMC); Gabriella Sanzo (RUMC); Sarah J. Peterson (RUMC); Robert A. Balk (RUMC); Helen J. Burgess (U Mich); Garth A. Swanson (RUMC); Ali Keshavarzian (RUMC)

Introduction: Critically ill patients often suffer from fragmented sleep due to light and noise in the intensive care unit (ICU).

Objective: We investigated whether placing patients in a sleep/circadian friendly protocol improved patient-reported sleep quality and ICU outcomes.

Methods: Patients were included if they were expected to have a >24-hour stay. Exclusion criteria included age <18 years, pregnancy, frequent overnight assessments, poor prognosis, pre-existing cognitive impairment, and severe psychological disorders. Patients were randomized to a sleep/circadian protocol or control protocol. Demographic, treatment, sound (dB), light (lux), patient-reported sleep, and medical outcomes were collected. Those who were not maintained in the sleep/circadian protocol were combined with the controls for statistical analysis. Univariate analysis was performed with Chi-Square test and Wilcoxon rank-sum test.

Results: Sixty-one patients were enrolled: 28 randomized to sleep/circadian protocol, 33 to control protocol. Fourteen subjects were excluded from analysis due to developing criteria for exclusion. Nine patients (median age 50 years, 6 females) maintained in the sleep/circadian protocol, 13 patients were not maintained in sleep/circadian protocol and 25 patients in control protocol (median age 64 years, 20 females). There was no difference in age, gender, or race between groups ($p > 0.05$). Median ICU first overnight dB level (10:00pm-6:00am) was 44.2 (± 2.7) for sleep/circadian protocol and 50.5 (± 4.9) for combined group ($p = 0.008$). Median ICU first overnight lux (10:00pm-4:00am) was 2.28 (± 61.3) in sleep/circadian protocol and 18.42 (± 90.9) in combined group ($p = 0.0374$). A continued stay in the sleep/circadian protocol resulted in decreased total decibel level ($p = 0.0018$), decreased total overnight lux exposure ($p = 0.0025$) and decreased reported awakenings in first night ($p = 0.0175$). There were no differences in ICU length of stay, inpatient mortality, or readmission rates between groups ($p > 0.05$). Three patients developed delirium, all originally randomized to control group.

Conclusion/Significance: We report on the successful outcomes associated with a sleep/circadian friendly protocol within a large tertiary center medical ICU which resulted in significant decreases in objectively assessed noise and light, and subjectively reported nocturnal awakenings. We continue to collect data to determine if the sleep/circadian friendly protocol should be permanently implemented in the ICU.

ESTABLISHING THE GROWTH CURVE OF CATENIBACTERIUM MITSUOKAI

Presenting Author: Laura Tran, Integrated Biomedical Science

Co-Authors: Laura Tran (RUMC), Kajal Gupta (RUMC), Ece A. Mutlu (RUMC), Garth R. Swanson (RUMC), Maliha W. Shaikh (RUMC), Christopher B. Forsyth (RUMC), and Ali Keshavarzian (RUMC)

Introduction: In the United States, 1 in 8 women have a lifetime risk of developing breast cancer. While genetic mutations are commonly associated to disease development, environmental factors such as the microbiota may play an important role. Gut microbiota are involved in metabolic activity, such as regulating circulating estrogen levels. Therefore, microbial perturbation (dysbiosis) may disrupt estrogen homeostasis and contribute to the risk of developing breast cancer. In our previous study, 16S sequencing of feces from breast cancer patients showed an increase of *Catenibacterium mitsuokai*, a gram-positive anaerobic bacterium. We hypothesize that *Catenibacterium mitsuokai* has estrogen metabolizing capabilities.

Objective: To date, there is no standard growth curve analysis on this bacterium. The purpose of this experiment is to establish the growth curve of *Catenibacterium mitsuokai*.

Methods: Growth curves were generated under anaerobic conditions using *Catenibacterium mitsuokai* broth standardized to an optical density (OD) of 0.05 at 600nm. Experiments were conducted using an anaerobic jar compared to an anaerobic chamber. Serial dilutions were performed in triplicate on agar plates at scheduled time points (0, 2, 4, 5, 6, 7, 8, 9, 10, and 12h) and incubated at 37°C for 48h. Colony forming units (CFU) were counted and calculated.

Results: Under both anaerobic conditions, the lag phase occurred between 0 to 2h. Exponential growth phase occurred between 2 to 9h. Stationary phase occurred after 9h, and the death phase began following 10h. Peak biomass occurred at 9h for the anaerobic jar and at 10h for the anaerobic chamber (4.15×10^6 CFU/mL). The average peak biomass occurred at 9h (4.12×10^6 CFU/mL).

Conclusion/Significance: There is no statistical difference between the two anaerobic culture conditions for *Catenibacterium mitsuokai*. Both growth curves were comparable, yielding similar growth phases and CFU/mL values, to characterize a standard growth curve for *Catenibacterium mitsuokai*. This data can serve as a reference for future metabolomic studies of *Catenibacterium mitsuokai*. Specifically, future studies will investigate the growth of *C. mitsuokai* in the presence of human female hormones: progesterone, and estrogens. Establishment of a role for the microbiome in breast cancer could result in new prevention and treatment strategies.

CAN UNPLANNED REOPERATION FOLLOWING COLORECTAL SURGERY BE PREDICTED?**Presenting Author:** Maribel Munoz, BA**Co-Authors:** Maribel Munoz, Sarah B Jochum, Ethan M Ritz, Dana M Hayden, Theodore J Saclarides, Anuradha R Bhama**Introduction:** Reoperation in colorectal surgery occurs at a higher rate compared to general surgery. Risk factors for reoperation have not been identified previously.**Objective:** The goal of this study is to identify preoperative and postoperative risk factors leading to unplanned reoperations after a colectomy and proctectomy.**Methods:** The ACS NSQIP Procedure Targeted Database was utilized to identify patients who underwent colectomy during 2012-2017 and proctectomy during 2016-2017. The primary outcome was risk factors associated with unplanned reoperation. Multinomial logistic regression was performed to assess preoperative and postoperative risk factors associated with reoperation.**Results:** A total of 167,641 patients were identified within the colectomy group and 8,289 patients within the proctectomy group. Only 5.3% (n=8,925) of patients in the colectomy group required an unplanned reoperation, compared to 6.1% (n=502) in the proctectomy group. The strongest risk factors for an unplanned reoperation after a colectomy were an ASA score of 5 (OR 1.803 (CI 1.443-2.252), p<0.001), emergent surgery (OR 1.494 (CI 1.381-1.616), p<0.001), preoperative renal dialysis (OR 1.35 (CI 1.13-1.614), p<0.001), and smoker status (OR 1.197 (CI 1.116-1.283), p<0.001). Wound disruption (OR 23.308 (CI 20.548-26.439), p<0.001) and anastomotic leak (OR 17.258 (CI 15.829-18.816), p<0.001) were postoperative complications predicting an unplanned reoperation following a colectomy. In the proctectomy group, the largest clinicopathologic risk factor for an unplanned reoperation was severe COPD (OR 1.72 (CI 1.046-2.829), p<0.001), emergent surgery (OR 1.589 (CI 0.827-3.051), p=0.010) and smoking status (OR 1.487 (CI 1.147-1.928), p<0.001). As seen in the colectomy group, wound disruption (OR 14.694 (CI 9.624-22.436), p<0.001) and anastomotic leak (OR 8.463 (CI 5.95-12.038), p<0.001) were the most common postoperative complication risk factors for an unplanned reoperation following a proctectomy.**Conclusion/Significance:** Multiple demographic factors and postoperative complications are associated with the risk of an unplanned reoperation following colorectal surgery. Patient factors with a higher risk of reoperation include COPD and higher ASA scores. Postoperative complications such as wound disruptions and anastomotic leak appear to be the most prevalent postoperative complications associated with reoperation. Understanding the risk factors for unplanned reoperation can contribute to preoperative patient counseling and inform surgical decision-making regarding prevention of wound disruption and anastomotic leak.

IMPROVEMENT OF INPATIENT COLONOSCOPY PREPARATION

Presenting Author: Mary Janik, BSN,MS

Co-Authors: Mary Janik RN, BSN, MS, CPAN,(Rush Oak Park Hospital); Lauren Robertson RN, BSN, MS, CGRN,(Rush Oak Park Hospital); Lauren Nourse RN, CGRN,(Rush Oak Park Hospital); and Mary Heitschmidt, RN, APN, PhD, CCRN-K,(Rush Oak Park Hospital)

Introduction: Inpatients often times have bowel preparations for colonoscopies. Many times there are a multiple of factors that affect the quality of the preparation. A unit based quality improvement retrospective chart review was completed. The results found that inpatients scheduled for colonoscopies during their stay were not appropriately prepped .This led to repeat colonoscopies for patients, increased patient length of stay, and antidotal reports of decreased patient satisfaction

Objective: Problem/hypothesis. Inpatients scheduled for colonoscopies during their hospitalization were not appropriately prepped leading to unsuccessful and repeat procedures. The purpose of this study was to determine if an educational intervention: 1. improved and optimized inpatients bowel preparation and; 2. impacted quality of bowel preparation, patient's satisfaction and understanding of bowel preparation.

Methods: Methods. Three months prior to educational intervention inpatients completed surveys to determine if appropriate colonoscopy prep was provided. Educational In-services on how to administer bowel preparation were presented to inpatient multi-disciplinary staff during the next 3 months. Post education, patients were surveyed for 9 months to determine impact of educational intervention. All surveys were completed before the colonoscopy timeout and the administration of sedation.

Results: Research Finding/Outcomes. Post educational intervention, 40 patients were surveyed. Patient's perception of education differed if they verbalized a past colonoscopy experience. Educational intervention targeting inpatient staff improved colonoscopy BBP scores and patient satisfaction with colonoscopy experience. 70% of all Medical Surgical ,ICU ,Telemetry , and Skill care RN's were educated. Reduction in cases cancelled once the procedure were started decreased to 2 cases (5%).BBPS were used 100% of the time. Decreased cancelled/incomplete colonoscopies by 22%.65% of patients that had education from both the MD and RN had the highest prep score.

Conclusion/Significance: Relevance of research. Educating inpatient providers on the necessary preparation protocol has improved inpatient care outcomes by decreasing the amount of incomplete and repeat inpatients colonoscopies and therefore may reduce health care costs.

SMOKING AS A RISK FACTOR FOR ANASTOMOTIC LEAK AFTER COMPLETION PROCTECTOMY AND ILEAL POUCH ANAL ANASTOMOSIS: AN ACS NSQIP ANALYSIS

Presenting Author: Monica Dholakia, B.S. Cell and Molecular Biology, M.S. Pharmacology

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Introduction: An anastomotic leak (AL) can be a devastating complication following completion proctectomy with an ileal pouch anal anastomosis (IPAA). Anastomotic leaks can lead to significant health costs for a patient, including mortality.

Objective: The purpose of this study is to develop a model to predict the likelihood of AL in this population.

Methods: Patients that underwent completion proctectomy with IPAA were cataloged in the National Surgical Quality Improvement Program (NSQIP) for 2016 and 2017 using CPT codes 45113 and 44211. Preoperative, intraoperative, and postoperative variables were included in a multivariate analysis performed to identify predictors of developing an AL.

Results: A total of 910 patients underwent completion proctectomy with IPAA, with 36 (3.96%) developing an AL. The majority of patients were male (57.89%). The mean age for this group was 48±6 and mean body mass index (BMI) was 26.37. The one risk factor for development of an AL was the preoperative factor of smoking (OR 3.806, (CI 1.663-8.71), p=0.0016). Race (p=0.74), sex (p=0.42), hypertension (p=0.57), diabetes (p=0.31), steroid use (p=0.13), American Society of Anesthesiologists (ASA) classification (p=0.17), and weight loss of > 10% prior to surgery (p=0.48) were not associated with anastomotic leak.

Conclusion/Significance: Anastomotic leak is a feared and potentially lethal complication of completion proctectomy with IPAA. Interestingly, operative approach, steroid use, and significant weight loss were not associated with AL. These results demonstrate the magnitude of the consequences of smoking in this population and highlight the importance of smoking cessation prior to surgery.

EVALUATING AN ASSAY FOR THE ACTIVITY OF ADAMTS-13 PROTEASE

Presenting Author: Anita Lutzow, MS in MLS

Co-Authors: Dr. Nadine Lerret, Laurie Gillard, Ricardo Sumugod, Kathleen Carmichael, Northwestern Memorial Hospital

Introduction: ADAMTS13 deficiency is a type of bleeding disorder characterized by symptoms of Thrombotic Thrombocytopenic Purpura (TTP). The pentad of symptoms includes thrombocytopenia, anemia, fever, central nervous system abnormalities, and renal abnormalities. Patients with TTP have microthrombi that form from platelets which are present in microcirculation of many organs within the body. Glycoproteins in the body are present to degrade platelets; these glycoproteins are called von Willebrand Factor (VWF). Typically, VWF is not free floating within our body because it is attached to other blood products. When VWF is found in high amounts in our bodies it is due to the deficiency of the protease, known as A Disintegrin And Metalloprotease with Thrombospondin type 1 motif, member 13 (ADAMTS13). This protease is responsible for regulating the VWF structure.

Objective: This project had two aims. 1) Validate an assay, ATS-13, at Northwestern Memorial Hospital, which is used to detect the quantitative measurement of inhibitory antibodies of the ADAMTS protease activity. 2) Compare the turn around time of the current ADAMTS13 testing, which is being done at a reference lab, to the testing that was done on site.

Methods: 20 deidentified patient platelet poor plasma samples were used on the ATS-13 Activity Assay (Immucor) which is based off fluorescence resonance energy transfer (FRET) technology. It works by measuring the energy transferred from the donor fluorophore to the acceptor fluorophore. The plasma was frozen at -70°C when received and then thawed rapidly at 37°C. The samples which are used in this project are provided by the same vendor which provides the assay.

Results: Our results indicated that the assay provides valid and accurate patient results. The assay is very sensitive and proper pipetting technique needs to be utilized. Importantly, the turn-around-time for this assay is approximately 1 hour to analyze 10 patient samples.

Conclusion/Significance: Giving both patients and providers results the same day the test is requested, rather than waiting up to a week for results from the reference lab. NMH is known for providing top quality care for their patients. Based on our results from this project, this assay should be implemented in the hemostasis laboratory.

THE FEASIBILITY OF A COMBINED LIFESTYLE PHYSICAL ACTIVITY AND COGNITIVE TRAINING INTERVENTION TO PREVENT MEMORY LOSS IN OLDER WOMEN WITH CARDIOVASCULAR DISEASE

Presenting Author: Shannon Halloway, PhD, RN

Co-Authors: Shannon Halloway (Rush), JoEllen Wilbur (Rush), Lynne T. Braun (Rush), Michael S. Schoeny (Rush), Annabelle S. Volgman (Rush)

Introduction: Prevalence of memory loss increases with age, and affects women more than men due to unique risk factors. A leading risk factor for memory loss in women is cardiovascular disease (CVD). Physical activity (PA; includes both unplanned lifestyle activities and planned exercise) and cognitive training (CT; regular cognitive activities aimed to improve specific cognitive functions) are interventions that can improve memory in healthy older adults, and when delivered together in a multimodal intervention may have synergistic effects. However, no multimodal intervention has targeted women with CVD. Existing interventions have not examined lifestyle approaches that are preferred by women and encourage long-term adherence.

Objective: The purpose of this study was to test feasibility and acceptability of the 24-week MindMoves program, a lifestyle intervention comprised of PA and CT developed for the specific needs of older women with CVD.

Methods: The PA component includes a personal PA prescription with self-monitoring using Fitbits and five behavioral group meetings. The CT component is an evidence-based program (BrainHQ) that is progressive, individualized, and delivered on a tablet with a prescription of 30 minute sessions 3 times per week. Participants were 10 women ≥ 65 years with CVD. Exclusion criteria were: clinical diagnosis or symptoms of cognitive impairment, regular weekly PA, and current CT use. Measures were: a) feasibility (recruitment, attendance, CT participation, retention, acceptability); b) change in PA (Fitbit daily minutes/steps, 2-minute walk test), and c) memory (NIH Toolbox[®] battery).

Results: Group meeting attendance was 76%, and 70% of participants attended $\geq 4/5$ meetings. Participants completed 2.3 out of 3 CT sessions per week. Participant retention was 100%. Over 90% of participants rated MindMoves with the highest levels of satisfaction and helpfulness. Though not an aim, participants had significant improvements in steps, $t(9) = 4.60$, $p = .001$, sedentary behavior, $t(9) = -5.24$, $p = .001$, light PA, $t(9) = 2.60$, $p = .029$, and moderate PA, $t(9) = 2.30$, $p = .047$ as measured by Fitbit, and there was a trend for improvement in all 3 memory measures though this did not reach significance.

Conclusion/Significance: Findings support testing MindMoves in a trial to study the effect on memory.

THE IMPACT OF A NURSE-LED HYPERTENSION EDUCATION PROGRAM FOR YOUNG ADULTS WITH UNCONTROLLED HYPERTENSION

Presenting Author: Monica Huback, BSN

Co-Authors: Monica Huback (RU), Susan Buchholz (CON), Shannon Halloway (CON)

Introduction: Uncontrolled hypertension in U.S. adults 18 to 44 years exceeds the rates of adults 45 years and older by 10%. Uncontrolled hypertension is prevalent in 30% of new patients 18 to 44 years at a Midwest primary care clinic. However, this clinic lacked a formal education program for hypertension management.

Objective: To implement a 3-month, nurse-led hypertension education program for adults 18 to 44 years of age with uncontrolled hypertension at a suburban primary care clinic in order to improve blood pressure (BP) and cardiovascular health.

Methods: A nurse-led 3-month individualized hypertension management education program was developed. The biweekly-delivered in-person/telephone program combined Life's Simple 7, the AHA's My Life Check tools, and free home BP monitors for patients 18 to 44 years with uncontrolled hypertension. Pre- and post-intervention measures included a heart health score, systolic/diastolic BP, glucose, cholesterol, weight and self-reported measures (physical activity, diet, smoking habits, confidence in monitoring own BP). Mean change in scores for pre- and post-tests was assessed (SPSS).

Results: The program was offered to 30 young adults with uncontrolled hypertension. Twenty-eight (93%) adults (9 females/19 males; age M = 38, SD + 3.2) completed the 3-month program. There was a 28% improvement in the heart health score ($p < .05$). Systolic BP decreased by 4% and diastolic BP decreased by 6 % ($p < .05$). Although glucose, cholesterol and weight decreased, these changes were not significant ($p > .05$). Average post-intervention minutes of weekly moderate and vigorous activity increased by 23% and 57%, respectively ($p < .05$). Significant ($p < .05$) changes were seen with improvement in fruit and vegetable, fish, and whole grain consumption, and a decrease in sugary drinks and sodium use. Smoking decreased from 11 to 8 participants. Level of confidence in obtaining self-measurement of BP improved ($p < .05$).

Conclusion/Significance: Benefits were seen with young adults with uncontrolled hypertension, with this primary care nurse-led hypertension management program. Similar benefits could potentially be achieved using this education program in other settings, which included BP self-monitoring.

THE EFFECT OF POSTTRAUMATIC STRESS DISORDER (PTSD) ON CANNABIS USE AMONG INNER-CITY WOMEN

Presenting Author: Haylee Bergstrom, B.S.

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Introduction: Posttraumatic stress disorder (PTSD) has been shown to be associated with greater odds of lifetime, current, and daily cannabis use; however, according to a large epidemiologic study, this correlation has been understudied in minority groups.

Objective: This study addresses this gap by examining if lifetime trauma is related to cannabis use among inner-city women. We hypothesize that inner-city women with higher rates of reported lifetime trauma will report greater cannabis use frequency.

Methods: Cross sectional data (N=527) from an ongoing study assessing inner-city women between the ages of 18-40 was used. Sections of the Trauma History Questionnaire (THQ) and SCID4 were used to assess history of sexual physical and emotional trauma, and severe neglect, as well as other traumatic events. These events were then added as a lifetime trauma total. Self-reported cannabis use frequency (i.e. never, rarely, monthly) was also used. Proportional odds models were used to assess the impact of trauma severity with cannabis use frequency.

Results: Study participants came primarily from minority backgrounds [288 (54.7%) black, 135 (25.6%) Hispanic, 77 (14.6%) white, and 27 (5.1%) other]. Median age was 28. More than half reported some trauma; specifically, 103 (19.5%) reported both sexual and physical trauma, 109 (20.7%) physical trauma, 90 (17.1%) sexual trauma, and 225 (42.7%) reported neither. Cannabis use was reported as follows: 253 (48.0%) never, 52 (9.9%) monthly, 71 (13.5%) weekly, and 100 (19.0%) daily. Trauma severity scores had a median [interquartile range (IQR)] of 4 (2 - 7). Each 1 point higher on the trauma severity scale was related to 1.19 [95% CI= (1.13, 1.26), p=0.003] higher odds of being in a higher category of cannabis use, independent of trauma type, age and race. There was no interaction between trauma type and trauma severity. The estimate was slightly attenuated after adjusting for age and race but remained significant.

Conclusion/Significance: These findings indicate that inner-city women with lifetime trauma are more likely to engage in more frequent cannabis use. Any factor that contributes to substance use is a significant health concern. Future studies can help improve understanding of the distinct role of minority stressors and their mechanism on health outcomes.

BINGE EATING AND DEPRESSION ARE ASSOCIATED WITH POOR DIETARY ADHERENCE FOLLOWING BARIATRIC SURGERY

Presenting Author: Aviva Ariel-Donges, PhD, MPH

Co-Authors: Aviva H. Ariel-Donges, Ph.D., MPH (RUMC), Carlysa K. Oyama, B.A. (RU), Megan M. Hood, Ph.D. (RUMC)

Introduction: Weight-loss maintenance following bariatric surgery largely depends upon adherence with specific behavioral guidelines (e.g., following a prescribed diet, engaging in physical activity). Prior research indicates that post-operative binge eating and depression negatively impact weight outcomes, yet there is limited research relating these psychological conditions to behavioral adherence after surgery.

Objective: The aim of the current study was to evaluate associations between post-surgical binge eating, depressive symptoms, and dietary adherence behaviors.

Methods: The study utilized a novel, 21-item self-report assessment of patients' adherence with post-bariatric surgery dietary guidelines over the past 30 days. Responses were rated on a 5-point Likert scale ranging from 1 ('I didn't do this or I rarely did this') to 5 ('I did this almost all of the time'). Binge eating and depression were measured using the Binge Eating Scale (range: 0-46) and Beck Depression Inventory - Second Edition (range: 0-63), respectively. Pearson and point biserial correlations were used to assess the relationship between dietary adherence (scores <3 ['non-adherent'] vs. scores >4 ['adherent']), binge eating, and depressive symptoms.

Results: Sixty-six patients (83.3% female, 45.5% White, 25.8% Hispanic/Latino, M \pm SD: 44.8 \pm 12.1 years) completed the assessment following bariatric surgery (10 \pm 6.0 months post-surgery; range: 1-30 months); 12.1% endorsed binge eating (scores >17), and 12.1% endorsed depressive symptoms (scores >14). Greater binge eating was associated with worse depressive symptoms, $r=.313$, $p=.029$. Binge eating was negatively associated with behavioral guidelines of eating: three meals daily, $r=-.482$; 1-2 snacks daily, $r=-.509$; high protein snacks, $r=-.554$; small bites of food, $r=-.521$; and stopping eating/drinking when full (or sooner), $r=-.508$, $ps<.001$. Depressive symptomatology was negatively associated with eating non-starchy vegetables daily, $r=-.458$, $p=.001$.

Conclusion/Significance: Binge eating and depressive symptoms were associated with poor self-reported adherence to specific dietary guidelines, including the key recommendations for optimizing weight-loss outcomes of regularly eating high protein/low carbohydrate meals and snacks, consuming small bites of food, and avoiding overeating. Individuals who report higher levels of binge eating and depressive symptoms after bariatric surgery may benefit from targeted behavioral interventions. Identifying correlates of dietary non-adherence allows for early intervention with those at risk for poor weight-loss outcomes.

THE SCALES OF RECOVERY: BALANCING POSTTRAUMATIC STRESS WITH RESILIENCE IN THE VIOLENTLY INJURED

Presenting Author: Annie Guedikian, BS

Co-Authors: Annie Guedikian (Rush), Eleanor Clifford (Rush), Andrew Wheeler (Cook), Leah C Tatebe (Cook, Rush), Carol Reese (Cook), Beth-Anne Jacob (Cook), Sydney Pekarek (Cook), Nandini Rajaram Siva (Cook), Erik Lisen (Cook), Victoria Schlanser (Cook, Rush), Matthew

Introduction: Community violence remains a clinical concern for urban hospitals nationwide; however, research on resilience and posttraumatic growth (PTG) among survivors of violent injury is lacking. This study intends to assess survivors of violent injury for resilience and PTG to better inform mental health interventions.

Objective: The primary aim of this study is to take an initial step in examining rates of resilience, as well as potential contributing factors, among victims of community violence.

Methods: Adults who presented with non-accidental penetrating trauma to an urban Level 1 trauma center and were at least one month, but no more than 12 months, from treatment were eligible. Participants completed the Connor-Davidson Resiliency Scale, Posttraumatic Growth Inventory (PTGI), Primary Care Posttraumatic Stress Disorder (PC-PTSD) Screen, and a community violence exposure screen. Additional demographic, injury, and treatment factors were collected from medical record.

Results: A total of 88 patients participated. The mean resiliency score was 83.2, with 71.1% scoring higher than the general population while 96.4% scored higher than reported scores of those seeking treatment for posttraumatic stress disorder (PTSD). Participants demonstrated mean PTGI score of 78 (SD 20.4) with 92.4% scoring above the significant growth threshold of 45. Additionally, 60.5% of patients screened positive for significant PTSD symptoms, approximately 8 times higher than general population. Exposure to other traumatic events was high; an overwhelming 94% of participants stated they have had a family member or a close friend killed, and 42% had personally witnessed a homicide. Higher resilience scores correlated with PTGI scores ($p < 0.001$) and lower PTSD screen ($p = 0.02$).

Conclusion/Significance: Victims of violent injury experience a myriad of traumatic events yet are highly resilient and exhibit traits of growth across multiple domains. Resiliency can coexist with posttraumatic stress symptoms. Practitioners should assess for resiliency and PTG in addition to PTSD. Further investigation is needed to clarify the relational balance between resilience and posttraumatic stress.

iCARDIA: A PHYSICAL ACTIVITY RESEARCH mHEALTH PLATFORM

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Introduction: Physical activity interventions ideally include the use of wearable physical activity monitors. Obtaining real-time physical activity data from a wearable physical monitor requires Bluetooth technology. We successfully developed and tested a database of > 250 motivational physical activity text messages, called the Text4Walking database. mHealth platforms allow for delivery and storage of data obtained via Bluetooth. When participants wear a physical activity monitor (i.e. Fitbit) researchers need a secure HIPPA compliant mHealth platform for tracking the data. Optimally, text messages should be delivered via a secure HIPPA compliant mHealth platform).

Objective: The purpose of this presentation is to: 1) Present the main features and components of iCardia, an innovative mHealth platform designed to support the remote collection of physical activity data from Fitbit wearable sensor devices, and delivery of text messages. 2) Demonstrate the application of iCardia in a Sequential Multiple Assignment Randomized Trial (SMART) to improve physical activity.

Methods: iCardia is a secure research mHealth platform that allows researchers to remotely collect different physical activity measures (e.g. steps, intensity of activity, and sedentary minutes) from registered Fitbit wearable devices. iCardia is also able to send personalized text messages to participants' cell phones through Twilio, a secure communications platform. iCardia is password-protected and hosted in a HIPAA compliant environment. iCardia is being used in the Working Women Walking clinical trial to collect Fitbit data and deliver pre-programmed text messages. A SMART design is being used to determine the most effective adaptive intervention combining four efficacious treatments (physical activity monitor, text messages, personal calls, group meetings) to increase physical activity and improve cardiovascular health among employed women who are not physically active. We have begun recruitment of 312 women (five waves), aged 18 to 70, who are employed at a large urban academic medical center.

Results: Participants in Wave One of the study (n=51) have completed 8 weeks of the intervention. Using iCardia, we have successfully recorded >2800 days of continuous Fitbit data and sent >1000 text messages.

Conclusion/Significance: iCardia is demonstrating reliability in delivering mHealth technology in a physical activity clinical trial.

REPORTED TIME-USE AROUND MELATONIN ONSET IN HIGH-SCHOOL-AGED ADOLESCENTS

Presenting Author: Kristopher Janevski, BA

Co-Authors: Kristopher Janevski, Charmane I Eastman, Stephanie J Crowley Biological Rhythms Research Laboratory, Department of Psychiatry & Behavioral Sciences, Rush University Medical Center, Chicago IL

Introduction: Older adolescents are an especially vulnerable population to insufficient sleep as pubertal changes regulating sleep coincide with early high school start times. Adolescents show heightened alertness in the evening close to the time of their Dim Light Melatonin Onset (DLMO), a marker of circadian (~24-h) timing. Around this time is when the circadian system is most responsive to light that shifts rhythms later. We examined reported activities and screen time of adolescents around the time of their DLMO.

Objective: Examine whether or not self-reported activities predict DLMO in older adolescents.

Methods: Forty-six adolescents (14.2-17.9 years; 24 females) who reported ≤ 7 h sleep on school nights and late bedtimes (school-night $\geq 23:00$; non-school night \geq midnight) slept at home on their usual school-year sleep schedule for 2 weeks. Participants reported their main activity via text message every hour from 16:00 until self-selected bedtime. After these 2 weeks, their DLMO was measured in the laboratory. We examined reported activities in the hour around the DLMO and the 2 hourly responses that followed on weeknights (Sunday-Thursday) to determine the most common activities (n=1380 responses). Logistic regression tested whether frequency of activities predicted whether a participant's DLMO fell within the earliest (n=15; 19:31 \pm 00:44), middle (n=16; 20:49 \pm 00:20), or latest (n=15; 22:29 \pm 1:15) tertile. The study was approved by the Rush University Medical Center's Institutional Review Board.

Results: Overall, reported activities that consumed the most time were cell phone use (19.5%), homework (18.3%), and watching TV (15.1%). Adolescents who reported more homework, were more likely to have a DLMO in the middle tertile compared to the earliest and latest tertiles. Cell phone use was least likely in adolescents in the earliest DLMO tertile. TV watching did not predict DLMO group.

Conclusion/Significance: Adolescents who had the earliest DLMOs spent less time on their phones when light has the greatest delaying effect. These data may indicate that light from cell phone screens may delay circadian phase in this age group. Alternatively, cell phone use may be more likely if adolescents cannot fall asleep due to a later circadian cue for sleep onset.

DO DAILY STRESSORS VARY BETWEEN HEALTHY AND CLINICAL HIGH RISK FOR PSYCHOSIS INDIVIDUALS?

Presenting Author: Briana Galindo, B.A. Psychology

Co-Authors: Briana. N. Galindo, Kristen Haut, Sarah Pridgen, Austin Lee, Christine. I. Hooker

Introduction: Stressful life events are associated with the development of many mental health conditions, including psychosis.

Objective: This study examines how daily stressors are related to symptomatology and mood in individuals at clinical risk for psychosis (CHRp) and how they differ from healthy individuals.

Methods: 81 CHRp and healthy individuals were identified using the Structured Interview of Psychosis-Risk Syndromes (SIPS). Participants completed a daily diary where they reported emotional states, stressful events or interpersonal conflicts and how stressful each event was for them.

Results: Correlation analysis was used to assess the relationship between stressful events and symptom ratings in CHRp. There was a significant association between conflicts events per-day and total symptom rating ($r = .21, p < .05$). A two-sample t-test was conducted to compare the average daily mood with and without interpersonal conflicts. There was a significant difference in daily average mood when experiencing interpersonal conflicts ($M = 2.84, SD = 0.58$) and not experiencing interpersonal conflicts ($M = 2.59, SD = 0.53$); $t(134) = 2.58, p = 0.01$.

Conclusion/Significance: These results suggest that CHRp individuals experiencing more symptomatology also report more interpersonal conflicts. These findings suggest the need for better understanding of the relationship between stressful events and CHRp individuals. Therefore, this study will also include data from healthy participants to see if CHRp individuals have more interpersonal conflicts than healthy individuals.

THE EFFECT OF ADVERSE CHILDHOOD EXPERIENCES ON THE HEALTH OF TRANSGENDER AND GENDER DIVERSE AND CISGENDER ADOLESCENTS

Presenting Author: Valerie Tobin, MS, PMHCNS-BC

Co-Authors: Kathleen Delaney, Barbara Swason, Lou Fogg

Introduction: Transgender and gender diverse (e.g. genderqueer, gender fluid, unsure of their gender) (TGD) adolescents have higher rates of adverse childhood experiences (ACEs) such as physical, sexual, and emotional abuse; domestic violence; parental incarceration; and parental mental illness than their cisgender peers. There are no studies, however, that have investigated the relationship of ACEs and mental health problems among TGD adolescents.

Objective: The purpose of this study is to determine if the relationship between ACEs and mental health problems (depression, suicidal ideation, and suicide attempt) differs based on gender identity.

Methods: This study was a cross sectional, secondary data analysis of the Minnesota Student Survey (MSS), 2016. This is a voluntary, anonymous statewide school-based survey that measures variables related to students' health. Ninth and 11th grade students were asked their gender identity (transgender and gender diverse versus cisgender). Measures included ACEs (#6 yes/no items), PHQ-2 depression (2 items range 0-6), suicidal ideation (1 item ever considered yes/no), and suicide attempt (1 item ever attempted yes/no).

Results: 80,821 ninth and eleventh graders participated in the survey with 2168 (2.7%) self-identifying as TGD. TGD adolescents ($M=1.41$, $SD=1.55$) reported significantly more ACEs than cisgender adolescents ($M=0.62$, $SD=0.004$); $t(1,950)=-22.07$, $p < .001$. Being TGD ($B = 1.39$, $p < .01$) and number of ACEs ($B = 0.47$, $p < .01$) were significantly related to depression. Number of ACEs ($OR=1.97$, $p < .001$) and being TGD ($OR=5.21$, $p < .001$) were associated with increased risk of suicidal ideation. Number of ACEs ($OR=1.98$, $p < .001$) and being TGD ($OR=4.00$, $p < .001$) were associated with increased risk suicide attempt.

Conclusion/Significance: Increasing numbers of ACEs place all students at risk for depression and suicide risk. Beyond the effect of ACEs, TGD students show higher rates of depression and suicide risk than cisgender students.

EXPLICIT AND IMPLICIT DISABILITY ATTITUDES OF HEALTHCARE PROVIDERS**Presenting Author:** Laura VanPuymbrouck, PhD**Co-Authors:** Laura VanPuymbrouck, PhD, OTR/L (Rush University); Carli Friedman, PhD (Council on Quality Leadership); and Heather Feldner, PhD, PT (University of Washington)

Introduction: Healthcare providers' (HCPs') attitudes of marginalized groups can be key factors that contribute to healthcare access and outcome disparities because of their influence on patient encounters as well as clinical decision-making. Despite a growing body of knowledge linking disparate health outcomes of ethnic/minority groups to providers' bias, less research has focused on providers' attitudes about disability. The aim of this study was to examine providers' explicit (conscious) and implicit (unconscious) disability attitudes, interactions between their attitudes, and correlates of explicit and implicit bias.

Objective: This study had four research questions: 1) What are HCPs' explicit attitudes towards disability?, 2) What are HCPs' implicit attitudes towards disability?, 3) What is the relationship between HCPs' explicit and implicit attitudes?, and, 4) What demographic factors are associated with lower explicit and implicit disability attitudes of HCPs?

Methods: We analyzed secondary data from 25,006 HCPs about their explicit (explicit questionnaire measure) and implicit (Disability Attitudes Implicit Association Test (DA-IAT) disability attitudes. We also utilized an adapted version of Son Hing et al.'s (2008) model of two-dimensional prejudice to compare HCPs' explicit and implicit attitudes. Finally, we used linear regression models to examine correlates of HCPs' explicit and implicit attitudes.

Results: While provider's explicit attitudes ($M = 4.41$) indicated little prejudice toward PWD, their implicit attitudes ($M = 0.54$) revealed they moderately preferred nondisabled people - most HCPs were aversive ableists. Correlates of HCPs' explicit and implicit attitudes included age, gender, political orientation, and having relationships with disability (friends, family, and being a PWD).

Conclusion/Significance: This study revealed a majority of HCPs self-reporting not being biased against PWD. However, when disability attitudes were explored implicitly, the overwhelming majority of HCPs were biased against PWD, suggesting in many cases HCP are not cognizant of their own biases related to disability. Significance: More research is needed to fully understand the impact of bias on PWD in healthcare contexts, as well as to determine and implement effective means of reducing bias among HCPs. This study's findings can be used to better understand how HCPs disability bias might contribute to inequitable healthcare access and health outcomes for PWD.

DESIGN SCIENCE METHODS TO ENGAGE WITH RUSH RESEARCH STUDY TEAMS

Presenting Author: Siqi Zhang, Master of Design

Co-Authors: Charlene Gamboa (RUMC), Santosh Basapur (RUMC), and Dr. Raj C. Shah (RUMC)

Introduction: Rush initiates almost 400+ clinical trials per year on an average. Research study start-up is a lengthy and complex process. Rush as a co-leader of the Institute of Translational Medicine has initiated many efforts to speed up the process of study start-up and research sustenance.

Objective: The aim is to identify barriers to research study start-up and to identify solutions to success.

Methods: Quantitative and qualitative assessments were conducted. The quantitative assessment presented insight into bottlenecks of research study start-up. Design science methods included 3 co-working design studio workshop sessions, attended by 5-6 people on an average.

Results: The quantitative assessment presented insight into bottlenecks and Qualitative data provided insight into what people do, why and how. For instance, quantitative results indicate Internal Medicine has the largest number of studies open (study counts of 1171) among all of the Rush departments (total study counts of 3665). Also, amendments take the most time for ORA's IRB team -- 56% of the IRB review at ORA is amendments related. Design sessions yielded key ideas: (1) create situational awareness about protocol (2) Create dashboard of key performance indicators of ORA along with protocol status for individual research managers and (3) Better training and (4) Better peer-peer communications platforms such as Design studios where peers come together to express issues and ideate solutions

Conclusion/Significance: Involving study teams empowers them to participate and resolve issues efficiently. Peer to peer co-working sessions work really well to facilitate camaraderie and self-help culture. Design science methods enable research teams at Rush to have a voice and consequently, feel empowered to lean in and resolve the frustrating issues. Design enables discovery and prioritization of issues as a participatory process.

PROMOTING A HEALTHY WORK ENVIRONMENT TO DECREASE WORK-RELATED STRESS

Presenting Author: Katherine Frigo, MSN

Co-Authors: Katherine Frigo, RN, MSN, CNL (RUMC), Beth A. Staffileno, PhD, FAHA (RUMC)

Introduction: Cumulative exposure to work-related stress can lead to burnout and an unhealthy work environment. With the increased awareness of the negative effects of stress, it is important to implement strategies to promote a healthy workplace.

Objective: The purpose of this initiative was to determine the impact of mechanical chair massage among registered nurses (RNs) and advanced practice providers (APPs) on perceived stress, blood pressure (BP) and heart rate (HR).

Methods: This pre-post practice initiative was conducted in an ambulatory transplant clinic. A storage closet was repurposed, cleaned and painted to create a calming environment. The massage chair was located in a secured space with refreshments and snacks. A total of 24 nurses (RNs and APPs) in the clinic were eligible to participate. An email was sent with screenshots describing the purpose of the initiative, how to use the chair and complete the pre-post measures. The massage chair was available for 15-minute cycles and could be pre-scheduled or used spontaneously in response to a stressful event.

Results: Data were collected from February 1 to October 31, 2019. Among the 110 massage chair encounters, nurses were aged 37.6 ± 7.0 and working in transplant 7.9 ± 8.3 years. There were significant decreases in systolic BP (117.3 ± 10.8 vs 111.7 ± 13.4 mmHg), diastolic BP (70.8 ± 9.8 vs 66.7 ± 10.3 mmHg), and perceived stress (4.8 ± 1.9 vs 2.8 ± 1.4), respectively $p < 0.001$. HR decreased (66.5 ± 11.5 vs 65.7 ± 11.4 bpm), although not statistically significant. Ninety-six percent of nurses used the chair with 4.7 ± 7.0 average encounters (ranging 1-30). Interestingly the majority of chair encounters were spontaneous (87%).

Conclusion/Significance: These findings suggests that providing a quiet room to relax within the clinical setting serves an opportunity to promote a healthy work environment and favorably impact BP, HR, and perceived level of stress.

CAPILLARY KETONE BODY TESTING IN THE KETOGENIC DIET

Presenting Author: Kristina Olack, MS in Medical Laboratory Science

Co-Authors: Kristina Olack (Rush University), Nadine Lerret (Rush University), Kate Letten (Rush University), Kelly Roehl (Rush University), and Christy Tangney (Rush University)

Introduction: The ketogenic diet (KD) has been advocated for a wide-range of diseases including epilepsy for seizure control and Parkinson's Disease for motor and nonmotor symptoms. In order to affirm whether an individual has achieved ketosis, both urine and capillary blood specimens were acquired before adoption of a KD and during diet days seven and eight.

Objective: The aims were as follows: 1) determine if urinary and/or blood ketone measurements reflect the ketogenic state in volunteers on a modified KD, and 2) determine if the two point of care testing (POCT) devices for blood ketones can be used interchangeably.

Methods: 19 volunteers, the majority of whom were nutrition professionals, were instructed on the KD and provided fasting blood and urine samples on day zero (normal diet), and days seven and eight (on KD). Urinary acetoacetate was measured by Siemens Labstix Reagent Strips (Malvern, PA, USA) and blood samples were analyzed for beta-hydroxybutyrate with two POCT devices, Precision Xtra (Alameda, CA, USA) and KetoMojo (Napa, CA, USA). Ketosis was defined as blood beta-hydroxybutyrate concentrations ≥ 0.5 mmol/L; urinary acetoacetate concentrations ≥ 15 mg/dL. Data were analyzed by SPSS using descriptive statistics, Spearman rank correlation and Chi Square tests.

Results: Thirteen of 19 participants (68.4%) were found to be in ketosis via both POCT devices by KD day eight. The urine however, showed only 11/19 (57.8%) participants to be in ketosis by diet day eight. The beta-hydroxybutyrate values from both devices were related on day zero, ($\rho=0.61$, $p=0.006$), day seven, ($\rho=0.94$, $p<0.0001$) and day eight, ($\rho=0.99$, $p<0.0001$). At day zero, urinary ketone concentrations correlated with those of blood via the Precision ($\rho=0.46$, $p=0.05$) and KetoMojo ($\rho=0.47$, $p=0.04$); at day seven, these coefficients were $\rho=0.85$, $p<0.0001$ and $\rho=0.80$, $p<0.0001$, respectively. At day eight, the correlations were similar: $\rho=0.86$, $p<0.0001$ and $\rho=0.84$, $p<0.0001$, respectively.

Conclusion/Significance: Both POCT devices were highly correlated and able to identify individuals who were in ketosis when the KD was adopted for eight days. Blood measurement of beta-hydroxybutyrate via the POCT devices is the preferred method over urinary acetoacetate to ascertain whether an individual is in a state of ketosis.

ENVIRONMENTAL SOUND IMAGERY AND ENVIRONMENTAL SOUND IDENTIFICATION IN COCHLEAR IMPLANT LISTENERS

Presenting Author: Breanna Corle, AuD/Clinical Doctorate

Co-Authors: Breanna Corle (Rush University), Kara Vasil (Ohio State University), Aaron Moberly (Ohio State University), Valeriy Shafiro (Rush University).

Introduction: Identification of common environmental sounds ('car honking', 'baby crying', 'waves') is a continuing challenge for many adult postlingual cochlear implant (CI) listeners, often with little improvement following implantation.

Objective: This study investigated whether CI listeners' perceived ability to imagine environmental sound is predictive of their ability to identify these sounds.

Methods: Listeners first were asked to rate in general how closely environmental sounds that they imagine resemble actual sounds. Next, they read the names of 24 individual sounds, and were asked to rate how familiar, pleasant, complex, and easy to imagine each corresponding sound was. Finally, listeners heard these sounds in a random order and were asked to identify them.

Results: Response were transformed to determine a index of how each sound's rating corresponded to its identification accuracy. Although listeners' general rating of their ability to imagine sounds did not correlate with their actual identification abilities, there were moderate to high correlations between perceived ability to imagine specific environmental sounds and identification accuracy.

Conclusion/Significance: These results indicate that environmental sound imagery can be predictive of environmental sound identification in CI listeners. It can be integrated into post CI rehabilitation to determine which sounds should be targeted and to monitor patients' progress.

BRUSH LICKING TOXICITY

Presenting Author: Christine Hoang, B.S. Forensic Science & B.A. Biology

Co-Authors: Christine Hoang (Rush University) & Nadine M. Lerret (Rush University)

Introduction: One of the shortcuts frequently used by painters is licking their brush bristle to form a point. The literature shows artists who are careless around their mediums have a higher incidence of becoming ill, yet whether or not their brushes harbor any toxic substances or pathogenic bacteria is completely unknown. Therefore, it would be beneficial and educational to discover if brush licking is toxic to the artist.

Objective: This study aims to determine whether there is risk associated with brush licking, The objectives are to determine if pathogenic bacteria and or heavy metals are present on the brushes of local artists.

Methods: We obtained 17 volunteer paint brushes and inoculated specialized collection and transport media with the brush heads (ESwab, BD Biosciences) while the volunteer filled out a qualitative de-identified survey indicating if they were a brush licker. After the brush was swirled around in the E-swab collection tube, it was then subbed to agar plates for bacteria growth analysis. Matrix-assisted laser desorption/ionization time-of-flight (MALDI-Tof) technology was used for identification. MALDI-tof is an analytic technique based on the cellular proteome of an organism routinely used in clinical laboratories. With the remaining EB-Swab media lead (3M) and arsenic (HACH) testing using commercial kits was done. The bacterial identification results from MALDI-tof and the heavy metal testing were then compared to whether or not the volunteer routinely licked their brush.

Results: From the 17 specimen ran, only one (6%) had pathogenic bacteria, *Pseudomonas aeruginosa* and interestingly this volunteer also indicating routine brush licking. The sensitivity of specificity of MALDI-tof for *Pseudomonas aeruginosa* is 96.67% and 97.87%, respectively. The remaining 16/17 (94%) had normal flora present. Importantly, the same specimen found to have *Pseudomonas aeruginosa* present also had high levels of arsenic. None of the specimen tested contained lead.

Conclusion/Significance: Results indicate there is indeed some risk associated with brush licking. However, due to the small sample size statistical significance could not be determined. Nonetheless, the lack of knowledge surrounding this subject is beneficial to explore in order to educate painters on the possible toxicities of brush licking.

TESTING MULTIDRUG RESISTANT BACTERIA WITH NEWLY APPROVED ANTIBIOTICS**Presenting Author:** Leanne Horvath, BS**Co-Authors:** Nicholas Moore Ph.D., MLS(ASCP)CM (Rush University)

Introduction: Antibiotic resistance is a major public health threat with 2.8 million infections and more than 35,000 deaths annually. The purpose of the study was to determine if minimal inhibitory concentration (MIC) and disk diffusion testing methods for 3 newly approved antibiotics yielded categorical agreement (CA).

Objective: We hypothesized that all antibiotics would yield CA between methods.

Methods: Gram-negative Bacilli (GNB) recovered from hospitalized inpatients at Rush University Medical Center were tested to determine the MIC using gradient test strips (Liofilchem, Waltham, MA) and categorical interpretation by disk diffusion (Hardy Diagnostics, Santa Maria, CA) testing according to the Clinical and Laboratory Standards Institute.

Results: We tested 154 GNB isolates against plazomicin, eravacycline, and omadacycline. Sixty-nine (45%) isolates were *Escherichia coli*, 29 (19%) were *Klebsiella pneumoniae*, 19 (12%) were *Pseudomonas aeruginosa*; the remaining 37 (24%) were other species of Enterobacterales. 93 (95%) isolates of Enterobacterales were susceptible to plazomicin (MIC_{50/90} = 0.75 /1.5 µg/mL), whereas only 2 (11%) isolates of *P. aeruginosa* were susceptible (MIC_{50/90} = 6/16 µg/mL). With omadacycline, 110 (78%) Enterobacterales were susceptible (MIC_{50/90} = 1/24 µg/mL) but only 3 (15%) *P. aeruginosa* isolates were susceptible (MIC_{50/90} = >32 µg/mL). 112 (79%) Enterobacterales isolates tested with Eravacycline were susceptible (MIC_{50/90} = 0.125/0.75 µg/mL) and 1 (5%) of *P. aeruginosa* isolate (MIC_{50/90} = 8/>32 µg/mL). In order to determine if there was categorical agreement between the MIC and KB methods, Pivot tables were constructed for each drug. With plazomicin and omadacycline, isolates were distributed into three categories: susceptible, intermediate, and resistant. 90% of isolates had categorical agreement between MIC and disk diffusion testing methods with both drugs. For eravacycline, isolates are there is only a susceptible cutoff established, and 90% of isolates tested gave categorical agreement between methods.

Conclusion/Significance: MIC and disk diffusion methods for plazomicin, omadacycline, and eravacycline did yield categorical agreement. The data shows that the majority of the organisms are susceptible, plazomicin being the most effective against multi-drug resistant Enterobacterales and omadacycline being most effective against *P. aeruginosa*.

APPROPRIATENESS OF C. DIFFICILE TESTING WITH CLINICAL SUPPORT TOOL VERSUS MANDATORY INFECTIOUS DISEASES ATTENDING APPROVAL

Presenting Author: Sonya Kothadia, MD, MPH

Co-Authors: Sonya Kothadia (RUMC); Samantha Blank (RUMC); Tania Campagnoli (RUMC); Tiffany Wiksten (RUMC); Alison Weston (RUMC); Ruth Kniuksta (RUMC); Mary Hayden (RUMC); Manya Gupta (RUMC); Brian Stein (RUMC); John Segreti (RUMC); Michael Lin (RUMC)

Introduction: In an effort to reduce inappropriate testing of hospital-onset *Clostridioides difficile* infection (HO-CDI), we sequentially implemented two strategies: an electronic health record-based clinical decision support tool (CDST) that alerted ordering providers about potentially inappropriate testing (intervention 1), replaced by mandatory ID attending approval for any HO-CDI test order (intervention 2).

Objective: We analyzed appropriate HO-CDI testing rates of both intervention periods.

Methods: We performed a retrospective study of patients 18 years or older who had an HO-CDI test (performed after hospital day 3) during 3 different time periods: baseline (no intervention, 9/2014-2/2015), intervention 1 (CDST only, 4/2015-9/2015), and intervention 2 (ID approval, 12/2017-9/2018). From each of the 3 time periods, we randomly selected 150 patients who received HO-CDI testing on the general medicine, bone marrow transplant, medical intensive care, and neurosurgical intensive care units (450 patients total). We assessed each HO-CDI test for appropriateness and compared rates of appropriateness using the Chi-squared test or Kruskal-Wallis Test, where appropriate.

Results: The median hospital day that HO-CDI testing was performed differed among the three groups: 12 days at baseline, 10 days during intervention 1, and 8.5 days during intervention 2 ($P < 0.001$). Appropriateness of HO-CDI testing increased from baseline with both interventions, but mandatory ID approval was associated with the highest rate of testing appropriateness. Reasons for inappropriate ordering did not differ among the periods, with less than 3 documented stools being the most common criterion for inappropriateness. During intervention 2, among the 33 inappropriate tests, 8 (24%) occurred where no approval from an ID attending was recorded. HO-CDI test positivity rates during the three time periods were 12%, 11%, and 21%, respectively ($P = 0.03$).

Conclusion/Significance: We found that both the CDST and mandatory ID attending approval interventions improved appropriateness of HO-CDI testing, with mandatory ID attending approval leading to the highest appropriateness rate. Even with mandatory ID attending approval, some tests continued to be ordered inappropriately per retrospective chart review; we suspect that this is partly explained by under-documentation of criteria such as stool frequency. In healthcare settings where appropriateness of HO-CDI testing is not optimal, mandatory ID attending approval may provide an option beyond CDSTs.

ATOPIC DERMATITIS SEVERITY IN PATIENTS FROM AFRICAN ANCESTRY; RESULTS OF TWO COHORTS**Presenting Author:** Kylie Jungles, Bachelors of Science (MD pending, April 2020)**Co-Authors:** Kylie Jungles (Rush), Michael Levin (University of Cape Town), Maresa Botha (University of Cape Town), Betty Andy-Nweye (Rush), Sukruthi Jois (Rush), Claudia Gray (University of Cape Town), Carol Hlela (University of Cape Town), Avumile Mankahla (Universi**Introduction:** Atopic dermatitis has been shown to be more prevalent and severe in Black children. There is a strong association between AD and the development of other atopic conditions, such as asthma and food allergy. It is unclear whether genetic, environmental, or socioeconomic factors are responsible for the severity of AD in AA children.**Objective:** We aimed to compare two cohorts of Black children with AD from different countries in order to assess how environmental factors may impact the severity of AD.**Methods:** We investigated and compared two cohorts of black toddlers (12-36 months old) with AD from South Africa (SA) and the United States (African Americans [AA]). All parents completed a standardized detailed questionnaire consisting of history of diet and feeding, atopic conditions, and a SCORAD questionnaire, which was used to calculate the severity of their AD. Children were evaluated for other atopic conditions including food sensitization.**Results:** We have enrolled 132 and 64 toddlers in the AA and SA cohorts respectively. The two cohorts had similar breast-feeding rate and duration, and age of introduction to solid foods. Although the two cohorts had a similar age and gender distribution, the SA cohort had significantly higher SCORAD scores compared to the AA cohort (mean \pm SD of 29.5 ± 25.5 vs. 14.13 ± 12.3 in SA and AA respectively; $p < 0.001$). 23.5% of the SA toddlers met criteria for severe AD compared to only 0.8% of their AA counterparts ($p < 0.001$). There was a trend suggesting more food sensitization among the SA cohort, with 30.2% of SA cohort testing positive for food sensitivity compared to 20% of AA cohort ($p = 0.08$). However, the AA cohort had significantly higher rate of wheezing disorders (13.3% in AA vs. 1.6% in SA; ($p < 0.001$).**Conclusion/Significance:** The differences in AD severity in two cohorts of Black children from different countries could be due to differences in skin care practices, environmental factors, or genetic differences between AA and SA children which calls for larger in-depth comparative studies. The increased severity of AD in SA children may contribute to skin barrier dysfunction and thus allergen sensitization, leading to a higher rate of food sensitization in SA children.

Abstract Number: 151

Disease/Immunology

Category: Infectious

SQUAMOUS CELL CANCER MIMICKING CELLULITIS

Presenting Author: Navina Birk, MD

Co-Authors: Navina Kapur Birk (Rush), Lin Cheng (Rush), Carlos Santos (Rush)

Introduction: Squamous Cell Cancer Mimicking Cellulitis- A Case Report

Objective: A 33 year old male with newly-diagnosed supraglottic squamous cell cancer presented with emesis, bloody secretions from his tracheostomy, and redness over a right neck surgical site from a recent supraglottic laryngectomy and supraclavicular local flap reconstruction with tracheostomy placement due to his malignancy. Because of his surgical history and appearance of the site, there was a concern for severe cellulitis.

Methods: A CT scan of the neck demonstrated fluid collection and soft tissue infiltrate, and he was started on broad spectrum antibiotics for treatment. The erythema continued to spread despite antibiotic administration, and serial imaging showed progression of the soft tissue infiltrate.

Results: Biopsy of the right neck was done due to progression of erythema while on antibiotics, and showed squamous cell carcinoma. This patient's clinical presentation was initially concerning for cellulitis. However, its progression on broad spectrum antibiotics led us to seek alternative diagnoses.

Conclusion/Significance: The patient had a very aggressive form of laryngeal cancer that was mimicking cellulitis. Antibiotics were stopped and he was started on chemotherapy for treatment. This case highlights the importance of keeping a broad differential when treating immunocompromised patients.

LABIAL CELLULITIS AS AN UNUSUAL PRESENTATION OF LATE, LATE-ONSET GROUP B STREPTOCOCCAL SEPSIS IN A 108 DAY OLD PRETERM INFANT

Presenting Author: Mary Elizabeth Calabrese, DO

Co-Authors: Jordan Hall MD (Rush University Children's Hospital), Mary Elizabeth Calabrese DO (RUCH), Christine Jensen MD (RUCH), Julie Wohrley MD (RUCH)

Introduction: Group B streptococcal (GBS) disease is a significant cause of morbidity and mortality in neonates and young infants. Late, late-onset GBS sepsis typically occurs at 3-4 weeks of age, presenting as bacteremia without a focus, or meningitis, particularly in preterm infants. Cellulitis in an infant greater than 3 months of age is most typically caused by Group A streptococcal disease or staphylococcal infection.

Objective: We describe a case of late, late-onset GBS bacteremia with sepsis presenting as labial cellulitis in a 108 day old preterm female.

Methods: A 108 day-old female presented to the emergency department (ED) with fever and severe labial edema. Infant was born via C-section at 27 5/7 weeks' gestation to a 26 year-old G3P1203 adequately treated GBS-positive mother with rupture of membranes at the time of delivery. Blood cultures obtained at birth revealed no growth and the infant received 48 hours of empiric treatment with ampicillin and gentamicin. The neonatal course was notable for respiratory failure in the setting of prematurity, requiring non-invasive ventilation. She was discharged home at 57 days of life and remained well until presentation to the ED with a one day history of violaceous bilateral labial edema and associated desquamation. Imaging included pelvic x-ray without free air, and pelvic ultrasound with normal anatomy. C-reactive protein was elevated to 150 mg/L. Sepsis workup included urine, blood, and CSF cultures. Urinalysis was negative for pyuria, while culture grew E. Coli, likely a contaminant. CSF cytology and culture was reassuring. The blood culture was positive for GBS. Infant was diagnosed with late, late-onset GBS bacteremia manifesting as labial cellulitis and sepsis.

Results: Treatment with ampicillin-sulbactam and vancomycin was initiated. The infant completed a ten day course of targeted therapy with intravenous (IV) penicillin G from the first negative blood culture. She was discharged home after demonstrating significant clinical improvement and reassuring downtrend in inflammatory markers.

Conclusion/Significance: GBS must be considered in the differential diagnosis of sepsis in infants older than 90 days, particularly in premature infants. Labial cellulitis is an uncommon manifestation of GBS disease and a full sepsis workup is indicated.

IMPLEMENTATION OF NEONATAL SEPSIS GUIDELINES FOR PRETERM INFANTS

Presenting Author: Brittany Tang, B.S

Co-Authors: Brittany Tang, B.S (Rush); Priya V. Patel, MD (Rush); Betty N. Vu, PharmD, BCIDP, AAHIVP (Rush); Colleen B. Nash, MD, MPH (Rush)

Introduction: Despite improved prophylactic strategies, early onset sepsis (EOS) continues to be a significant contributor to neonatal mortality worldwide. One of the challenges is early detection, as EOS often has a non-specific clinical presentation. There is also significant ambiguity in dealing with asymptomatic neonates with negative blood cultures but abnormal labs. Antibiotic utilization has proved effective in curtailing negative EOS sequelae however, there are detrimental effects of prolonged antibiotic utilization which include but are not limited, late onset sepsis (LOS), necrotizing enterocolitis (NEC), drug toxicities and death.

Objective: Using retrospective chart review, our objective is to monitor the variation in antibiotic utilization in preterm infants (<37 weeks gestational weeks) before and after the Neonatal/Infant Sepsis guidelines, implemented in the Rush NICU in July 2018.

Methods: The study is IRB approved at Rush Medical Center. Data from 107 patients pre-implementation and 54 patients post-implementation, were compiled and analyzed using Microsoft Excel and IBS SPSS Statistics software. Primarily, we tracked the percentage of antibiotic-free days per admission for patients born in July, August and September 2016, 2017 and 2018. Secondly, we tracked utilization of ampicillin, gentamicin, vancomycin, ceftazidime, cefepime, piperacillin/tazobactam, and oxacillin; noting the frequency of antibiotic re-restart within 7 and 30 days.

Results: Overall, our preliminary data did not support our initial hypothesis that there would be a statistically significant increase in the percentage of antibiotic-free days after the implementation of the guidelines (p-value 0.841). Likewise, there were significantly increased number of patients restarted on antibiotics within 30 days in the post-implementation group (p-value 0.004).

Conclusion/Significance: These result may be confounded by the significantly higher acuity nature of the post-implementation patient cohort, who possessed a lower average birth weight and gestational age. However, there was a promising 19% relative decrease in the utilization of vancomycin. In conclusion, we aim to continue to compile a more expansive data sample, to more accurately assess the impact of the guideline on antibiotic usage overall.

CD4 DIM CD8 BRIGHT T (DPT) CELLS ARE SUFFICIENT TO MEDIATE HIV NEUROINVASION, INDEPENDENT OF CD4+ T CELLS**Presenting Author:** Yasmeen Albalawi, M.S**Co-Authors:** Yasmeen Albalawi, Srinivas Narasipura, Victoria Lutgen, Jennilee Wallace, Leannie Olivares and Lena Al-Harhi Department of Microbial Pathogens and Immunity, Rush University Medical College, Chicago, IL. USA.**Introduction:** CD4dim CD8bright T (DPT) cells is a genuine population of mature CD8+ T cells which induce CD4 expression on their surface in response to activation. We previously established that DPT cells are enriched in anti-viral cytolytic responses.**Objective:** Given that DPT cells are infected by HIV, we evaluated the contribution of DPT cells to HIV neuroinvasion.**Methods:** NOD/SCID/IL-2rcy (-/-) mice were reconstituted with highly purified CD8+ T cells (>99.9%), which give rise to DPT cells, or CD4+ T cells and infected with HIVBaL at 100 ng of p24 at 2 weeks post-reconstitution. At week 2 post-infection, the animals were perfused, total lymphocytes from the brain were isolated by mechanical disruption of brain tissues and resuspended in Percoll gradient. HIV was measured by intracellular staining for HIV p24 by flow cytometry and detection of HIV DNA and RNA by nested PCR. Lymphocyte phenotype was evaluated by multi-color flow cytometry for markers of naïve, effector memory, central memory and terminally differentiate effector memory T cells (CD62L, CDRA, CCR7, CD28, CD27) as well as markers of CNS homing receptors (CX3CR1 and CXCR3, two chemokine receptors linked to T cell homing to endothelium and brain).**Results:** Both DPT and CD4+ T cells were found in NSG-humanized mouse brain within 2 weeks of infection. Further, we demonstrate that i) peripheral reconstitution of CD8+ T cells leads to detection of DPT in the CNS within two weeks post reconstitution, ii) brain DPT cells are HIV infected as 5-22% of brain DPT cells were positive for intracellular HIV p24+; iii) brain DPT cells expressed markers for central memory cells (CCR7+CD27- CD28lo CD62L+ CD45RA; and iv) compared to uninfected animals, in the brain, both single CD4+ and DPT cells had 40-60% higher expression levels of brain homing receptor CX3CR1, as measured by the geometric mean of fluorescence. Further, in infected animals, brain DPT cells had significantly 4-5 folds higher expression of CXCR3 than single CD4+ T cells.**Conclusion/Significance:** Taken together, these results demonstrate that DPT cells are sufficient and independent of CD4+ T cells can seed the brain with HIV and contribute to HIV neuroinvasion.

IMMUNOGENICITY AND SAFETY OF NEW HEPATITIS B ADJUVANTED VACCINE (HBAV) IN PATIENTS WITH CHRONIC LIVER DISEASES (CLD)**Presenting Author:** Sarah Repking, RN, MSN, ACNP-BC**Co-Authors:** Sarah Repking, ACNP-BC (Rush), Nikunj Shah, MD (Rush), Costica Aloman, MD (Rush)

Introduction: Hepatitis B virus (HBV) infection affects more than 350 million people globally. To prevent HBV infection in patients with CLD, HBV vaccination is recommended in many immunization guidelines. Recombinant HBV vaccines have been available since 1983. These vaccines are safe and extensively used throughout the world and has shown high (>90%) immunogenicity in general population. The efficacy of standard recombinant vaccines in patients with CLD is variable and the response rate varies from 18% to 60%. Recently the FDA approved a new recombinant HBAV for the general population requiring only two doses one month apart. The immunogenicity and safety of HBAV is not known in CLD patients.

Objective: We looked to discover if the new HBAV is more effective than the recombinant vaccine to immunize against Hepatitis B in the hepatology population.

Methods: We identified patients in our Academic Hepatology Clinic who were not immune to HBV. They were administered HBAV as approved by FDA and received two doses of HBAV intramuscularly in their deltoid one month apart. Subsequently anti HBV surface antibody (anti-HBs) was tested for development of immunity to HBV. We also collected demographic information, etiology of CLD, and if they failed to develop immunity to standard recombinant vaccines in the past.

Results: We identified 112 patients not immune to HBV. Of the 112 patients, 94 (83%) completed two doses of HBAV. For 51 patients whom results for anti-HBs were available, there were 26 patients with cirrhosis of liver and 25 non-cirrhotic liver disease or post-liver transplant. 38 (78%) were positive and 13 (22%) negative for anti-HBs. Of 26 patients with cirrhosis 21(81%) developed anti HBs. Out of 25 non-cirrhotic patients or post-liver transplant, 17 (68%) developed immunity.

Conclusion/Significance: In patients with CLD, HBAV is highly immunogenic even if patients have cirrhosis. HBAV has higher rates of immunogenicity than the standard recombinant vaccines within the cirrhotic population. It is safe in non-cirrhotic liver disease and post-liver transplant patients, but not necessarily as immunogenic as with the general population.

β -CATENIN NEGATIVELY REGULATES IL-6 AND IL-8 EXPRESSION AT TRANSCRIPTIONAL LEVEL AND INDUCES REACTIVITY IN HUMAN ASTROCYTES

Presenting Author: KaReisha Robinson, MS

Co-Authors: KaReisha Robinson, Srinivas D. Narasipura, Jennillee H. Wallace, Ethan M. Ritz, and Lena Al-Harhi*

Introduction: HIV invades the brain during acute infection, setting the stage for persistent neuroinflammation despite combined antiretroviral therapy (cART). These events lead to HIV-Associated Neurocognitive Disorders (HAND), which occurs in ~50% of HIV-infected individuals. The cellular and molecular mechanisms driving this neuroinflammation/HAND are not entirely clear.

Objective: Our lab has been focused on understanding the role of Wnt/ β -catenin signaling in HAND.

Methods: siRNA technology was used to knockdown β -catenin, ATF2, and Zeb1 in astrocytes. Pharmacological agents 6-bromoindirubin-3'-oxime (BIO) and lithium chloride (LiCl) were used to overexpress β -catenin in astrocytes. Real-time PCR was used to evaluate the mRNA levels of the cytokine IL-6 and chemokine IL-8 expression in astrocytes with β -catenin knocked down or overexpressed. Western Blot was used to evaluate the protein levels of β -catenin knocked down or overexpressed. Enzyme-linked immunosorbent assay (ELISA) was used to evaluate the IL-6 and IL-8 protein expression in astrocytes with β -catenin knocked down or overexpressed. To assess the direct impact of β -catenin on transcriptional activity of IL-6 and IL-8, we conducted a bioinformatics analysis of their respective promoters to test for presence of putative TCF/LEF binding sites. ChIP analysis and co-immunoprecipitation were used to examine whether β -catenin, TCF1, TCF3, TCF4, and/or LEF1 were directly interacting with the IL-6 and IL-8 promoters and each other, respectively. SB525334 and LDN-193189 small inhibitor molecules were used to inhibit Smads 2 and 3 and 1, 5, 8/9, respectively. Transmigration assay was used to determine whether β -catenin kd altered IL-8 chemotaxis. One sample T-test and one-way ANOVA Dunnett's multiple comparison test were used for statistical analyses.

Results: We demonstrate that knockdown of β -catenin in normal human astrocytes (NHAs) significantly induced IL-6 and IL-8 at the transcription and protein levels and conversely, induction of β -catenin significantly downregulated these two molecules. Further, KD of β -catenin induced three genes associated with A1 phenotype by 2.4-6.4 fold.

Conclusion/Significance: These findings are intriguing given that no role for β -catenin to date is associated with IL-6 and IL-8 regulation. Also, these results indicate that β -catenin expression in astrocytes is a critical regulator of anti-inflammatory responses and its disruption can potentially mediate persistent neuroinflammation.

ANTI-BACTERIAL IMMUNE RESPONSES TO BREAK IMMUNE TOLERANCE AND ELIMINATE CANCER

Presenting Author: Christina Nowicki, B.Sc.

Co-Authors: Christina A. Nowicki, Kajal H. Gupta, Eileena Giurini, Josef Goldufsky, Amanda Marzo, and Andrew Zloza All authors affiliated with: Division of Hematology, Oncology, and Cell Therapy, Department of Internal Medicine, Rush University Medical Center, Chicago

Introduction: The use of immunotherapy for cancer has resulted in long-term cancer patient benefit. However, this benefit has only been reported in a small proportion of patients. Currently, cancer immunotherapies focus almost exclusively on increasing immune cell responses against tumor antigens. The immune system has developed tolerance mechanisms that can prevent or eliminate strong immune responses to self-antigens. Thus, mounting a strong immune response against such tumor antigens (self-antigen) with the help of anti-pathogen (foreign antigen), can help to combat tolerance to self-antigens in the tumor. Bacterial toxins share the ability to enter host cells to target various intracellular proteins and modulate host immune responses.

Objective: We hypothesize that anti-bacterial immune responses will ultimately lead to a generation of systemic innate and long-term (memory) anti-tumor responses. Recently, *Listeria monocytogenes* has been evaluated as a potential treatment against melanoma, however our understanding of the mechanisms behind this anti-tumor response remains unclear. Killed but metabolically active (KBMA) *L. mono* vaccines have shown promise in cancer therapy, as shown by Brockstedt (2005). We studied the difference in tumor response after intratumoral injection of different forms of *L. mono* (live, dead, KBMA) into an intradermal B16 melanoma in mice.

Methods: In this study, KBMA *L. mono* was created by treating *L. mono* with psoralen and UV light (UVA-365nm) to cause DNA crosslinking, preventing bacterial proliferation while maintaining metabolic activity. Metabolic activity was determined in vitro using Alamar Blue cell viability assay while simultaneously assessing growth on BHI agar. In vivo, C57BL/6 mice were challenged intradermally with B16 melanoma, and subsequently intratumorally treated three times with *L. mono*.

Results: We were able to show that live *L. mono* vaccines effectively cause tumor regression in this in vivo model of melanoma, more so than KBMA *L. mono* or dead *L. mono*. Our preliminary results suggest that the live *L. mono* vaccine has different underlying mechanisms leading to more effective anti-tumor response when compared to dead of KBMA *L. mono*.

Conclusion/Significance: Through targeting bacterial immunity, instead of focusing on improved tumor antigen response, this research aims to help develop innovative treatments to improve patient outcomes.

CONTRIBUTION OF INNATE LYMPHOID CELLS TO INFLAMMATION IN COLON DURING EARLY SIV INFECTION

Presenting Author: Natasha Ferguson, BS, MS

Co-Authors: Natasha Ferguson MS (RUSH University); Andrew Cogswell PhD (Northwestern University); Edward Barker PhD (RUSH University)

Introduction: The initial target of HIV/SIV infection is the gastrointestinal (GI) tract. Hallmarks of HIV/SIV infection of the gut include massive loss of CD4+ T-cells, breakdown of the epithelial barrier, and microbial translocation within weeks of transmission. It has been posited that HIV-infection of CD4+ Th22/Th17 cells may account for disruption of the epithelial layer and increased MT from the lumen into the lamina propria of the GI tract due to loss of gut homeostatic cytokines interleukin (IL)-22 and IL-17. However, innate lymphoid cells (ILCs) also produce IL-22 and IL-17 and are unaltered during HIV/SIV infection. In addition, ILCs are also capable of producing inflammatory cytokines (IFN-gamma/TNF-alpha that impact epithelial barrier integrity of the intestine. Inflammatory cytokines are also produced by CD8+ T-cells during HIV/SIV infection but wane as the infection progresses.

Objective: In this study, we determined if ILCs and T-cells express IL-22/IL-17 and IFN-gamma/TNF-alpha during acute SIV-infection. We hypothesize that ILCs, like T-cells, are a continuous source of gut homeostatic and inflammatory cytokines not only in early phase of SIV infection but during chronic phases when T-cell cytokine responses wane.

Methods: We isolated lamina propria mononuclear cells from the colon of rhesus macaques(RM) and immediately stained them using surface antibodies to identify ILCs and intracellular antibodies to identify IL-22/IL-17, IFN-gamma and TNF-alpha using polychromatic flow cytometry.

Results: We found that IFN-gamma/TNF-alpha and IL-22/IL-17 are secreted by not only T-cells but also ILCs during early SIV-infection. However, during chronic SIV-infection only ILCs contributed to cytokine production. In uninfected colon only ILCs expressed only IL-22/IL-17.

Conclusion/Significance: The frequency of inflammatory cytokine producing ILCs is higher than the frequency of inflammatory cytokine producing T-cells in acute SIV infection. This could contribute to the uptick in inflammation seen in early HIV/SIV that disrupts the epithelial barrier leading to chronic systemic inflammation (a hallmark of HIV/SIV infection).

DIABETES ALTERS TRABECULAR BONE STRUCTURE IN A RAT FEMORAL IMPLANT MODEL

Presenting Author: Kyle Anderson, MS

Co-Authors: Frank C. Ko (Rush), Amarjit S. Viridi (Rush), D.R. Sumner (Rush), Ryan D. Ross (Rush)

Introduction: Type II Diabetes (T2D) is increasingly common in Total Joint Replacement (TJR) patients, affecting 8-22% of all TJR patients. T2D significantly increases the risk for aseptic loosening and revision surgery, but mechanisms for this increased risk are not well known.

Objective: Determine the structural factors at the peri-implant interface, that may contribute to increased complications in T2D following TJR surgery.

Methods: 14 week-old female outbred Sprague-Dawley (SD) (n=11) and Zucker Diabetic Fatty (ZDF) (n=11) rats had bilateral femoral implantation of titanium rods and were sacrificed at 2, 6, and 10 weeks after surgery. Right femora were scanned via μ CT and measured structural endpoints at two ROIs. 1. Proximal to the distal growth plate for trabecular bone endpoints and 2. The midshaft diaphysis for cortical bone endpoints. Two-way analysis of variance (ANOVA) tests was performed to assess the effects of group, time to sacrifice, and the group-by-time interaction. When main effects were significant, group differences were compared to age-matched SD group using student's t-test.

Results: Tb. BV/TV and Tb. N was significantly decreased (0.41 fold and 0.52 fold respectfully) in ZDF group at week 10. Tb. Sp was increased (2.1 fold) in ZDF group at week 10 that resulted in a significant group effect for these measures. There was also a significant time effect and interaction as ZDF animals showed progressive decline starting at 6 weeks while trabecular measures in SD animals remained relatively constant overtime. Tb. Th was not significantly altered when comparing age-matched SD group. Ct. Area and thickness increased significantly over the experimental time but no changes were observed in any cortical measurements among ZDF group versus the SD group.

Conclusion/Significance: As compared to SD, ZDF animals had significant decrease in trabecular bone volume and trabecular number as well as increased trabecular spacing. This suggests that the altered glucose regulation had significant impact on the more metabolically active trabecular bone. These findings may help explain the higher implant failure rate in diabetic compared to non-diabetic patients. Alterations in peri-implant bone remodeling may explain the increased risk for revision surgery in diabetic patients compared to non-diabetic patients following joint replacement.

BEST PRACTICE MULTIMODAL ANALGESIA IN TOTAL JOINT ARTHROPLASTY: EVALUATING THE IMPACT

Presenting Author: Alifiya Hyderi, PharmD, BCPS

Co-Authors: Mary Carol Racelis, MSN, APRN, ACNS-BC (Rush University Medical Center)

Introduction: The ongoing opioid epidemic has elevated the need to explore effective methods for pain management in total joint arthroplasty (TJA) patients.

Objective: The purpose of this study was to evaluate pain level acceptability after receiving scheduled multimodal analgesia (MMA) following TJA at Rush University Medical Center (RUMC), compared to traditional post-operative pain management.

Methods: This is an IRB approved single-center, retrospective, observational study that evaluated an inpatient multimodal postoperative analgesia protocol used in patients who have undergone TJA. Patients who underwent primary TJA from November 2016 to April 2017 prior to MMA implementation were compared to those who underwent primary TJA from September 2017 to February 2018 after the initiation of MMA. A sample size of 195 patients in the traditional pain management group and 200 patients in the MMA group were evaluated, with the primary endpoint of pain acceptability defined as: whether or not patients' pain was acceptable upon the Defense & Veterans Pain Rating Scale (DVPRS) assessment. Secondary endpoints included hospital length of stay (LOS), post-operative opioid consumption, patient experience, initial post-operative physical therapy assessment, and anti-emetic use.

Results: For patients in the MMA group, there was a significant difference in pain control on post-operative day one ($p=0.04$, 95% CI 1.01, 1.22) in addition to decreased hospital length of stay ($p= 0.001$, 95 %CI 0.44, 0.77). The opioid consumption in the MMA group was decreased by half compared to the traditional pain management group. Impact to patient experience, initial post-operative physical therapy assessment, and anti-emetic use will be described.

Conclusion/Significance: Implementation of the MMA protocol at RUMC has led to improved post-operative pain control and patient experience, decreased LOS, and reduced opioid consumption in TJA patients. Impact to nursing and pharmacist practices will be described as well.

ASYMMETRICAL INTER-LIMB HIP STRENGTH IS ASSOCIATED WITH WORSE FUNCTIONAL OUTCOMES AND GREATER HIP PAIN IN PATIENTS WITH UNILATERAL FEMOROACETABULAR IMPINGEMENT SYNDROME

Presenting Author: Daniel Wichman, B.S.

Co-Authors: Daniel M. Wichman (Rush), Philip Malloy (Rush), Kyleen Jan (UIC), Alejandro A. Espinoza Orias (Rush), Shane J. Nho (Rush)

Introduction: Femoroacetabular impingement syndrome (FAIS) is a clinical disorder of the hip that affects over 3% of adolescents and young adults. Muscle weakness of the hip flexors, extensors, and abductors has been frequently reported in patients with FAIS. However, the implications of strength asymmetry in the FAIS population remains unclear. Since muscle strength is a modifiable factor, it is important to understand the relationship between muscle strength and functional outcomes.

Objective: The purposes of this study were to determine if patients with FAIS demonstrate inter-limb asymmetry in hip muscle strength and if hip muscle strength is correlated with patient reported outcome (PRO) and hip pain measurements. We hypothesized that: 1) FAIS patients will demonstrate greater strength in the muscles of the involved hip and 2) greater muscle strength will be positively correlated with higher preoperative PRO scores and negatively correlated with hip pain.

Methods: This study was approved by the IRB of Rush University and patients provided informed consent prior to participation. 32 subjects were recruited between December 2018 to December 2019. A dynamometer was used to measure the forces generated by subjects during hip flexion, internal rotation, and external rotation over a 5-second period. PRO and pain measurements, including activities of daily living and sports subscales of the Hip Outcome Score (HOS-ADL, HOS-SS), International Hip Outcome Tool-12 (iHOT-12), and Visual Analog Scale for pain (VAS-Pain) were recorded using an online database. Statistical analysis was performed using SPSS software.

Results: Flexion and abduction strength were 0.4 and 0.2 N/kg larger in the uninvolved hip compared to the involved hip. Flexion was positively correlated with HOS-ADL, abduction was positively correlated with iHOT-12 and HOS-ADL, internal rotation was negatively correlated with VAS Pain, and external rotation was positively correlated with iHOT-12, HOS-ADL, and negatively correlated with VAS Pain.

Conclusion/Significance: Hip muscle strength is compromised in the involved leg of patients with FAIS. Increased hip strength in FAIS patients is associated with higher function and less pain. Understanding how modifiable factors such as strength affect patient outcomes is crucial to further investigate conservative treatment options and understand which patients are best candidates for surgical intervention.

THE IMPACT OF MODIC CHANGES ON PREOPERATIVE SYMPTOMS AND CLINICAL OUTCOMES FOLLOWING ANTERIOR CERVICAL DISCECTOMY AND FUSION

Presenting Author: James Baker, BA

Co-Authors: James Baker (RMC); Garrett Harada (RUMC); Howard An (RUMC); and Dino Samartzis (RUMC)

Introduction: Modic changes (MC) are common imaging phenomena, whose etiology is largely unknown. They can be classified into three types, and have frequently been associated with spinal degeneration. Anterior cervical discectomy and fusion (ACDF) is a common procedure to correct degenerative pathology, however it has been associated with adjacent segmental degeneration (ASD). Few studies have assessed the role of preoperative MC on preoperative symptoms and outcomes following ACDF.

Objective: To assess the role of MC on preoperative symptoms and postoperative outcomes following ACDF.

Methods: We performed a retrospective study of consecutive patients who underwent ACDF at a single institution. Patients with preoperative T1- and T2-weighted 1.5T MRIs available that could be used to assess the presence of cervical MC were included. MC were stratified by type and location, and compared to patients without MC. Associations with symptoms (neck pain, arm pain, sensory deficits, weakness, radiculopathy, myelopathy, and myeloradiculopathy), patient-reported measures (Visual Analog Scale (VAS)-Neck, VAS-Arm, Neck Disability Index (NDI), Short Form 12-Item, and Veterans' Rand 12-Item), and surgical outcomes (reoperation and ASD) were assessed using multivariate linear and logistic regression controlling for baseline demographic characteristics. Statistical significance was set at $p < 0.05$.

Results: A total of 861 patients were included in this study, with 356 (41.3%) patients showing MC. MC most frequently occurred at C5-C6 (36.2%), and MC2 was the most common type (61.2%). MC was associated with advanced age ($p < 0.001$). Overall MC ($p < 0.001$), MC2 ($p = 0.002$), and MC3 ($p = 0.013$) were associated with more levels fused. Both MC and MC2 had longer duration of symptoms, but MC did not correlate with specific preoperative symptoms. MC at C7-T1 resulted in higher NDI. MC did not correlate with an increased rate of ASD or reoperation.

Conclusion/Significance: This is the first study to systematically examine the impact of cervical MC, stratified by both type and location, on clinical outcomes following ACDF. Patients with MC were generally older, required larger fusion constructs, and had longer durations of symptoms, although no differences in specific symptom profiles or postoperative outcomes were appreciated. While MC may not affect specific outcomes following ACDF, they may indicate a more generalized and debilitating preoperative state for patients.

ASSESSMENT OF MATERIAL LOSS, DAMAGE MODES, AND MICROSTRUCTURE OF SEVERELY DAMAGED TOTAL HIP ARTHROPLASTY FEMORAL HEAD TAPERS

Presenting Author: Stephanie McCarthy, BS

Co-Authors: Stephanie M. McCarthy (Rush), Deborah J. Hall (Rush), Jennifer L. Wright (Rush), Brett R. Levine (Rush), Hannah J. Lundberg (Rush), and Robin Pourzal (Rush)

Introduction: Damage to total hip arthroplasty implants can vary by type and severity and remains a major clinical concern. After the onset of micromotion between femoral stem and head tapers, more severe damage modes such as imprinting or column damage can occur. These modes occur due to stem taper topography and banding within CoCrMo alloy microstructure.

Objective: Evaluate severely damaged retrieved femoral heads for material loss and correlate to the occurrence of specific damage modes and alloy microstructure.

Methods: 108 severely damaged retrieved CoCrMo femoral heads were evaluated. Coordinate measuring machine data was used to compute volumetric material loss and generate intensity maps for global damage presence. Implant time in situ and corresponding femoral stem alloy were obtained. Metallographic samples of the heads were produced. Alloy type (wrought/cast; high/low carbon) and microstructure banding were identified using light microscopy. Kruskal-Wallis and Mann-Whitney tests were conducted to compare volume loss between damage modes.

Results: All study heads were wrought CoCrMo alloy (93% low/ 7% high carbon). Average time in situ was 95 ± 78 months. 81 heads exhibited imprinting, 50 showed column damage, and 42 had both. All heads with column damage exhibited banding. Average volume loss was $2.3 \text{mm}^3 \pm 3.7$. A head taper radial shape deviation was noticeable in 27 heads. Heads were assigned to groups; A) column damage, B) imprinting, C) both damage modes, D) neither, and average loss was calculated per group. There was significantly higher loss in group (A) compared to (B) ($p=0.041$).

Conclusion/Significance: Imprinting and column damage modes appear to be the most detrimental. Interestingly, there were several cases with neither damage mode, but high material loss requiring further investigation into the role of topography. Banding presence in the microstructure is a condition for column damage. Shape deviations observed may affect contact mechanics of the implant, causing initiation of different damage modes. These results indicate various implant designs may undergo diverse damage processes requiring varying counter measures. Additionally, alloy microstructure must be optimized to prevent column damage and material loss. Understanding underlying causes of severe damage is imperative to establish counter measures and increase implant longevity in the future.

INTRAMEMBRANOUS BONE REGENERATION IS ACCELERATED IN CONSTITUTIVELY ACTIVE LRP5 MUTANT MICE

Presenting Author: Frank Ko, PhD

Co-Authors: Frank Ko (Rush); Meghan Moran (Rush); Ryan Ross (Rush); Rick Sumner (Rush)

Introduction: Wnt signaling plays an important role during the skeletal development, homeostasis, and repair. Prior studies demonstrated that activating Wnt signaling in mice leads to accelerated fracture healing, which includes both endochondral and intramembranous bone repair. How Wnt signaling affects intramembranous bone regeneration in the absence of concomitant endochondral repair, as seen in joint replacement, is unclear.

Objective: The current study aims to determine the spatiotemporal pattern of Wnt signaling during intramembranous bone regeneration and to test the hypothesis that constitutive activation of Wnt signaling accelerates intramembranous bone regeneration in mice.

Methods: In IACUC approved experiments, we used C57Bl/6 and constitutively active LRP5 mutant (HBM) mice and their wildtype (WT) littermates. All mice underwent bone marrow ablation surgery of the right femur at 4 weeks of age. C57Bl/6 and HBM mice were killed at 3, 5, 7, and 14 days after the surgery. Femurs were harvested, scanned by microCT, and processed for histology. Region of interest for microCT analysis was the marrow volume from 40 to 70% of the total bone length away from femoral condyle. To determine Wnt signaling activity in mice, immunohistochemical staining for β -catenin was performed. Statistical analyses were performed using ANOVA.

Results: In C57Bl/6 mice, regenerated bone within the ablated marrow compartment peaked at 7 days after the surgery, where the mean BV/TV was 8.1 ± 1.8 % ($p < 0.05$). Increased immunoreactivity to β -catenin within the ablated marrow compartment preceded increase in BV/TV, where β -catenin positive marrow stromal cells appeared at day 3. This reconstitution of the empty marrow space by β -catenin positive cells was followed by extracellular matrix deposition that mineralized and was partially resorbed by day 14. HBM mice had 2-fold more bone at day 5 post surgery than their littermate controls ($p < 0.05$).

Conclusion/Significance: Our studies demonstrate that Wnt signaling plays an important role during intramembranous bone regeneration in a mouse model of marrow ablation. Modulating Wnt signaling can have significant impacts in clinical scenarios where bone healing occurs via intramembranous bone regeneration, including joint replacement or distraction osteogenesis. Pharmacological agents that activate Wnt signaling may allow patients to recover faster from such surgeries.

CERVICAL SPINE ENDPLATE ABNORMALITIES & ASSOCIATION WITH PAIN, DISABILITY, AND ADJACENT SEGMENT DEGENERATION AFTER ANTERIOR CERVICAL DISCECTOMY AND FUSION.

Presenting Author: Kevin Alter, BS

Co-Authors: 1,2 Garrett K. Harada, MD; 1,2 Kevin Alter, BS; 1,2 Austin Q. Nguyen, BS; 3 Youping Tao, MD; 1,2 Philip K. Louie, MD; 1,2 Bryce A. Basques, MD; 4 Fabio Galbusera, PhD; 3 Frank Niemeyer, PhD; 3 Hans-Joachim Wilke, PhD; 1,2 Edward Goldberg, MD; 1,2 Howard S

Introduction: Structural endplate abnormalities are important phenomena that remain understudied in the cervical spine. Anterior cervical discectomy and fusion (ACDF) is a common surgical treatment for degenerative disc disease; however, adjacent segment degeneration/disease (ASD) may develop.

Objective: The purpose of this study was to determine how type, location, and size of endplate lesions on magnetic resonance imaging (MRI) may be associated with symptomatology and clinical outcomes after ACDF.

Methods: We performed a retrospective study with prospectively-collected data of patients who underwent ACDF. Charts were reviewed for preoperative sagittal MRI of the cervical spine. Endplate abnormalities were identified and stratified by type (atypical, typical), location, relation to operative levels, presence at the adjacent level, and size. These strata were assessed for association with presenting symptoms, patient-reported, and postoperative outcomes.

Results: Of 861 possible patients, 57.3% had evidence of endplate abnormalities, 39.0% had typical abnormalities, while 18.2% had atypical abnormalities. Mean duration of follow-up was 17.4 months. Patients with any endplate abnormality had greater odds of myelopathy irrespective of location or size, while sensory deficits were associated with atypical lesions ($p=0.016$). Typical and atypical abnormalities demonstrated a difference in patient-reported outcomes based on location relative to the fusion segment. Typical variants were not associated with adverse surgical outcomes, while atypical lesions were associated with ASD irrespective of size or location ($p=0.004$), and reoperations, when a large abnormality was present at the proximal adjacent level ($p=0.025$).

Conclusion/Significance: This is the first study to examine endplate abnormalities on MRI of the cervical spine, demonstrating distinct risk profiles for symptoms, patient-reported, and surgical outcomes after ACDF. Patients with typical lesions reported worsening postoperative pain/disability, while those with atypical abnormalities experienced greater rates of ASD and reoperation. This highlights the relevance of a degenerative spine phenotypic assessment, and suggests endplate abnormalities may prognosticate clinical outcomes after surgery.

CHANGES IN RADIOGRAPHIC ALPHA ANGLE MEASUREMENTS ARE ASSOCIATED WITH VOLUMETRIC AND SURFACE AREA RESECTION DURING FEMORAL OSTEOCHONDROPLASTY

Presenting Author: Alexander Newhouse, BS

Co-Authors: Alexander C. Newhouse (Rush), Philip Malloy (Rush), Nozomu Inoue (Rush), Alejandro A. Espinoza OrÃ¡as (Rush), Shane J. Nho (Rush)

Introduction: Femoroacetabular impingement syndrome (FAIS) is a loss of sphericity of the femoral head that is most commonly characterized on radiography using the alpha angle measurement. A normal alpha angle is considered to be 42 degrees. Removing the excess bone is performed during a femoral osteochondroplasty and confirmation of adequate bone resection is achieved using intra-operative and post-operative radiography. Complete resection is imperative as residual CAM morphology is the primary indicator for revision hip arthroscopy. It is currently unknown if the actual surface area and volume of bone resected during surgery is associated with postoperative alpha angle.

Objective: The purposes of this study were to determine if the amount of bone resected during a femoral osteochondroplasty is directly correlated with a reduced postoperative alpha angle. We hypothesize that a larger surface area and volume resection is associated with a larger change in postoperative alpha angle.

Methods: 6 cadaveric specimens with radiographically confirmed CAM morphology (alpha angle > 50deg.) underwent femoral osteochondroplasty to resect the bone. 1.5T magnetic resonance imaging (MRI) and standard radiography were performed on all specimens before and after the procedure. All preoperative and postoperative imaging was segmented using commercial software (Materialise Mimics, Ann Arbor, MI) and 3D femoral surfaces were reconstructed. A custom-written program in Microsoft Visual C++ 2015 (Microsoft, Corp., Redmond, WA) was used to perform image subtraction analysis to quantify the volume and surface area difference between the preoperative and postoperative hip models.

Results: The mean surface area and volume of the resected bone was quantified as $1156.65\text{mm}^2 \pm 239.86\text{mm}^2$ and $2538.3\text{mm}^3 \pm 970.28\text{mm}^3$, respectively. The 3D parameters including surface area and volume showed strong correlation with the 2D postoperative alpha angle with R2 values of 0.7365 and 0.6853, respectively.

Conclusion/Significance: The volume and surface area of bone resected during a femoral osteochondroplasty reduces the postoperative alpha angle into the normal range. If the osteochondroplasty can be quantified, this analysis can be useful in determining how much bone a patient need resected to achieve an alpha angle within the normal range.

FOUR-DIMENSIONAL COMPUTED TOMOGRAPHY EVALUATION OF SHOULDER JOINT CONTACT AREA IN BASEBALL PLAYERS

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Introduction: Although the micro instability is an important factor of shoulder pain, in vivo glenohumeral joint kinematics remains controversial because it is difficult to directly assess the minute glenohumeral joint instability. We hypothesized that a 4DCT device and an original tracer program would be able to visualize the glenohumeral micromotion and trace the center of humeral head in vivo during simulated pitching motion.

Objective: The purpose of this study is to evaluate the glenohumeral contact area and humeral head center during simulated pitching motion in baseball players using 4DCT device.

Methods: We obtained 4DCT data from the dominant and nondominant shoulders of seven baseball players during the cocking motion. First, CT image data of each shoulder joint was reconstructed using a 3D reconstruction software package. Second, the resulting virtual 3D models were exported into point-cloud and .STL formats using the same software package. Third, we extracted the humeral head surface, and calculated the center of the humeral head from this surface. Fourth, we extracted the glenoid surface, and calculated the contact area. Finally, we compared statistically the contact area and humeral head center between the dominant and non-dominant side.

Results: The obtained data showed that there was no apparent difference in the mean contact area between the dominant and non-dominant side. The center of humeral head was stable in same position and moved during maximum external rotation to maximum internal rotation. There are no remarkable change in mean contact area during maximum external rotation to maximum internal rotation

Conclusion/Significance: Our 4DCT analyses produced interesting results. The center of the humeral head moved during the shoulder external rotation to internal rotation in abduction on both of the dominant and nondominant side. 4DCT scanning and the tracer program for bone surface modeling of the glenohumeral joint could visualize micromotion. 4DCT scanning and the tracer program for bone surface modeling of the glenohumeral joint could visualize micromotion and be used for kinematic evaluation with a low radiation exposure. The current results showed that the repetitive pitching motion may create glenohumeral joint laxity.

SPECIATION ANALYSIS OF INTRA-CELLULAR METALLIC IMPLANT DEBRIS USING SYNCHROTRON XRF-IMAGING

Presenting Author: Songyun Liu, Master

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Introduction: Wear and corrosion debris generated from total hip replacements have been associated with ALTRs or osteolysis, often leading to premature implant failure.

Objective: The goal of this study is to demonstrate the beneficial use of the synchrotron X-ray Fluorescence imaging and spectroscopy to perform elemental speciation (distribution and valency state) analysis of intracellular metallic debris.

Methods: The retrieved implant was a dual modular metal-on-metal THR with moderate bearing surface wear and severe fretting corrosion damage on the modular components made from CoCrMo alloy and Ti-alloy. 5 μm sections of FFPE tissue was made and placed on a plastic foil. The entire tissue was pre-screened using a 30 μm step size scan. Sub-regions of the samples were then cut off and transferred to a 5x5 mm Si frame for high resolution scans to obtain intracellular elemental and chemical information at different beamlines. Additionally, XANES of intracellular debris were to determine the oxidation state of the metallic debris.

Results: The predominant intracellular metallic elements in a total of 64 macrophages was revealed to be Cr by XRF imaging analysis. The mean Cr/Co ratio was 29.66 (15.59~37.9), and the mean Ti/V ratio was 4.76 (4.46~5.51). Within single particles the Cr/Co ratio ranged from 1.12~100.16, and the Ti/V ratio ranged from 2.21~6.68. Overall, two types of Cr XANES spectra were found which corresponded to Cr₂O₃ and CrPO₄, yet no metallic Cr was observed. CrPO₄ had higher Cr/Co ratios than Cr₂O₃ and was colocalized with calcium. Most of the Co-rich debris was confirmed to be Co²⁺ by comparison to Co standard XANES spectra, whilst a few particles showed spectra that most closely resembled that of Co in its alloy state. The Mo spectra were also taken from some Co and Cr-rich areas. It mainly occurred in its oxidation state and matched MoO₂. However, at a low Cr/Co ratio (<2:1), it occurred in its alloy state. The XANES spectra of Ti-rich debris showed mainly a rutile-like structure, but the pre-edge peaks were somewhat distorted.

Conclusion/Significance: Synchrotron XRF provides a detailed and accurate method to characterize intracellular wear debris and corrosion products, which significantly improve the understanding of implant alloy degradation.

WEARABLE FEEDBACK TECHNOLOGY TO ENHANCE PARTIAL WEIGHT-BEARING AFTER LOWER EXTREMITY FRACTURE: A PROOF-OF-CONCEPT STUDY WITH SURGICAL AND HEALTHY INDIVIDUALS**Presenting Author:** Gregory Ruzich, BA**Co-Authors:** Gregory Ruzich, BA (RUMC); Joel Williams, MD (RUMC); Jessica Pezzo, PA-C (RUMC); Markus Wimmer, PhD (RUMC); Christopher Ferrigno, PhD, PT (RUMC)**Introduction:** Excessive loading following lower extremity fracture (LEF) surgery disrupts the internal healing process and can result in complications, such as mal-union, delayed union, and non-union costing unnecessary pain, prolonged treatment course, and functional impairment. Traditionally, partial weight-bearing (PWB) is subjectively estimated and can result in over-loading.**Objective:** This proof-of-concept study utilized 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 $13.0 \pm 7.5\%$ off their 30% of TBW threshold compared with $20.4 \pm 4.6\%$ 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 $33.5 \pm 9.8\%$, $21.7 \pm 19.9\%$, and $6.0 \pm 3.9\%$, respectively, and for the second surgical subject were $9.8 \pm 5.1\%$, $8.6 \pm 5.3\%$, and $2.7 \pm 2.2\%$, respectively.**Conclusion/Significance:** 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.

COMPONENT ALIGNMENT AFFECTS MATERIAL LOSS IN TOTAL KNEE REPLACEMENT - A PARAMETRIC FINITE ELEMENT STUDY OF ISO 14243-1:2009

Presenting Author: Steven Mell, PhD

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Introduction: Two major causes of failure of total knee replacements (TKRs) are component misalignment and polyethylene wear.

Objective: In this study, the effect of 9 TKR component alignment parameters on predicted volumetric wear in displacement control TKR simulations is investigated using a TKR finite element analysis (FEA) and wear model combined with a design of experiments approach. Multiple linear regression is used to evaluate the effect on volumetric wear of each of the input parameters.

Methods: The effect of 9 component alignment parameters on TKR volumetric wear was investigated using a previously validated TKR FEA wear model. Parameters investigated included: internal/external (IE) rotation of the femoral component, IE rotation of the tibial component, femoral component varus/valgus (VV) angle, tibial insert anterior/posterior (AP) position, tibial component rotation in the flexion/extension (FE) axis, location of the femoral center of rotation (CoR) in both the AP and superior/inferior (SI) directions, and location of the tibial IE axis in the medial/lateral (ML) direction. ISO 14243-3:2009 force control kinematic and loading inputs were used. The effect each parameter had on wear was evaluated using multiple linear regression.

Results: Volumetric wear varied from 5.9 to 22.1 mm³/million cycles (MC) within the simulations performed. The linear regression model included all first order terms except for femoral component VV angle and the femoral CoR in the AP and SI directions. All terms were significant ($p < 0.05$) except for the location of the tibial component in the AP direction. The regression model was highly significant to $p < 0.001$. Model R² was 0.79, explaining most of the variance in the FEA predictions. The most influential parameters were femoral component IE angle and tibial slope.

Conclusion/Significance: In this study nine alignment parameters were investigated and six were found to have significant influences on wear, with femoral IE angle and tibial slope the most influential. The linear regression model generated was able to explain 79% of the variability in the output data. This study demonstrates that component rotational alignment in the transverse and sagittal planes can have a large influence on TKR wear and therefore care should be taken to properly align components during surgery.

WHICH SURGICAL AND IMPLANT DESIGN FACTORS MOST INFLUENCE MODULAR HIP TAPER CONTACT MECHANICS?

Presenting Author: Jonathan Gustafson, PhD

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Introduction: Modular junctions in total hip replacement (THR) have been a primary source of fretting-based corrosion, leading to adverse tissue reactions and implant failure. Improper seating during head/stem component assembly can lead to unintended micromotion-a precursor to fretting-and can be influenced by surgeon assembly technique and implant design.

Objective: The objective of this study was to assess the role of head/stem assembly method-one vs three strikes-and taper design features on modular junction mechanics using a novel, microgroove FEA model.

Methods: A two-dimensional, axisymmetric FE model of a CoCrMo femoral head taper and Ti6Al4V stem taper was created using median geometrical measurements taken from hip implant retrievals. A sinusoidal function was used to model the micro-grooves of the stem and head taper interfaces based on median retrieval measurements (stem taper: amplitude=11 | 2 | 6 μm , period=200 | 50 | 150 μm ; head taper: amplitude=2 μm , period=25 μm). Surgeon assembly was simulated by applying multiple dynamic loads (4kN, 8kN, and 12kN) to the femoral head taper as either one strike or three strike sequences. Lastly, mismatch between the stem and head taper were varied between 0 (no mismatch) and $\pm 3'$ ($\pm 0.05^\circ$). Fifty-four simulations (3 loads x 2 assembly methods x 3 angles x 3 stem taper topography) were performed in Abaqus v2019/Standard. A stepwise linear regression model in SPSS v24 (IBM®, Armonk, NY) was used to assess role of assembly magnitude & method, taper topography, and mismatch.

Results: The stepwise regression analysis identified peak contact pressure and microgroove plasticity were significantly influenced by assembly load magnitude (Beta = 0.362, p=0.003) and taper topography (Beta = 0.674, p<0.001). Number of assembly strikes significantly influenced the number of microgrooves plastically deformed (Beta = -0.345, p<0.001). The total model fit was R² = 0.834.

Conclusion/Significance: Stability of THR modular components are significantly influenced by assembly magnitude, stem taper surface topography, and number of mallet hits. It may be possible to optimize component design and standardize surgeon assembly to limit risk of fretting corrosion in THR using these novel models.

SURGICAL IMPACTION FORCE ON BENCHTOP HEAD/STEM THA ASSEMBLY: EFFECT ON SURGEON EXPERIENCE LEVEL AND IMPLANT MATERIAL

Presenting Author: Michael Godoy, IBS PhD

Co-Authors: Michael Godoy (Rush), Kirsten Sipek (Rush), Brett R. Levine (Rush), Hannah J. Lundberg (Rush), Jonathan A. Gustafson (Rush), Robin Pourzal (Rush)

Introduction: Total hip arthroplasty (THA) is a commonly performed procedure to relieve arthritis or traumatic injury. However, implant failure can occur from fretting-corrosion of head-neck modular junctions. Our previous retrieval study has attributed fretting-corrosion damage to implant surface topography and femoral offset, but the statistical model only accounted for 20% of the variance of damage scores. Therefore, we suspect that damage must arise from factors that cannot be investigated with retrieval analysis, such as how the surgeons assemble the femoral head onto the stem.

Objective: The objective of this study is to evaluate differences in dynamic loading applied during THA assembly considering variation in the surgeon's experience (attending, resident, fellow) and femoral head material (metal or ceramic).

Methods: 34 surgeons of varying levels of expertise (attendings, residents, fellows) were recruited and asked to perform a benchtop, head-stem assembly using a customized apparatus simulating a THR procedure. The benchtop setup contained a load cell sensor (9347C, Kistler® USA, Amherst, NY) on a 12/14 stem taper. Surgeons were randomly assigned a metal or ceramic femoral head and instructed to assemble the taper using their preferred surgical technique. Taper assembly was repeated five times. Output load data was analyzed for differences in peak load applied, variability between surgeon groups and average off-axis angles.

Results: When comparing between surgeon experience, both attendings and residents applied greater loads than fellows on metal heads (Residents=9.5 kN vs Fellows=7.7kN ($p=0.29$), Attendings=8.7kN vs 7.7kN ($p=0.49$)). As for variability between groups, attendings scored lower than residents and fellows (Attendings: 2.7, Fellows: 12.5, Residents 12.1). Attending surgeons exhibited applied loads at significantly lower off-axis angles compared to fellows (Attending: 4.9° vs. Fellow: 7.3° ($p=0.01$)). When comparing head material, there were no significant differences between the loads applied to the metal and ceramic heads. However, all our clinicians assembled ceramic head tapers with a greater off-axis angle as compared to assembling metal heads.

Conclusion/Significance: There were no apparent differences in impaction load when metal and ceramic femoral heads were assembled, however, variability of technique and loading was observed across the surgical experience levels as well as within surgeons of the same experience level.

BIOMECHANICAL CHARACTERISTICS OF LABRAL AUGMENTATION VERSUS LABRAL RECONSTRUCTION IN A HIP CADAVER MODEL**Presenting Author:** Jonathan Rasio, B.S.**Co-Authors:** Jonathan Rasio (Rush), Sunikom Suppauksorn (Rush), Kevin C. Parvaresh (Rush), Elizabeth F. Shewman (Rush), Edward Beck (Wake Forest), Laura Krivicich (UIC), Shane J. Nho (Rush)**Introduction:** An integral component of hip stability is the negative pressure gradient created by the labral suction seal. No prior studies have quantitatively compared the integrity of the suction seal under normal, pathologic, and surgical conditions.**Objective:** The purpose of this study was to evaluate the biomechanical properties of the labral suction seal in the following four scenarios: intact labrum, labral tear, labral augmentation, and labral reconstruction.**Methods:** Eight fresh-frozen hemi-pelvises without osteoarthritis and with an intact labrum were dissected and evaluated sequentially under four testing conditions: intact labrum, labral tear, labral augmentation, and labral reconstruction. Following testing of the intact labrum, a labral tear was created from 12- to 3-o'clock. Labral augmentation was then performed with bone anchors and iliotibial band graft. Labral reconstruction was performed last with bone anchors and iliotibial band graft after removing the entire labral tear. In each condition the specimens were placed in the test machine to undergo pure distraction of the joint. First, the femur was compressed with 250 N of force and then distracted at 10 mm/s with force and displacement continuously recorded until the suction seal was disrupted. Each test was repeated three times for each of the four conditions, and the average peak force was calculated. Data was normalized to the intact peak force for each specimen to account for gender and size differences. Statistical testing was performed via a repeated measures ANOVA with a post-hoc pairwise analysis.**Results:** Peak loads occurred early in displacement. The average normalized peak force values (mean percent \pm standard deviation) relative to the intact condition were as follows: labral tear (91.1 ± 8.5), augmentation (66.1 ± 27.6), and reconstruction (55.6 ± 25.7). Relative to the labral tear, there was no significant difference in peak force for the augmentation ($p = 0.12$), but there was a significant decrease in peak force for the reconstruction ($p = 0.03$).**Conclusion/Significance:** This model provides a new means of quantitatively evaluating the labral suction seal under various normal, pathologic, and surgical conditions. The results show that labral augmentation may recreate the labral suction seal better than labral reconstruction, which may clinically improve hip stability.

A PROTEOMIC APPROACH TO IDENTIFY NOVEL SERUM BIOMARKERS OF PERI-IMPLANT OSTEOLYSIS IN A RAT MODEL

Presenting Author: Brittany Wilson, PhD

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Introduction: Circulating biomarkers may offer a method to identify peri-implant osteolysis before bone loss causes aseptic implant loosening, the primary cause of total joint replacement failure in the mid- to long-term. However, there are currently no validated biomarkers for peri-implant osteolysis and studying biomarkers in patients remains challenging.

Objective: To identify novel serum biomarkers of peri-implant osteolysis in a rat model of aseptic implant loosening.

Methods: In this IACUC-approved study, 33 male Sprague-Dawley rats (400 ± 12 g) were randomly allocated to four experimental groups (n=8-9/group). Titanium implants were placed in bilateral femora of three groups, which were then challenged with weekly intra-articular knee injections of either lipopolysaccharide-doped-polyethylene (LPS-PE) or cobalt-chromium-alloy (CoCr) particles, with particle-free vehicle (vehicle) serving as control. The remaining 8 rats were included as an intact age-matched control group that did not undergo surgery or injections. All rats were euthanized 6 weeks after surgery. The primary endpoint was serum protein expression assessed by mass spectrometry. Normalized and log-transformed total intensity raw protein data were extracted using the ScaffoldDIA desktop application. The false detection rate was set to 1% and a minimum of 2 peptides were required for protein identifications. Differential abundance analysis was performed using the limma package in the R programming language. An adjusted p value <0.05 was used to determine statistical significance. Pathway analysis software was used to explore cellular pathways enriched by proteins from the significantly altered protein sets.

Results: Expression of 502 unique serum proteins was compared between groups. There were 24 proteins significantly altered in the CoCr-challenged group compared to the vehicle-control group. There were 52 proteins significantly altered in the CoCr- versus LPS-PE-challenged groups. Pathway analysis revealed significant interactions among proteins that were altered (all $p < 0.001$). Further, while both PE and CoCr particles activated an innate immune response, CoCr particles also seemed to activate an adaptive immune response.

Conclusion/Significance: There may be multiple novel candidate biomarkers for peri-implant osteolysis meriting further investigation. Differential activation of innate and adaptive immune responses by different particle types suggests there may be unique biomarkers associated with osteolysis caused by different materials.

EFFECTS OF KINEMATIC AND KINETIC VARIABLES ON CARTILAGE SURFACE STIFFNESS AND CHONDROCYTE VIABILITY: A 3-FACTOR CENTRAL COMPOSITE DESIGN OF EXPERIMENTS**Presenting Author:** Catherine Yuh, B.S., M.S.**Co-Authors:** Catherine Yuh (Rush University), Benjamin Witt (Rush University), Tony Chen (Hospital for Special Surgery), Susanna Chubinskaya (Rush University), Suzanne Maher (Hospital for Special Surgery), Markus A. Wimmer (Rush University)**Introduction:** Knee articular cartilage experiences mechanical stresses from loading and sliding during joint articulation. Reports have suggested that specific kinematic/kinetic components change after injury and represent risk factors for osteoarthritis development (Favre, 2016).**Objective:** Here, we investigate the individual and interaction effects of kinematic and kinetic variables that drive changes at the tissue and cellular level. Using a cadaver model of gait, we defined the input range of each variable and determined the influences of load, sliding speed (SS), and migrating contact frequency (MCF).**Methods:** Thirty 14×20×3-mm live cartilage explants were obtained from ten 24-week-old bovine stifle joints. Combinations of load (20-60N), SS (1.00-100.00mm/s), and MCF (0-0.2Hz) determined using a central composite design were applied using a bioreactor (Wimmer, 2004). Microindentation was performed within the contact and non-contact regions of the explant, before/after bioreactor testing. Explants were then partitioned to assess cell viability and histology. Response surface methodology was utilized (n=2, Power=99%) to generate an ANOVA for a reduced quadratic model for each output variable (Design Expert 11).**Results:** In these short-term experiments, overall, tissue stiffness increased in the contact region following bioreactor testing. ANOVA models for stiffness and cell viability were both highly significant ($P < .006$), whereas the model for Modified Mankin Scores was not significant ($P > 0.05$). Load, all interaction terms, and $(SS)^2$ showed significant effects on tissue stiffening. One potential mechanism of stiffening is the exudation of the fluid from the superficial zone, leading to the collapse of the more compliant superficial zone onto the stiffer middle zone (Bartell, 2015). We found that cell viability was significantly affected by load and $(MCF)^2$. In both the conditions at 0 and 2 Hz MCF, we postulate that the increased relative contact duration led to increased cell death. There was no correlation between observed cell death and stiffening ($R^2 = 0.06$; $P = 0.19$).**Conclusion/Significance:** Kinematic/motion and kinetic/load changes after joint injury may drive osteoarthritis development. Here, we demonstrate that factors do not act in isolation, but interact on the tissue matrix and cellular levels. Future studies may provide further insight on how healthy and aberrant joint kinematics (destabilization, overloading, etc.) can change multiscale cartilage properties.

PLANTAR PRESSURE-BASED AUDITORY FEEDBACK FACILITATED GAIT RETRAINING TO REDUCE KAM-A LONGITUDINAL FEASIBILITY STUDY**Presenting Author:** Jade He, M.S.**Co-Authors:** Christopher Ferrigno (Rush University Medical Center, RUMC), Najia Shakoor (RUMC), Markus A Wimmer (RUMC)

Introduction: The knee adduction moment (KAM) is a surrogate measure of the ratio of knee compartmental loads that associates with the progression of medial knee OA. Gait modifications have been developed to alter KAM, however, a strategy to promote learning of these gait modifications is lacking.

Objective: We were to examine the efficacy of home-based gait retraining, which employed a flexible shoe, a smartphone, and a customized app, in individuals with medial knee OA. We hypothesized that KAM would reduce after training, and KAM reduction would remain but attenuate after a washout period.

Methods: Individuals with symptomatic medial knee OA were recruited and randomized into the intervention and control group (2:1) for the 6-week long clinical trial (NCT02955225). Insole of the intervention group was programmed to send real-time data to the smartphone for the generation of auditory feedback to cue a medial weight shift. After a supervised lab session, the intervention group conducted gait retraining using feedback 3 x 5 min/day and 6 days/week during the first 3 weeks. For the second 3 weeks, they recorded pressure (washout of feedback training). The control group recorded pressure for all 6 weeks. Clinical measures and gait data were collected from three evenly spaced lab visits and statistically analyzed.

Results: Both groups (n=33) improved similarly regarding pain and other clinical measures. The flexible shoe increased stride by 0.07 m ($p = 0.048$) and subjects walked 0.043 m/s faster ($p = 0.014$) per visit. The intervention group by modifying gait reduced KAM1 by 0.187 %BW*HT, while their flexion and extension moments, speed, and cadence also reduced. Within-visit KAM1 reduction did not differ between Week 0 and 3 but attenuated at Week 6. The ability to modified gait did not seem to influence subjects' natural gait, as KAM1 of natural gait at Week 3 and 6 did not differ.

Conclusion/Significance: Pressure-based feedback aided subjects to train a gait modification at home. Subjects were able to recall the gait modification and showed KAM1 reduction. However, 3 weeks were short for motor learning. Attenuated KAM1 reduction indicated that motor learning only reached an early stage.

BIOLOGICAL RESPONSE OF OSTEOBLASTS AND MACROPHAGES TO ELECTROCHEMICAL METAL ION RELEASE**Presenting Author:** Amandine Impergre, PhD**Co-Authors:** Amandine Impergre (RUMC, MATEIS), Bernard Normand (MATEIS)

Introduction: The surface potential of metallic biomaterials is governed by oxidation-reduction reactions, which increases under abrasive wear [Wimmer, 2015] and in presence of inflammatory products released by cells [Fonseca, 2001]. Periprosthetic cells are affected by changes in polarization of metal surfaces [Chiarugi, 2003] with effects on biocompatibility. Vice versa, cells can locally induce potential variations and thus cause surface modifications of biomaterials.

Objective: This study investigated the effects of anodic potentials of CoCrMo alloy (i.e. the release of metal ions) on metabolic activity of cells.

Methods: Cell lines of osteoblasts and macrophages were seeded directly onto CoCrMo discs in RPMI-1640 (10% BSF and 1% antibiotics) in incubator. A conventional three-electrode cell was added to apply potential and controlled the metal ions released (Co^{2+} , Cr^{3+} , Cr^{6+} , Mo^{4+}). The cell viability was quantitatively determined by MTT assay after 4h of polarization and completed by fluorescence microscope observation. Electrochemical currents were recorded and related to the metal ion concentrations in the medium measured by ICP-MS.

Results: The polarized CoCrMo/cell system allowed simulating the real (300-400 mV/ECS) or accelerated (500-700 mV/ECS) in vivo degradation of metallic biomaterials (dissolution rates of 2250 and 44750 ppb/h for chromium and cobalt ions). Increasing the polarization potential lead to higher metal ion release into the medium causing a decrease in cell viability (100% to 0.5%). This started at concentrations as low as 0.7-2.9 $\mu\text{g}/\text{mL}$ (depending on potential condition). 70% of the total ions released were Co^{2+} , but decreases with increasing potential to the detriment of chromium (3 to 27%) due to the dissolution of passive film of CoCrMo. Macrophages were less affected than osteoblasts, possibly due to a higher metal ion acceptance threshold conferred by their foreign body removal function.

Conclusion/Significance: The evaluation of metal ion levels is of great importance as an indicator of device performance. This study found that concentrations of ions where cell viability is compromised (0.7-2.9 $\mu\text{g}/\text{mL}$) are well below the limit above which revision are planned (30-50 $\mu\text{g}/\text{mL}$) or considered a health risk (above 7 $\mu\text{g}/\text{mL}$) [Morlock, 2012].

LONG-TERM RADIOLOGIC DIFFERENCES IN SHORT AND LONG-SEGMENT ANTERIOR CERVICAL DISCECTOMY AND FUSION USING A DYNAMIC TRANSLATIONAL PLATE

Presenting Author: Lacin Koro, Doctor of Medicine

Co-Authors: Lacin Koro¹; Malcolm A. Gebauer¹; Benedikt W. Burkhardt, M.D.²; Mena Kerolus, M.D.¹; Brian T. David, Ph.D.¹; Christopher D. Witiw, M.D., M.S.³; Richard G. Fessler, M.D., Ph.D.¹
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Introduction: Anterior cervical discectomy and fusion (ACDF) using a plate is a well-established surgical technique for the treatment of symptomatic cervical spondylosis. Anterior cervical plates are categorized as either constrained or semiconstrained. Recent focus has been on comparative studies of constrained to semiconstrained plates, however, much less attention has been directed toward the clinical outcomes of semiconstrained plates in relation to number of cervical vertebrae fused. The goal of this study was to evaluate the radiographic outcomes following ACDF surgery for cervical spondylosis using a dynamic translational plate (DTP) with special focus placed on restoration of segmental lordosis and fusion rates.

Objective: A plate is commonly applied after ACDF, particularly in cases of multilevel fusion. The focus of this study was to evaluate the radiographic characteristics of a semiconstrained, translational plate used for 1, 2, or 3 level ACDF.

Methods: A retrospective review of 50 consecutive adult patients undergoing a 1, 2 or 3 level ACDF using a translational plate system for treatment of symptomatic cervical spondylosis was conducted at a single center. The cohort was separated into two groups depending on the number of cervical levels fused and plain neutral radiographs were assessed.

Results: There was a significant improvement in segmental lordosis over the segments fused between the pre-operative baseline and the immediate post-operative imaging in both groups. The short segment fusions improved from 2.5 ± 1.2 degrees to 5.4 ± 0.9 degrees ($p < 0.001$) and long segment fusions improved from -0.1 ± 3.2 degrees to 12.5 ± 3.3 degrees ($p < 0.001$). This correction was maintained through follow-up for both groups. Through last follow-up, there was minimal change in segmental lordotic correction for the short segment fusions from 5.4 ± 0.9 degrees to 6.4 ± 0.7 degrees ($p < 0.0001$). Conversely, long-segment fusions exhibited a greater loss in lordotic correction from 12.5 ± 3.3 degrees to 7.4 ± 2.1 degrees ($p = 0.0051$).

Conclusion/Significance: This study suggests that ACDF performed with a lordotic allograft using a DTP allows for correction of segmental lordosis while achieving a high fusion rate. However, short segment fusions appear to maintain a greater degree of segmental lordotic correction when compared with long segment fusions.

ASSESSING THERAPY DELAYS IN ACUTE REHABILITATION

Presenting Author: Fiona Lane, MSN

Co-Authors: Fiona Lane (RUMC); Margie Par (RUMC)

Introduction: In Rush University Medical Center acute inpatient rehabilitation unit, patients complete at least three hours of therapy a day. This includes physical therapy, occupational therapy, and speech language pathology therapy. The majority of this therapy takes place outside of the patient's room, in therapy gyms. Providing 3 hours of therapy can be a challenge to work around the needs of the patient. It has become a concern that patients are not receiving the full 45 minutes of therapy due to not being ready. This has the potential to affect patient recovery, in addition to, reimbursement if therapists cannot bill for the full session.

Objective: The purpose of this project is to first determine if there is a significant issue regarding patient readiness and then second, to implement a therapy readiness guide to avoid delays. It is important to study the barriers to therapy in inpatient rehabilitation facilities to prevent missed therapy time, anticipate therapy barriers, and improve patient outcomes.

Methods: The first step will be to gather information from therapists regarding which disciplines experience delays, how many of their patients are delayed, for how long they are delayed, what are the major causes and times of delays. We plan to survey the therapists for 3 weeks. The second step will be to develop a pre-therapy checklist based on the main reasons for delays. This tool will be developed with input from nurses and PCTs and be used to target the times where therapy delays are at the highest.

Results: Survey results from the therapists show significant delays for speech therapy, physical therapy, and occupational therapy. Most common causes for delays are the patients were in bed, toileting needs, or RN needs. The most common times for delays were 8am, 8:45am, and 1pm.

Conclusion/Significance: A pre-therapy checklist was developed with input from staff and rolled out. After 6 weeks of implementation, the therapists will be surveyed again to see if the lengths and number of delays for therapy decrease.

PHARMACOLOGICAL ACTIVATION OF PROTEIN TYROSINE PHOSPHATASE SHP-1 AMELIORATES AUTOIMMUNE ARTHRITIS IN MICE

Presenting Author: Adrienn Markovics, MD, PhD

Co-Authors: Adrienn Markovics, Daniel M Toth, Tibor T Glant and Katalin Mikecz Department of Orthopedic Surgery, Rush University Medical Center, Chicago, IL, USA

Introduction: The Src homology region 2 domain-containing phosphatase-1 (SHP-1) is known to exert negative regulatory effects on immune cell signaling. We observed previously that mice overexpressing an SHP-1 transgene were resistant to the development of autoimmune arthritis and showed decreased immune responses in the cartilage proteoglycan (PG)-induced (PGIA) model of rheumatoid arthritis (RA).

Objective: We sought to explore if pharmacological activation of SHP-1 in wildtype (WT) mice prevents or ameliorates arthritis.

Methods: To induce PGIA, mice were immunized with human PG in adjuvant. For in vivo SHP-1 activation, mice were treated with regorafenib (BAY 73-4506) per os either before arthritis symptoms developed (preventive treatment) or shortly after the initial signs of arthritis (therapeutic treatment). Regorafenib administration was continued for at least 21 days while arthritis incidence and severity were monitored.

Results: Preventive regorafenib treatment of WT mice significantly decreased arthritis severity (10 or 20 mg/kg) and incidence compared to vehicle treatment. Preventive treatment (10 mg/kg) increased tyrosine phosphatase activity of spleen cells and decreased IFN γ secretion by splenic T cells in vitro. Therapeutic treatment with 15 mg/kg decreased the severity of arthritis and lowered IFN γ production.

Conclusion/Significance: Our studies are the first to investigate the role of SHP-1 in autoimmune arthritis. We found that pharmacological activation of SHP-1 in vivo prevented the development of autoimmune arthritis or ameliorated arthritis severity when applied after the disease onset in the PGIA model of RA. Activation of SHP-1 might open a new therapeutic perspective in RA treatment.

EFFECTS OF PROLONGED CHEMOGENETIC INHIBITION OF NOCICEPTORS IN A MURINE SURGICAL MODEL OF OSTEOARTHRITIS

Presenting Author: Phuong Tran, PhD

Co-Authors: Phuong B. Tran (RUMC), Shingo Ishihara (RUMC), Rachel E. Miller (RUMC), Richard J. Miller (Northwestern University) and Anne-Marie Malfait (RUMC)

Introduction: In a surgical model of osteoarthritis(OA), mice undergo destabilization of the medial meniscus(DMM) surgery. They develop pain-related behaviors in association with progressive joint damage, and cellular changes in L4 dorsal root ganglia(DRG) include macrophage infiltration. Chemogenetic silencing of nociceptors involves using Designer Receptors Exclusively Activated by Designer Drugs(DREADD), aka Pdi, genetically targeted to voltage-gated sodium channel 1.8 (NaV1.8). Activation of Pdi with the agonist, clozapine N-oxide(CNO), inhibits the neuronal activity of these nociceptors. We previously reported that one injection of CNO in NaV1.8-Pdi DMM mice temporarily blocked firing in nociceptors and inhibited knee hyperalgesia and mechanical allodynia.

Objective: The aim was to explore the effects of prolonged chemogenetic inhibition of nociceptors on pain-related behaviors, cellular changes in the DRG, and joint damage in a murine model of knee OA.

Methods: CNO- or saline-loaded Alzet minipumps were implanted intraperitoneally into 10-week old NaV1.8-Pdi mice. DMM surgery was performed on the right knees of these mice 3 days later. The following behavioral tests were performed up to 6 weeks after surgery: (1)Knee hyperalgesia was measured using a Pressure Application Measurement(PAM) device, and (2)mechanical allodynia in the ipsilateral hindpaw using von Frey fibers and the up-down staircase technique. L4-DRG sections were immunostained with the macrophage marker, F4/80. Total number of macrophages per DRG section was quantified using ImageJ and normalized to the area of each DRG. Histopathology of the knee was evaluated based on OARSI recommendations.

Results: Evaluation of knee hyperalgesia and mechanical allodynia in saline(n=7) and CNO(n=11)-implanted NaV1.8-Pdi mice revealed that CNO-implanted mice trended towards having less knee hyperalgesia and significantly less mechanical allodynia than saline controls(p=0.048) 6 weeks after DMM. Macrophage infiltration in the DRG was significantly attenuated in CNO-implanted NaV1.8-Pdi DMM mice(p=0.004) compared to saline controls. Histologically, CNO-implanted NaV1.8-Pdi DMM mice had less cartilage damage and significantly less bone damage(p=0.02) in the knee joint than saline controls.

Conclusion/Significance: Chronic chemogenetic silencing of NaV1.8 nociceptors prevented pain sensitization after DMM surgery, which was associated with diminished macrophage infiltration in the DRG. Chronic CNO administration also had protective effects on knee joint damage, suggesting that persistent nociceptor firing after DMM surgery contributes to joint damage.

SCLEROSTIN ANTI-BODY REGULATION OF MINERAL METABOLISM IN THE 12-WEEK OLD HYP MOUSE MODEL**Presenting Author:** Kelsey Carpenter, M.S.**Co-Authors:** Kelsey A. Carpenter (Rush), Ryan D. Ross (Rush)

Introduction: X-linked hypophosphatemia (XLH) is the most common form of vitamin-D resistant rickets caused by a loss-of-function mutation in the phosphate regulating gene with homology to endopeptidase located on the X chromosome (PHEX). This mutation leads to elevated fibroblast growth factor 23 (FGF23) levels which impairs phosphate reabsorption and inhibits skeletal mineralization. Sclerostin, a protein produced primarily in osteocytes, suppresses bone formation by antagonizing Wnt-signaling and is elevated at both the gene level in Hyp mice, the XLH murine homolog, and in the circulation of XLH patients.

Objective: This study aims to investigate the response of mineral metabolism hormones to Scl-Ab treatment in 12-week old Hyp mice. We hypothesize that Scl-Ab treatment of Hyp mice will increase circulating phosphate, vitamin-D, and calcium as well as decrease FGF23 and PTH levels.

Methods: Male and female Hyp mice and their wild-type littermates (30 male; 27 female) were randomly assigned to biweekly subcutaneous injections of 25 mg/kg Scl-Ab or vehicle (saline) treatment starting at 4-weeks of age until sacrifice at 12-weeks of age. Cardiac serum was collected for analysis of circulating phosphate, FGF23, PTH, vitamin- D, and calcium using ELISA. Data was compared separately for males and females using a two-way analysis of variance (ANOVA) with genotype and treatment as the independent factors. When main effects were significant post-hoc analysis was performed using an independent student's T-test.

Results: Similar to our data in younger animals, Scl-Ab treatment significantly suppressed circulating levels of intact FGF23 in males and neared significance in females. Unlike our previous data, treatment significantly suppressed circulating levels of c-term FGF23 in male and female 12-week old Hyp mice. There was a significant increase in serum phosphate in females, but not in males. There were no significant treatment effects on serum PTH, vitamin-D, or calcium levels in either sex.

Conclusion/Significance: The current study demonstrates that Scl-Ab treatment significantly improves phosphate metabolism in Hyp mice by decreasing FGF23 levels. Calcium metabolism is not altered in Scl-Ab treated Hyp mice. These findings are surprising due to the well-established connection between PTH, vitamin D, and FGF23. Future work is needed to identify the mechanism by which sclerostin affects FGF23.

TRIUMEQ (ABACAVIR, DOLUTEGRAVIR, AND LAMIVUDINE) TREATMENT POTENTIALLY STIMULATES BONE FORMATION IN NORMAL WT FISHER RATS.

Presenting Author: Arnold Olali, B.S Conservation Biology

Co-Authors: Arnold Olali, Kyle Anderson, Lihua Chen, Xiu-Ti Hu, Lena Al-Harathi, Ryan Ross

Introduction: People living with HIV (PLWH) have reduced bone mineral density (BMD) compared to uninfected individuals increasing their risk of osteoporosis and osteoporotic fractures. Furthermore, initiation of combined anti-retroviral therapies (cART) is linked to greater bone loss within 1-2 years of initiation. The specific drugs mediating cART related bone loss, and through which mechanism is not clearly understood.

Objective: In this study we tested the effects of Triumeq, a commonly used cART that includes dolutegravir (DTG), abacavir (ABC), lamivudine (3TC) on bone quality. Normal WT 4-week-old Fisher rats were treated with 1mg/kg of DTG, 12mg/kg of ABC, 6mg/kg of 3TC daily for 4 weeks.

Methods: Bone quality was analyzed using micro-computed tomography (μ CT) and bone strength was tested using 3 point bending mechanical testing.

Results: We observed a statistically significant increase in cortical thickness and bone stiffness in the Triumeq treated rats when compared to the control rats, and no significant differences in trabecular bone.

Conclusion/Significance: In the clinical setting a switch from Tenofovir containing regimen, which is known to negatively impact bone, to ABC + DTG has been associated with a recovery in bone mineral density (BMD). Taken together with our data in healthy rats, suggests the components of Triumeq may stimulate bone formation.

DEEP LEARNING METHOD FOR DETECTING INTRACRANIAL HEMORRHAGE AND ITS SUBTYPES**Presenting Author:** Yunan Wu, Master**Co-Authors:** Yunan Wu (RUMC, Northwestern University); Jie Deng (RUMC)

Introduction: Identifying the location and type of intracranial hemorrhage (ICH) is essential for rapid and intensive medical treatment of this disease. However, this urgent process is complex and often time-consuming. This study aimed to develop a tool for automatic and accurate detection of ICH.

Objective: To design a novel pre-processing and deep convolutional neural network (CNN) for the detection of ICH and further differentiation of its five subtypes (intraparenchymal, intraventricular, subarachnoid, subdural, and epidural) in head Computer Tomography (CT) scans.

Methods: A total of 752803 slices of head CT images acquired from 21744 patients were published in 2019 RSNA Challenge. All scans were labeled by 60 radiologists from three institutions, with majority voting as the gold standard for the subtype of ICH on each slice. Ten-fold cross-validation was used, in each fold, 90% of the total slices were used as the training dataset and the remaining 10% as validation dataset. On each slice, three window levels were applied to enhance the display of brain, blood, and soft tissues using the pair of window center and width of [40, 80], [80,200], and [40, 380], respectively. The windowed images of each slice were normalized in a range of 0-255, and used as the input for the EffientNet-B2 CNN. The pre-trained weights of EffientNet-B2 were kept, and the parameters after the global average pooling layers were fine-tuned using the training dataset. Subsequently, the whole model was trained again using the validation dataset. The outcomes of the CNN predict the occurrence of any type of ICH and the subtype of the detected ICH on each slice.

Results: Averaged over all 10-fold validations, the CNN model achieved an overall accuracy of 0.973 and precision of 0.965 in the six-categorical classifications (any type of ICH plus 5 subtypes) using a separately labelled testing dataset. The processing time was less than 0.5s on average for a single CT slice.

Conclusion/Significance: We developed an EffientNet-B2 CNN model that can detect ICH and identify its five subtypes on a single-slice basis with fast speed and high accuracy. It provides a potential tool for improving the efficiency of the radiologists in ICH diagnosis.

DETECTION OF CANNABINOID RECEPTOR EXPRESSION BY ENDOMETRIOTIC LESIONS IN WOMEN WITH ENDOMETRIOSIS AS AN ALTERNATIVE TO OPIOID-BASED PAIN MEDICATION

Presenting Author: Sarah Allam, Masters in Biotechnology

Co-Authors: Sarah Allam, Itzel Lazcano, and Ph.D Animesh Barua (Rush University Medical Center)

Introduction: Endometriosis is a chronic condition affecting reproductive health and fertility in approximately 10% of women of reproductive age. Endometriosis develops with the implantation of the uterine tissues to other parts of the reproductive organ including ovaries, fallopian tubes, and pelvic cavity. Endometriosis is associated with extreme pain and excessive cyclic bleeding. No curable treatment is available and hormonal interventions, exploratory surgery and pain medication are the currently available management options involving high personal and public health costs.

Objective: Opioids are the currently prescribed pain medication for endometriosis. Unfortunately, availability and frequent use of opioids develop an addiction and make it a street drug. The National Institute of Health is searching for an alternative to opioids, which include cannabinoids. The goal of this pilot study was to examine if cannabinoid receptors (required for cannabinoid action) are expressed by endometriotic lesions in the ovary.

Methods: Expression of cannabinoid receptors was examined in archived ovarian tissues with endometriotic lesions (n=14) and normal endometrial tissues (n=11) from healthy subjects collected under an IRB approved protocol. The expression of cannabinoid receptors was determined by immunohistochemistry using anti-human cannabinoid antibodies. The intensity of cannabinoid receptor expression in tissue sections was determined using a light microscope and a computer-assisted software program. Significant differences in cannabinoid receptor expression between the endometriotic and normal tissues were determined by paired t-test and differences were considered significant when $P < 0.05$.

Results: Cannabinoid receptors were detected on the surface of epithelial cells in the endometriotic lesion and normal endometrial glands. The expression of cannabinoid receptors was stronger in endometriotic lesions while it was weak in normal tissues. Compared with normal, the expression of cannabinoid receptors was significantly higher in endometriotic lesions than normal endometrial tissues ($P < 0.001$).

Conclusion/Significance: Although the number of specimens used was comparatively smaller, however, results of this study showed that endometriotic lesions express cannabinoid receptors. This study will be a foundation for a clinical study using a larger cohort to determine the expression of cannabinoid receptors. It will change the paradigm from using opioids to cannabinoids and reduce public health costs as well as prevent the development of opioid addiction.

REPEATED EXPOSURE TO METHAMPHETAMINE REDUCES ACTIVITY OF PYRAMIDAL NEURONS IN THE MEDIAL PREFRONTAL CORTEX OF BOTH ADOLESCENT AND ADULT MALE RATS.**Presenting Author:** Lihua Chen, Ph.D.**Co-Authors:** Lihua Chen (RUMC), Lena Al-Harhi (RUMC), Xiu-Ti Hu (RUMC)

Introduction: Methamphetamine (Meth) is a highly addictive and widely abused psychostimulant. There is no FDA-approved medication for the treatment of Meth addiction. Elucidating mechanism underlying Meth-induced neuropathology is critical for the development of efficacious pharmacotherapy. The medial prefrontal cortex (mPFC) is a key regulator of cognition and addiction; but it is profoundly altered by Meth and other psychostimulants. Little is known about functional adaptations in mPFC pyramidal neurons imposed by chronic Meth exposure.

Objective: To determine the impact of chronic Meth exposure on mPFC neurons among male F344 rats at the age of 4-6 weeks (adolescent) or 5-6 months (adult).

Methods: Adolescent rats received daily injection of Meth (5mg/ml/kg, s.c.) for 5 days, while adult rats were trained to self-administer (SA) Meth at the dose of 0.01mg/kg/infusion for one week, and then switched to the dose of 0.05mg/kg/infusion for another two weeks. Saline (SAL)-treated or SAL-yoked rats were used as control. Brain slices containing the mPFC were prepared for whole-cell current-clamp recording after a withdrawal period of 1-4 days.

Results: We found that firing of mPFC pyramidal neurons was significantly decreased in rats after repeated Meth exposure and withdrawal compared to those treated with SAL in both adolescent and adult rats. But Meth-induced alterations in the neurons' membrane properties differed from each other. For example, adolescent rats showed a small but significant depolarization in the resting membrane potential (RMP) of neurons, while adult rats displayed an increased rheobase (a minimum excitatory stimulation that was required for evoking action potential). Given that RMP is mainly mediated by K₂P channel, and rheobase could also be regulated by voltage-gated K⁺ channels (VGKCs) and Ca²⁺ channels (VGCCs), these results suggest that Meth diminishes firing activity of mPFC neurons by disturbing K₂P channels in adolescent rats, while interrupting the function of K₂P, VGKCs and/or VGCCs in adult rats.

Conclusion/Significance: Chronic exposure to Meth significantly decreases the functional activity of mPFC pyramidal neurons in both adolescent and adult male rats during an early stage of withdrawal. Such alterations may contribute to Meth-induced impairments in cognition.

FEASIBILITY OF DUAL-TASK TREADMILL TRAINING TO IMPROVE GAIT AND BALANCE IN PATIENTS WITH FXTAS: A PILOT TRIAL

Presenting Author: Deborah Bang, MS

Co-Authors: Deborah Bang¹, Deborah A. Hall², Elizabeth Berry-Kravis³, and Joan A. O'Keefe^{1,2}

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Introduction: Gait ataxia is a major clinical characteristic of FXTAS, and worsening gait and balance along with cognitive decline may be prognostic for future falls, progressive disability and reduced quality of life (QoL). Cardiovascular exercise training with and without cognitive tasks improves both motor and cognitive function in individuals with Parkinson's disease, traumatic brain injury and chronic stroke survivors. A dual task (DT) intervention simultaneously targeting gait, balance and cognitive deficits has the potential to improve function and slow disease progression in FXTAS.

Objective: Our primary objective is to determine the feasibility of DT treadmill training (combined aerobic exercise at 65% max HR for 30-45 minutes with an executive function task) in patients with FXTAS. Secondary objectives are to explore the effects of the intervention on gait, balance, cognitive and functional outcome measures compared to a control group.

Methods: Five subjects with possible, probable or definite FXTAS, who are community ambulators without an assistive device, will be recruited for DT treadmill training intervention group for 6 weeks (3x/week for 50 minute per session). Five subjects with FXTAS who are not able to participate in the intervention (due to lack of time/interest/transportation, etc.) will be assigned to the control group. Outcome measures will be collected pre- and post-intervention (immediately after the 6-week intervention, and at 1- and 6-months post-intervention; controls will also be tested at the same timepoints). These include assessments of gait, balance, cognitive function, functional outcome measures, cardiovascular function (via VO₂max) and QoL.

Results: Three subjects with FXTAS have completed the treatment intervention with 100% attendance rates and one-month post-intervention follow-up; two controls have enrolled in the study and been tested at baseline, post-intervention and one-month post-intervention follow-up. Further results are to follow.

Conclusion/Significance: This research will demonstrate the feasibility of a DT treadmill training intervention and potential to improve motor and cognitive function and QoL in FXTAS. The results of the study will provide pilot data to inform the design and conduct of the first exercise-based RCT in FXTAS.

DIET PATTERN IN ACUTE STROKE PATIENTS, A SEMIQUANTITATIVE ANALYSIS**Presenting Author:** Morgan Angotti, BS**Co-Authors:** Cherian, L; Holland, T; Agarwal, P; Wang, Y; Angotti, M; Morris, M; Aggarwal, N**Introduction:** Diet is a modifiable risk factor for cerebrovascular disease, and data on specific dietary component intake in the year leading up to a stroke may be beneficial in guiding targeted dietary prevention efforts.**Objective:** Describe the dietary habits of subjects admitted to the inpatient stroke service.**Methods:** Subjects ≥ 18 years of age admitted to our institution's inpatient stroke service who were able to communicate were invited to participate in this single-center observational study. After obtaining informed consent, dietary data was collected using a validated 141 item semi-quantitative food-frequency questionnaire (FFQ). FFQs were analyzed to obtain a Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) dietary pattern score. MIND diet includes higher intake of green leafy and other vegetables, berries, nuts, whole grains, fish, beans, poultry, olive oil and lower intake of red meat, fried food, butter, whole-fat cheese and sweets.**Results:** The mean MIND diet score, obtained from FFQs from 51 subjects, was 6.26 out of a total possible score of 15 (Median: 6.5, Mode: 7.5, Range: 2.5-10). On average in the year preceding the stroke, patients consumed fewer than the recommended weekly servings of the following MIND diet components: (green leafy (≈ 2), other vegetables (≈ 14), nuts (< 3), whole grain (1-2), beans (< 1), poultry (1)). Patients consumed higher than the weekly recommended servings for the following components: (red meat (> 6), fried food (> 3), sweets (> 10)). Only 12 % patients used olive oil as their primary oil. However, consumption of berries (≈ 2), fish (≈ 1), butter (< 6) and whole-fat cheese (< 7) per week was adequate.**Conclusion/Significance:** The dietary pattern of acute stroke patients in the year preceding their stroke resembled a western diet, rather than the MIND Diet or a diet similar to the Life Simple 7 plan, highlighting the possibility for improvement with a diet intervention in stroke patients.

VARENICLINE FOR THE TREATMENT OF IMBALANCE IN PARKINSON'S DISEASE.

Presenting Author: Jacob Hawkins, BS

Co-Authors: Jacob Hawkins, BS (RUMC), Deborah Hall, MD PhD (RUMC), Sachin Kapur, MD MS (Chicago Movement Specialists), Christina Vaughan, MD MS (University of Colorado), Glenn Stebbins, PhD (RUMC).

Introduction: Incidence of falls resulting from imbalance is estimated at 68% for PD patients. While dopamine replacement effectively treats PD motor symptoms, it has little effect on balance. Limited research has found varenicline, a partial $\alpha 4\beta 2$ agonist and full $\alpha 7$ agonist originally developed for smoking cessation, improved gait function and balance for ataxia patients.

Objective: To determine if varenicline is effective for balance in Parkinson's disease (PD).

Methods: This was an investigator-initiated, double-blind, placebo-controlled study testing varenicline for balance in PD. Participants with a confirmed diagnosis of PD were randomized to receive varenicline or placebo for eight weeks. After dose escalation, subjects took 1mg of drug twice daily until the end of study. Patients with severe tremor were excluded. Primary outcome was change on the Berg Balance Scale (BBS) from baseline to eight weeks. The BBS is a fourteen-item measure consisting on basic balance tasks. The study had a secondary, exploratory outcome of change in cognition, measured with the Frontal Assessment Battery (FAB) and the Mini Mental State Exam (MMSE) from baseline to eight weeks. The FAB is a six item measure of executive functioning.

Results: Thirty-six participants were randomized (82% men, 100% Caucasian). Average age was 71.0 years (± 8.1). Average baseline UPDRS was 34.7 (± 11.6). There were no significant differences between treatment groups on the BBS ($F[1,28]=2.85, p=0.10$), FAB ($F[1,24]=0.20, p=0.66$), or MMSE ($F[1,26]=2.66, p=0.12$).

Conclusion/Significance: In contrast to previous research, the results did not suggest varenicline had any effect on balance in PD patients. Furthermore, varenicline did not appear to impact cognition. Perhaps if an objective measure of balance, such as posturography, had been used in place of the BBS the results would have been significant. However, the authors do not recommend further study.

CHARACTERIZATION OF A HUMANIZED ANTI-ALPHA-SYNUCLEIN NANOBODY IN PATIENT-DERIVED CEREBRAL ORGANIDS MODELING PARKINSON'S DISEASE.

Presenting Author: Diptaman Chatterjee, B.S.

Co-Authors: Diptaman Chatterjee (Rush University), David Butler (Neural Stem Cell Institute), Anne Messer (Neural Stem Cell Institute), Jeffrey H. Kordower (Rush University)

Introduction: Alpha-synuclein (α -syn) aggregation is critically linked to multiple neurodegenerative diseases including Parkinson's disease (PD). Therapeutics that target intracellular α -syn-mediated aggregation and toxicity may be effective in decelerating or modifying the progression of synucleinopathies. Nanobodies are single-domain antibody fragments that can be expressed intracellularly (intrabodies) and specifically bind to target regions pertinent to α -syn aggregate formation. Upon fusion with a proteasome-targeting PEST sequence, nanobodies can modify concentrations of target proteins through proteasomal degradation and interfere with critical aggregation motifs with enhanced stability, thus creating therapeutic constructs capable of long-term targeting PD-related protein aggregation.

Objective: Here, we generated a fully-humanized variant of our lead nanobody construct, VH14-hPEST, and aimed to validate target engagement for potential clinical application.

Methods: To validate target engagement of the VH14-hPEST in human cells, we generated cerebral forebrain organoids derived from induced pluripotent stem cells (iPSCs) of PD patients with triplications of the gene encoding for α -syn (SNCA). 3D-brain organoid culture systems feature complex cellular subpopulations, demonstrate neuronal functionality, and provide superior context of diseased brains compared to 2D cell culture and immortalized-cell screening systems. We utilized these organoids as a test system for our humanized intrabody to evaluate target engagement of α -syn in human cells.

Results: When tested in ST14A cells transfected with α -syn-GFP, VH14-hPEST provided equivalent levels of α -syn protein degradation as its previously characterized murine counterpart, as determined by immunoblot and immunofluorescence. Next, we validated 3X-SNCA organoids can grow into fully-mature organoids featuring mixed populations of neurons, astrocytes, and oligodendrocytes. 3X-SNCA organoids express significantly higher levels of α -syn protein compared with organoids derived from isogenic control iPSCs. When infected with lentivirus expressing VH14-hPEST for 1-month, 3X-SNCA organoids presented with significant ($p < 0.05$) reductions of human α -syn signal compared to control organoids treated with empty vector (27%) or VH14-inactivePEST (17%). Here, we present long-term (120 days) characterization of VH14-hPEST in α -syn-burdened forebrain organoids.

Conclusion/Significance: These data validate the therapeutic potential for the fully-humanized α -syn-targeting VH14-hPEST in high-fidelity, disease-relevant model systems. Confirmation of VH14-hPEST efficacy provides a platform for in vivo therapeutic testing and optimization. These studies highlight the prospective potency and novelty of intracellular α -syn targeting for the disease-modification of PD.

BRINGING ART TO LIFE CHICAGO - AN INTERGENERATIONAL MULTIDIMENSIONAL SERVICE-LEARNING COURSE BRINGING ART THERAPY AND EMPOWERMENT TO PERSON WITH ALZHEIMER'S DISEASE AND RELATED DEMENTIAS

Presenting Author: Amanda Narkis, N/A

Co-Authors: Amanda Narkis (Rush); Carrie Shaw (Embodied Labs); Erin Washington (Embodied Labs); Tazim Merchant, BS (Northwestern); Emily Phelps (Rush); Annabella Santos Volgman, MD (Rush); Daniel Potts, MD (Cognitive Dynamics Foundation); and Neelum T. Aggarwal (Rush)

Introduction: As the population ages, it is important to combat ageism among the youth and encourage positive interactions with the elderly. Bringing Art to Life Chicago (BATL-C) is an inter-generational multidimensional service-learning course that uses art therapy and life story preservation to empower and enrich the lives of persons with Alzheimer's Disease and Related Dementias (ADRD).

Objective: BATL-C aims to 1) educate students about ADRD through the lenses of science, care partnerships, and art therapy and 2) facilitate inter-generational communication with a focus on cultural sensitivity and competency as it relates to dementia.

Methods: For the 2019 BATL-C program, seven South Asian (SA) high schoolers were paired with four senior home residents with a form of dementia. Preprogramming data collection from students included questions on personal experience, beliefs, and knowledge about ADRD, surveys regarding empathy and ageism, and weekly self-reflections. Students took part in a multi-experiential curriculum that included didactic lectures, a virtual reality simulation of a woman with AD, and participated in 6-weekly art therapy sessions with their partner. Students completed the same surveys following the 8-week program and data was collected.

Results: Preliminary results noted that students had increased factual knowledge surrounding ADRD and higher scores (4.7+8.8; $p=0.21$) on the post-program Interpersonal Reactivity Index, which suggests higher dispositional empathy expression. Increased scores (1.7+3.5; $p=0.24$) on the Geriatrics Attitude Scale suggests greater positive attitudes towards older persons after program completion. Recruitment for BATL-C is ongoing and will continue to generate more data points for analyses. Motifs from student reflections included themes of greater understanding of how to interact and communicate with elderly persons, as well as positive interactions with their partners. Students indicated an appreciation for BATL-C due to their lack of prior experience with elderly persons as well as lack of transparency of an ADRD diagnosis among the SA community.

Conclusion/Significance: This pilot study suggests that programs like BATL-C may be promising in combating ageism and increasing empathy towards older adults. Future directions for the program include expansion to the SA community to improve education and views on ADRD within the community among youth, older adults, and caregivers.

EFFICACY OF KARATE INTERVENTION ON GAIT AND POSTURAL DEFICITS IN EARLY TO MIDDLE STAGE PARKINSON'S DISEASE

Presenting Author: Nicholas Armijo, Bachelor of Sciences

Co-Authors: Nicholas S. Armijo BS (Rush);Jori E.Fleisher,MD,MSCE(Rush);Joan A. O'Keefe,PhD,PT(Rush)

Introduction: Parkinson's Disease (PD) is the second most common neurodegenerative disease resulting in the degeneration of dopamine neurons in the substantia nigra pars compacta (SNc). Functional changes in the basal ganglia circuitry result in reduced motor cortex activity with phenotypic motor symptoms including rest tremor, rigidity, bradykinesia, freezing of gait, and impaired gait and posture. Prior exercise intervention studies have shown promising results in improving gait and posture in individuals with PD.

Objective: To examine the effects of a karate exercise intervention program on gait and balance performance in early to middle stage PD individuals.

Methods: This randomized, single-blinded, 1-year study of non-contact, community-based karate intervention is delivered twice weekly to early to middle stage PD patients. 50 subjects participated in the study. 25 were in the karate treatment arm for the first 6 months and 25 were in the wait list control arm, after with time they crossed over into the karate arm for 6 months. Subjects in the first arm were encouraged to participate in continued karate intervention for the next 6 months (resulting in a potential of 12 months of karate intervention for that arm). Gait and balance were quantified with inertial sensor-based technology (APDMTM, Mobility Lab 2, Oregon, USA). Changes in baseline to 6 months outcome parameters were examined between the karate intervention and wait list control arms. Two sample and paired t-tests were performed to examine changes between and within treatment arms.

Results: These results only include participants from the first 6 months of the study. PD individuals who received karate intervention had significant improvements in gait cadence ($p = 0.043$), stride length asymmetry ($p = 0.022$) and mean velocity of postural sway (coronal plane) ($p = 0.007$) compared to the wait list control arm.

Conclusion/Significance: PD participants receiving community-based karate intervention twice weekly in the first 6 months of the trial had significant improvement in gait and balance performance on select outcome parameters compared to the wait list control arm. Further analysis will examine potential changes in these outcome measures in the crossover arm and in those receiving 12 months of karate intervention.

Primary Author/Presenter List (Sorted by Lastname)

Poster Number	First Name	Last Name	Status	Title
114	Anna	Ackermann	Poster	EVALUATING AND IMPROVING THE TEACHING OF MEDICAL LABORATORY SCIENCE MATERIAL IN MEDICAL, NURSE PRACTITIONER, AND PHYSICIAN ASSISTANT PROGRAMS
5	Aamir	Ahmed	Poster	ETIOLOGY OF PULMONARY TUMOR EMBOLISM: PRIMARY SINUSOIDAL ANGIOGENESIS VS LIPIODOL ADMINISTRATION
155	Yasmeen	Albalawi	Poster	CD4 DIM CD8 BRIGHT T (DPT) CELLS ARE SUFFICIENT TO MEDIATE HIV NEUROINVASION, INDEPENDENT OF CD4+ T CELLS
30	Grace	Alexander	Poster	WOMEN CAREGIVERS WITH HEART DISEASE: A PILOT STUDY TO UNDERSTAND THE LEVEL OF CAREGIVING STRESS AND NEEDS OF WOMEN WITH HEART DISEASE THROUGH THE DEVELOPMENT OF A CARDIOLOGY SPECIFIC CAREGIVING PROGRAM TO IMPROVE CAREGIVER QUALITY OF LIFE AND HEALTH
186	Sarah	Allam	Poster	DETECTION OF CANNABINOID RECEPTOR EXPRESSION BY ENDOMETRIOTIC LESIONS IN WOMEN WITH ENDOMETRIOSIS AS AN ALTERNATIVE TO OPIOID-BASED PAIN MEDICATION
166	Kevin	Alter	Poster	CERVICAL SPINE ENDPLATE ABNORMALITIES & ASSOCIATION WITH PAIN, DISABILITY, AND ADJACENT SEGMENT DEGENERATION AFTER ANTERIOR CERVICAL DISCECTOMY AND FUSION.
51	Shirley	Ambutas	Poster	PROTECT THE NARES: BECAUSE I CARE... REDUCING NARES ACQUIRED PRESSURE INJURIES IN ADULTS
160	Kyle	Anderson	Poster	DIABETES ALTERS TRABECULAR BONE STRUCTURE IN A RAT FEMORAL IMPLANT MODEL
189	Morgan	Angotti	Poster	DIET PATTERN IN ACUTE STROKE PATIENTS, A SEMIQUANTITATIVE ANALYSIS
137	Aviva	Ariel-Donges	Poster	BINGE EATING AND DEPRESSION ARE ASSOCIATED WITH POOR DIETARY ADHERENCE FOLLOWING BARIATRIC SURGERY
68	Akmaral	Arman	Poster	CO-OCCURRENCE OF VESTIBULAR PATHOLOGIES. A CASE OF MENIERE'S DISEASE AND BPPV.
193	Nicholas	Armijo	Poster	EFFICACY OF KARATE INTERVENTION ON GAIT AND POSTURAL DEFICITS IN EARLY TO MIDDLE STAGE PARKINSON'S DISEASE
105	Kimbia	Arno	Poster	THE 'SIMTENDING': A NOVEL MODEL FOR SIMULATING THE ATTENDING ROLE IN SENIOR RESIDENTS

Poster Number	First Name	Last Name	Status	Title
69	Haydee	Avila	Poster	DETERMINATION OF ACCEPTABLE L INDEX CUT OFF VALUE TO DETECT LIPEMIA INTERFERENCE IN SODIUM CONCENTRATION MEASUREMENT USING THE ROCHE COBAS 6000
163	James	Baker	Poster	THE IMPACT OF MODIC CHANGES ON PREOPERATIVE SYMPTOMS AND CLINICAL OUTCOMES FOLLOWING ANTERIOR CERVICAL DISCECTOMY AND FUSION
110	Jasmin	Banegas	Poster	MASTERS VS BACHELORS IN MEDICAL LABORATORY SCIENCE
188	Deborah	Bang	Poster	FEASIBILITY OF DUAL-TASK TREADMILL TRAINING TO IMPROVE GAIT AND BALANCE IN PATIENTS WITH FXTAS: A PILOT TRIAL
98	Julia	Bassett	Poster	RUSH EMPLOYEE VOLUNTEER PROGRAM
88	Eleanor	Battino	Poster	YOUTH MENTAL HEALTH: PROMOTING HEALTH EQUITY THROUGH MENTAL HEALTH EDUCATION IN PILSEN MIDDLE SCHOOLS
136	Haylee	Bergstrom	Poster	THE EFFECT OF POSTTRAUMATIC STRESS DISORDER (PTSD) ON CANNABIS USE AMONG INNER-CITY WOMEN
152	Navina	Birk	Poster	SQUAMOUS CELL CANCER MIMICKING CELLULITIS
46	Emily	Brey	Poster	A MULTISTEP QUALITY IMPROVEMENT PROJECT TO REDUCE HYPOGLYCEMIA THROUGH COORDINATION OF BLOOD GLUCOSE MONITORING, MEAL DELIVERY, AND INSULIN ADMINISTRATION
40	Christina	Brown	Poster	ANALYSIS OF INTERPROFESSIONAL DISCHARGE COMMUNICATION AT RUSH UNIVERSITY MEDICAL CENTER
118	Hannah	Brown	Poster	SAFETY OF HIGH-VOLUME, DOSE-ESCALATED SINONASAL MOMETASONE IRRIGATION IN REFRACTORY CHRONIC RHINOSINUSITIS
139	Susan	Buchholz	Poster	iCARDIA: A PHYSICAL ACTIVITY RESEARCH mHEALTH PLATFORM
100	Victoria	Buckman	Poster	ADVERSE CHILD EXPERIENCES AND MATERNAL-INFANT HEALTH: AN ANALYSIS OF MATERNAL-INFANT PERINATAL HEALTH OUTCOMES AMONG WOMEN OF THE RUSH ACE-HOME VISITING INITIATIVE
17	Giulia	Buzzi	Poster	PREVALENCE OF SARCOPENIA IN WOMEN WITH METASTATIC BREAST CANCER
153	Mary Elizabeth	Calabrese	Poster	LABIAL CELLULITIS AS AN UNUSUAL PRESENTATION OF LATE, LATE-ONSET GROUP B STREPTOCOCCAL SEPSIS IN A 108 DAY OLD PRETERM INFANT
12	Sarah	Calhoun	Poster	REGULATION OF ACETYL-CoA SYNTHETASE PROTEINS ACSS1 AND ACSS2 IN BREAST CANCER

Poster Number	First Name	Last Name	Status	Title
183	Kelsey	Carpenter	Poster	SCLEROSTIN ANTI-BODY REGULATION OF MINERAL METABOLISM IN THE 12-WEEK OLD HYP MOUSE MODEL
73	Alexa	Castillo	Poster	READING MIND IN THE EYES: THEORY OF MIND ASSESSMENT IN INDIVIDUALS AT CLINICAL HIGH RISK FOR PSYCHOSIS
85	Maricristal	Chan	Poster	SPORTS MEDICINE HEALTH EDUCATION FOR HIGH SCHOOL STUDENTS WITHOUT ACCESS TO ATHLETIC TRAINERS
191	Diptaman	Chatterjee	Poster	CHARACTERIZATION OF A HUMANIZED ANTI-ALPHA-SYNUCLEIN NANOBODY IN PATIENT-DERIVED CEREBRAL ORGANOIDS MODELING PARKINSON'S DISEASE.
187	Lihua	Chen	Poster	REPEATED EXPOSURE TO METHAMPHETAMINE REDUCES ACTIVITY OF PYRAMIDAL NEURONS IN THE MEDIAL PREFRONTAL CORTEX OF BOTH ADOLESCENT AND ADULT MALE RATS.
63	Vera	Clinton	Poster	TURN TEAMS: MAKING A DIFFERENCE ONE TURN AT A TIME
59	Alyssa	Coleman	Poster	SCREENING FOR INHERITED RETINAL DISEASE-ASSOCIATED GENE MUTATIONS IN PATIENTS OF A UNIVERSITY-AFFILIATED RETINA PRACTICE.
44	Samantha	Conrad	Poster	OCCUPATIONAL THERAPY UTILIZATION PATTERNS FOR PATIENTS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES IN THE ACUTE CARE HOSPITAL SETTING.
147	Breanna	Corle	Poster	ENVIRONMENTAL SOUND IMAGERY AND ENVIRONMENTAL SOUND IDENTIFICATION IN COCHLEAR IMPLANT LISTENERS
94	Leigh	Dairaghi	Poster	THE RUSH HEART CENTER FOR WOMEN - TWO BIG HEARTS PROJECT: DESIGN AND BASELINE OVERVIEW
83	Hannah	Dau	Poster	PORTRAITS OF JOY: UNLOCKING THE LIVED EXPERIENCES OF ADULTS WITH AUTISM USING PHOTOVOICE
4	Ami	Dave	Poster	PERSISTENT RENAL TOXICITY AFTER INCREASED USE OF REACTIVE GASTROSTOMY TUBE PLACEMENT IN OROPHARYNX CANCER PATIENTS TREATED WITH CHEMORADIATION
10	Laura	DeCesare	Poster	RISK OF VENOUS THROMBOEMBOLISM AMONG PATIENTS UNDERGOING SURGICAL EXCISION FOR CUTANEOUS MALIGNANCY
132	Monica	Dholakia	Poster	SMOKING AS A RISK FACTOR FOR ANASTOMOTIC LEAK AFTER COMPLETION PROCTECTOMY AND ILEAL POUCH ANAL ANASTOMOSIS: AN ACS NSQIP ANALYSIS

Poster Number	First Name	Last Name	Status	Title
11	Jesus	Diaz	Poster	THE ROLE OF GLUTAMATE RECEPTOR INHIBITION IN THE TREATMENT OF MELANOMA
8	Stephanie	Dietz	Poster	INTRODUCTION OF CRYOTHERAPY IN A SEE AND TREAT PROTOCOL FOR CERVICAL DYSPLASIA IN HAITI
22	Patrick	Drazkowski	Poster	PULMONARY ARTERY ENDOTHELIAL CELLS ARE SEX DIMORPHIC IN THEIR PROLIFERATIVE POTENTIAL. IMPLICATIONS FOR PLEXIFORM ARTERIOPATHY
124	Phillip	Engen	Poster	SINGLE-ARM, NON-RANDOMIZED, TIME SERIES, SINGLE-SUBJECT STUDY: FECAL MICROBIOTA TRANSPLANTATION IN MULTIPLE SCLEROSIS
14	Ricardo	Estupinian	Poster	AUGMENTING TUMOR ANTIGEN REPRESENTATION TO IMPROVE IMMUNITY TO CANCER
48	Renee	Evans	Poster	REDUCING 30 DAY READMISSIONS IN LIVER TRANSPLANT RECIPIENTS
159	Natasha	Ferguson	Poster	CONTRIBUTION OF INNATE LYMPHOID CELLS TO INFLAMMATION IN COLON DURING EARLY SIV INFECTION
55	Cristina	Foschi	Poster	NEURODEVELOPMENTAL OUTCOME AT 20 MONTHS CORRECTED AGE IN EXTREMELY PRETERM INFANTS AFTER EXPOSURE TO HYDROCORTISONE AND DEXAMETHASONE IN THE NICU
121	Dulce M.	Frausto	Poster	THE IMPACT OF THE INTESTINAL MICROBIOME ON MICROGLIAL INFLAMMATION
145	Katherine	Frigo	Poster	PROMOTING A HEALTHY WORK ENVIRONMENT TO DECREASE WORK-RELATED STRESS
141	Briana	Galindo	Poster	DO DAILY STRESSORS VARY BETWEEN HEALTHY AND CLINICAL HIGH RISK FOR PSYCHOSIS INDIVIDUALS?
103	Meghan	Garland	Poster	THE WOMEN'S LIFESTYLE PHYSICAL ACTIVITY PROGRAM: SELF-EFFICACY, OUTCOME EXPECTATIONS, GROUP SOCIAL SUPPORT AND ADHERENCE TO PHYSICAL ACTIVITY IN AFRICAN AMERICAN WOMEN
15	Eileena	Giurini	Poster	ROLE OF INFLUENZA-DERIVED TLR AGONISTS IN CANCER IMMUNOTHERAPY
64	Margaret	Gladman	Poster	CARE MANAGERS' KNOWLEDGE OF AND CONFIDENCE IN HEART FAILURE MANAGEMENT
173	Michael	Godoy	Podium Presenter	SURGICAL IMPACTION FORCE ON BENCHTOP HEAD/STEM THA ASSEMBLY: EFFECT ON SURGEON EXPERIENCE LEVEL AND IMPLANT MATERIAL
81	Ashley	Gousios	Poster	THE FREQUENCY AND BARRIERS TO CODING FOR MALNUTRITION

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95	Lauren	Gregory	Poster	IMPROVING ACCESS TO CARE FOR PEDIATRIC PATIENTS WITH HYPERTENSION
71	Megan E.	Gross	Poster	UTILIZATION AND COST OF LABORATORY TESTING IN VERY LOW BIRTH WEIGHT INFANTS
3	Kevin	Grudzinski	Poster	FUNCTIONAL DIET OUTCOMES AFTER TORS RESECTION OF OROPHARYNGEAL TUMORS
138	Annie	Guedikian	Poster	THE SCALES OF RECOVERY: BALANCING POSTTRAUMATIC STRESS WITH RESILIENCE IN THE VIOLENTLY INJURED
172	Jonathan	Gustafson	Poster	WHICH SURGICAL AND IMPLANT DESIGN FACTORS MOST INFLUENCE MODULAR HIP TAPER CONTACT MECHANICS?
77	Theresa	Guzaldo	Poster	INTERVENTIONS TO PROMOTE & SUPPORT DEVELOPMENT OF CLIENT SELF-ADVOCACY: A NARRATIVE REVIEW OF THE LITERATURE
45	Lillian	Hall	Poster	TEAM w.E.D.G.E. WORKING TO EVALUATE DISPOSABLE GRADE EQUIPMENT TO IMPROVE PATIENT OUTCOMES
134	Shannon	Halloway	Abstract	THE FEASIBILITY OF A COMBINED LIFESTYLE PHYSICAL ACTIVITY AND COGNITIVE TRAINING INTERVENTION TO PREVENT MEMORY LOSS IN OLDER WOMEN WITH CARDIOVASCULAR DISEASE
50	Mohammed Nabeel	Hameed	Poster	PERIOPERATIVE BLADDER MANAGEMENT: A QUALITY IMPROVEMENT INITIATIVE
190	Jacob	Hawkins	Poster	VARENICLINE FOR THE TREATMENT OF IMBALANCE IN PARKINSON'S DISEASE.
177	Jade	He	Poster	PLANTAR PRESSURE-BASED AUDITORY FEEDBACK FACILITATED GAIT RETRAINING TO REDUCE KAM-A LONGITUDINAL FEASIBILITY STUDY
96	Kirsten	Hendrickson	Poster	EXPLORING DISPARITIES IN MATERNAL MORTALITY IN THE UNITED STATES
108	Michelle	High	Poster	PARENT EDUCATION PROGRAMS FOR CHILDREN WITH MEDICAL COMPLEXITY: AN INTEGRATIVE REVIEW
16	Hanna	Hindt	Podium Presenter	GUT MICROBIAL CHARACTERISTICS OF WOMEN WITH AND WITHOUT BREAST CANCER
148	Christine	Hoang	Poster	BRUSH LICKING TOXICITY
149	Leanne	Horvath	Poster	TESTING MULTIDRUG RESISTANT BACTERIA WITH NEWLY APPROVED ANTIBIOTICS
135	Monica	Huback	Poster	THE IMPACT OF A NURSE-LED HYPERTENSION EDUCATION PROGRAM FOR YOUNG ADULTS WITH UNCONTROLLED HYPERTENSION
61	Beau	Hunsinger	Poster	HEALTHCARE UTILIZATION IN THE FIRST AND SECOND YEAR OF LIFE IN EXTREMELY PRETERM INFANTS EXPOSED TO HYDROCORTISONE AND DEXAMETHASONE

Poster Number	First Name	Last Name	Status	Title
178	Amandine	Impergre	Poster	BIOLOGICAL RESPONSE OF OSTEOBLATS AND MACROPHAGES TO ELECTROCHEMICAL METAL ION RELEASE
33	Joshua	Inslar	Poster	A CASE OF VANISHING THYMOMA
82	Jordyn	Irwin	Poster	'ALGO NUEVO': INTRODUCING A PARENT-CHILD EXECUTIVE FUNCTIONING PROGRAM IN A BILINGUAL-MULTICULTURAL COMMUNITY SETTING
125	Aeja	Jackson	Poster	MECHANISM FOR INTESTINAL MICROBIOME, LPS, and NLRP3 MICROGLIAL ACTIVATION IN PARKINSON'S DISEASE
140	Kristopher	Janevski	Poster	REPORTED TIME-USE AROUND MELATONIN ONSET IN HIGH-SCHOOL-AGED ADOLESCENTS
131	Mary	Janik	Poster	IMPROVEMENT OF INPATIENT COLONOSCOPY PREPARATION
116	Rishi	Jaswaney	Poster	EVALUATING UNCONSCIOUS BIAS REDUCTION IN THE 'HEALTH EQUITY AND SOCIAL JUSTICE' FOUR-YEAR PROGRAM
126	Sarah	Jochum	Poster	PERIPHERAL GASTROINTESTINAL CIRCADIAN DISRUPTION ASSOCIATED WITH COLITIS SEVERITY IN RODENT MODEL
151	Kylie	Jungles	Poster	ATOPIC DERMATITIS SEVERITY IN PATIENTS FROM AFRICAN ANCESTRY; RESULTS OF TWO COHORTS
26	Giedrius	Kanaporis	Poster	INOSITOL 1,4,5-TRISPHOSPHATE SIGNALING AND ATRIAL CALCIUM ALTERNANS
75	Rhona	Ke	Poster	UV-ACTIVATED FLUORESCENT LIGHTING IMAGES AS A PRACTICAL SCREEN FOR NIGHT BLINDNESS
165	Frank	Ko	Poster	INTRAMEMBRANOUS BONE REGENERATION IS ACCELERATED IN CONSTITUTIVELY ACTIVE LRP5 MUTANT MICE
120	Nicole	Kochman	Podium Presenter	CIRCADIAN MISALIGNMENT IN INFLAMMATORY BOWEL DISEASE IS ASSOCIATED WITH A MORE AGGRESSIVE DISEASE PHENOTYPE, INCREASED INTESTINAL PERMEABILITY, AND DYSBIOSIS
179	Lacin	Koro	Poster	LONG-TERM RADIOLOGIC DIFFERENCES IN SHORT AND LONG-SEGMENT ANTERIOR CERVICAL DISCECTOMY AND FUSION USING A DYNAMIC TRANSLATIONAL PLATE
86	Adam	Korte	Poster	ADDRESSING HEALTH CARE LITERACY: A PRE-TRAINING SURVEY OF COMMUNITY YOUTH
150	Sonya	Kothadia	Poster	APPROPRIATENESS OF C. DIFFICILE TESTING WITH CLINICAL SUPPORT TOOL VERSUS MANDATORY INFECTIOUS DISEASES ATTENDING APPROVAL
66	Lauren	Kret	Poster	ANESTHETIC MANAGEMENT OF PEDIATRIC PATIENTS WITH NIEMANN-PICK DISEASE TYPE C FOR INTRATHECAL 2-HYDROXYPROPYL- β -CYCLODEXTRIN INJECTION

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104	Julie	Kurek	Poster	ADDRESSING GAPS IN TRAINING AND EDUCATION TO IMPROVE CARE FOR PATIENTS WITH INTELLECTUAL OR DEVELOPMENTAL DISABILITIES: A PRELIMINARY SURVEY
36	Dirk	Labuschagne	Poster	CHAPLAINCY CARE IN THE MICU: DESCRIBING THE SPIRITUAL CARE PROVIDED TO MICU PATIENTS AND FAMILIES AT THE END OF LIFE.
180	Fiona	Lane	Poster	ASSESSING THERAPY DELAYS IN ACUTE REHABILITATION
89	Clara	Ledsky	Poster	PICTURING COMMUNITY: USING PHOTOVOICE AS AN EMPOWERMENT TOOL WITH THE YOUTH HEALTH SERVICE CORPS
57	Timothy K.	Lee	Poster	BODY MASS INDEX DOES NOT PREDICT THE SEVERITY OF NON-ALCOHOLIC FATTY LIVER DISEASE AT THE TIME OF CHOLECYSTECTOMY
54	Hazel	Levine	Poster	SUPPORTING THE ROLE OF THE NURSE IN ADVANCE CARE PLANNING ON A HEMATOLOGY/STEM CELL TRANSPLANT INPATIENT UNIT
169	Songyun	Liu	Poster	SPECIATION ANALYSIS OF INTRA-CELLULAR METALLIC IMPLANT DEBRIS USING SYNCHROTRON XRF-IMAGING
115	Morgan	Lohr	Poster	THE EVALUATION AND MODIFICATION OF INTERPROFESSIONAL EDUCATION OF MEDICAL LABORATORY SCIENCE STUDENTS AT RUSH UNIVERSITY
133	Anita	Lutzow	Poster	EVALUATING AN ASSAY FOR THE ACTIVITY OF ADAMTS-13 PROTEASE
19	MOUMITA	MAJUMDER	Poster	OVARIAN MALIGNANT TRANSFORMATION IS ASSOCIATED WITH INCREASED EXPRESSION OF DNA REPAIR ENZYME OXOGUANINE GLYCOSYLASE 1
78	Melissa	Malinasky	Poster	PERCEPTION OF VOWELS AND CONSONANTS IN COCHLEAR IMPLANT USERS
119	Agnieszka	Maniak	Poster	BILOTHORAX: AN UNCOMMON COMPLICATION FOR A COMMON PROCEDURE
181	Adrienn	Markovics	Poster	PHARMACOLOGICAL ACTIVATION OF PROTEIN TYROSINE PHOSPHATASE SHP-1 AMELIORATES AUTOIMMUNE ARTHRITIS IN MICE
99	Alicia	Martinez	Poster	BONE AND JOINT WELLNESS PROGRAM
23	Elizabeth	Martinez-Hernandez	Poster	ANTI-ARRHYTHMIC DRUGS MODULATE CALCIUM ALTERNANS IN ATRIAL MYOCYTES
72	Keegan	Marz	Poster	OPTIMIZED WORKFLOW AND STAFF ROLES TO IMPROVE THE MANAGEMENT OF PATIENTS WITH PREDIABETES
91	Ella	Mathieson	Podium Presenter	CHRONIC DISEASE SELF-MANAGEMENT WITH FORMERLY INCARCERATED PERSONS IN CHICAGO

Poster Number	First Name	Last Name	Status	Title
164	Stephanie	McCarthy	Poster	ASSESSMENT OF MATERIAL LOSS, DAMAGE MODES, AND MICROSTRUCTURE OF SEVERELY DAMAGED TOTAL HIP ARTHROPLASTY FEMORAL HEAD TAPERS
171	Steven	Mell	Poster	COMPONENT ALIGNMENT AFFECTS MATERIAL LOSS IN TOTAL KNEE REPLACEMENT - A PARAMETRIC FINITE ELEMENT STUDY OF ISO 14243-1:2009
37	Kelly	Modugno	Poster	A SINGLE CENTER RETROSPECTIVE REVIEW OF PHOTOPHERESIS TREATMENT COMPLETION UTILIZING A ONE TO ONE NURSING CARE MODEL
168	Daisuke	Momma	Poster	FOUR-DIMENSIONAL COMPUTED TOMOGRAPHY EVALUATION OF SHOULDER JOINT CONTACT AREA IN BASEBALL PLAYERS
117	Andrew	Moore	Poster	SEVERE THROMBOCYTOPENIA PREDICTS LOWER SURVIVAL RATE AND HIGHER TRANSPLANT RATE IN PATIENTS WITH LIVER CIRRHOSIS
102	Melissa	Morales-Perez	Poster	ADHERENCE TO ACS GUIDELINES IN WOMEN WITH METASTATIC BREAST CANCER
74	Ellen	Moran	Poster	NORAMAL VARIATION IN DLCO BIOLOGIC CONTROL MEASURES IN A MULTI-CENTER GLOBAL SUDY
128	Joseph	Morrow	Poster	EFFECT OF A SLEEP/CIRCADIAN FRIENDLY PROTOCOL ON THE OUTCOMES OF PATIENTS ADMITTED TO THE MEDICAL INTENSIVE CARE UNIT: A RANDOMIZED CONTROL TRIAL
20	Hita	Moudgalya	Poster	BASELINE SERUM BIOMARKER LEVELS AND PRE-BASELINE CLINICAL PARAMETERS ARE EFFECTIVE TOOLS FOR RISK STRATIFICATION OF CACHEXIA/PRE-CACHEXIA IN PRE-TREATED NON-SMALL CELL LUNG CANCER (NSCLC) PATIENTS
130	Maribel	Munoz	Poster	CAN UNPLANNED REOPERATION FOLLOWING COLORECTAL SURGERY BE PREDICTED?
31	Terrence	Murphy	Poster	AN APPLICATION OF A CHICAGO-BASED CLINICAL DATABASE RESEARCH NETWORK: INVESTIGATING THE AMERICAN HEART ASSOCIATION'S SIMPLE 7 AND ITS ASSOCIATION WITH HOSPITALIZATION.
111	Amy	Napleton	Poster	WRITTEN REFLECTION AS A TOOL FOR PERSONAL GROWTH IN HEALTH EQUITY-ORIENTED MEDICAL STUDENTS
192	Amanda	Narkis	Poster	BRINGING ART TO LIFE CHICAGO - AN INTERGENERATIONAL MULTIDIMENSIONAL SERVICE-LEARNING COURSE BRINGING ART THERAPY AND EMPOWERMENT TO PERSON WITH ALZHEIMER'S DISEASE AND RELATED DEMENTIAS

Poster Number	First Name	Last Name	Status	Title
167	Alexander	Newhouse	Poster	CHANGES IN RADIOGRAPHIC ALPHA ANGLE MEASUREMENTS ARE ASSOCIATED WITH VOLUMETRIC AND SURFACE AREA RESECTION DURING FEMORAL OSTEOCHONDROPLASTY
34	Morgan	Nienow	Poster	RELATIONSHIP BETWEEN BLOOD GLUCOSE VARIABILITY AND MUSCLE QUALITY AMONG ICU PATIENTS
158	Christina	Nowicki	Poster	ANTI-BACTERIAL IMMUNE RESPONSES TO BREAK IMMUNE TOLERANCE AND ELIMINATE CANCER
90	Karina	Oelerich	Podium Presenter	NEIGHBORHOOD BARRIERS ASSOCIATED WITH CERVICAL CANCER SCREENING IN CHICAGO, IL
146	Kristina	Olack	Poster	CAPILLARY KETONE BODY TESTING IN THE KETOGENIC DIET
184	Arnold	Olali	Podium Presenter	TRIUMEQ (ABACAVIR, DOLUTEGRAVIR, AND LAMIVUDINE) TREATMENT POTENTIALLY STIMULATES BONE FORMATION IN NORMAL WT FISHER RATS.
24	Maria Yuriana	Oropeza Almazan	Poster	MITOCHONDRIAL CALCIUM UNIPORTER COMPLEX ACTIVATION PROTECTS AGAINST CALCIUM ALTERNANS IN ATRIAL MYOCYTES
7	Ahmad	Othman	Podium Presenter	RUNX2 PROMOTES MICROTUBULE STABILITY FOR SURVIVAL OF BONE METASTATIC BREAST CANCER CELLS
93	Oswaldo	Palomares	Podium Presenter	PHYSICIAN KNOWLEDGE OF UNDOCUMENTED HEALTHCARE POLICY WITHIN RUSH UNIVERSITY MEDICAL CENTER
97	Susan	Panek	Poster	EXPOSURE TO COMMUNITY VIOLENCE
6	Elizabeth	Paris	Poster	NUCLEOLIN EXPRESSION CHANGES REFLECT MALIGNANT FORMATION IN THE FIMBRIA AND ONSET OF OVARIAN CANCER.
62	Ravi	Patel	Poster	CELLULAR MITOCHONDRIAL PROFILE IN HUMAN RENAL CELLS FOLLOWING SUPAR TREATMENT
127	Priya	Patel	Poster	A CASE REPORT ON A BASEBALL-SIZED LIVER MASS
29	Carlos	Pereira	Poster	ATRIAL ALTERNANS FORMS A DYNAMIC SUBSTRATE FOR THE INDUCTION OF ATRIAL FIBRILLATION
87	Leah	Petrucelli	Abstract	BENEFITS OF A SUSTAINABLE, STUDENT-LED SCREENING PROGRAM FOR SOCIAL DETERMINANTS OF HEALTH IN AN URBAN PRIMARY CARE PRACTICE
9	Alexander	Pohlman	Poster	THE ROLE OF CCL2 AND TUMOR ASSOCIATED MACROPHAGES (TAMS) IN LUNG ADENOCARCINOMA
70	Evguenia	Popova	Poster	COMMUNICATING WITH INTENTION: FAMILY-CENTERED CARE IN EARLY INTERVENTION THROUGH THE INTERPERSONAL LENS

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123	Hannah	Raff	Poster	CHRONOTHERAPY IN INFLAMMATORY BOWEL DISEASE
122	Vivian	Ramirez	Poster	THE DEEP NASAL MICROBIOTA IN PARKINSON'S DISEASE
32	Natasha	Rana	Poster	A RARE CASE OF REVERSE TAKOTSUBO CARDIOMYOPATHY WITH RIGHT VENTRICULAR INVOLVEMENT
174	Jonathan	Rasio	Poster	BIOMECHANICAL CHARACTERISTICS OF LABRAL AUGMENTATION VERSUS LABRAL RECONSTRUCTION IN A HIP CADAVER MODEL
156	Sarah	Repking	Poster	IMMUNOGENICITY AND SAFETY OF NEW HEPATITIS B ADJUVANTED VACCINE (HBAV) IN PATIENTS WITH CHRONIC LIVER DISEASES (CLD)
157	KaReisha	Robinson	Poster	β -CATENIN NEGATIVELY REGULATES IL-6 AND IL-8 EXPRESSION AT TRANSCRIPTIONAL LEVEL AND INDUCES REACTIVITY IN HUMAN ASTROCYTES
18	Marco	Rossi	Poster	THE ABILITY OF GUT MICROBIOTA INTERACTION PATTERNS TO PREDICT THE PRESENCE OF A DISTANT TUMOR
42	Micah	Rubin	Abstract	DELIRIUM IN ELDERLY PATIENTS UNDERGOING OUTPATIENT SURGICAL PROCEDURES: A RANDOMIZED CLINICAL TRIAL OF AN AVOID DELIRIUM PROTOCOL
84	Jordan	Rudman	Poster	PREDICTING APPOINTMENT NO-SHOW IN A COMMUNITY CLINIC PARTNERSHIP
170	Gregory	Ruzich	Poster	WEARABLE FEEDBACK TECHNOLOGY TO ENHANCE PARTIAL WEIGHT-BEARING AFTER LOWER EXTREMITY FRACTURE: A PROOF-OF-CONCEPT STUDY WITH SURGICAL AND HEALTHY INDIVIDUALS
53	Constance	Shay-Hadley	Poster	TRANSITIONING A NON-CLINICAL HOUSE ADMINISTRATOR TO A NURSE-LED HOSPITAL OPERATIONS ROLE
80	Theresa	Sherar	Poster	HOMELESSNESS AND MENTAL ILLNESS: CONSIDERATIONS FOR IMPROVING ACCESS TO HEALTHCARE
41	Nicholas	Skertich	Poster	COMPLICATIONS POST PEDIATRIC SURGERY IN PATIENTS WITH CEREBRAL PALSY, IS THERE A HEALTH DISPARITY?
92	Samantha	Souza	Podium Presenter	TOILETING BEHAVIOR QUESTIONNAIRE: A RASCH ANALYSIS OF VALIDITY
2	Jenny	Spencer	Poster	THE EFFECTS OF EXERCISE ON CANCER RELATED FATIGUE AND QUALITY OF LIFE IN HIGH GRADE GLIOMA PATIENTS UNDERGOING TREATMENT
49	Amanda	Sremac	Poster	CLINICAL VALIDATION OF TRI-AXIAL ACCELEROMYOGRAPHY AND ELECTROMYOGRAPHY

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79	Stephanie	Strong	Poster	ASSOCIATION BETWEEN VOCAL EMOTION IDENTIFICATION AND QUALITY OF LIFE IN ADULT COCHLEAR IMPLANT USERS
43	Morgan	Sturgis	Poster	ANALYSIS OF PROVIDER SURVEY ADDRESSING RUSH'S ADVERSE CHILDHOOD EXPERIENCE INTERVENTION DELIVERY
76	Jen'nea	Sumo	Podium Presenter	DEVELOPING AN ONLINE COMMUNICATION PLATFORM TO PROMOTE CULTURAL HUMILITY WITHIN A COLLEGE OF NURSING
28	Allison	Tambeaux	Poster	LUMINAL Ca ²⁺ CONTROL OF TYPE-1 INOSITOL 1,4,5-TRISPHOSPHATE RECEPTOR.
154	Brittany	Tang	Poster	IMPLEMENTATION OF NEONATAL SEPSIS GUIDELINES FOR PRETERM INFANTS
1	Samantha	Terranella	Poster	EVALUATING BIOPSY TECHNIQUES IN THE UPSTAGE RATE OF PAPILLARY BREAST LESIONS
142	Valerie	Tobin	Podium Presenter	THE EFFECT OF ADVERSE CHILDHOOD EXPERIENCES ON THE HEALTH OF TRANSGENDER AND GENDER DIVERSE AND CISGENDER ADOLESCENTS
107	Kaitlynn	Tracy	Poster	CREATION OF A MEDICAL STUDENT TRAINING TO IMPROVE CONFIDENCE PROVIDING TRAUMA-SENSITIVE CARE TO SEXUAL ASSAULT SURVIVORS
129	Laura	Tran	Poster	ESTABLISHING THE GROWTH CURVE OF CATENIBACTERIUM MITSUOKAI
182	Phuong	Tran	Poster	EFFECTS OF PROLONGED CHEMOGENETIC INHIBITION OF NOCICEPTORS IN A MURINE SURGICAL MODEL OF OSTEOARTHRITIS
106	Asantewaa	Ture	Poster	REDUCING IMPLICIT BIAS IN MEDICAL EDUCATION AND TRAINING: USE OF RACE IN STEP 1 QUESTION BANKS
143	Laura	VanPuymbrouck	Poster	EXPLICIT AND IMPLICIT DISABILITY ATTITUDES OF HEALTHCARE PROVIDERS
52	Connor	Wakefield	Poster	SUCCESSFUL MANAGEMENT OF NECROTIZING INFECTION EXTENDING TO BONE: A CASE SERIES
67	Maura	Waldron	Poster	MOBILITY COACH PILOT STUDY
113	Megan	Westendorf	Poster	EFFECT OF OCCUPATIONAL THERAPY INTERDISCIPLINARY EDUCATION ON PLAN OF CARE AND ADHERENCE TO BATHING IN LEAST RESTRICTIVE ENVIRONMENT: AN ACUTE CARE INTERVENTION
162	Daniel	Wichman	Poster	ASYMMETRICAL INTER-LIMB HIP STRENGTH IS ASSOCIATED WITH WORSE FUNCTIONAL OUTCOMES AND GREATER HIP PAIN IN PATIENTS WITH UNILATERAL FEMOROACETABULAR IMPINGEMENT SYNDROME

Poster Number	First Name	Last Name	Status	Title
175	Brittany	Wilson	Poster	A PROTEOMIC APPROACH TO IDENTIFY NOVEL SERUM BIOMARKERS OF PERI-IMPLANT OSTEOLYSIS IN A RAT MODEL
185	Yunan	Wu	Poster	DEEP LEARNING METHOD FOR DETECTING INTRACRANIAL HEMORRHAGE AND ITS SUBTYPES
35	Bryant	Yu	Poster	OUTCOMES OF DISLOCATED INTRAOCULAR LENS REPAIR BY MCCANNEL SUTURE
176	Catherine	Yuh	Podium Presenter	EFFECTS OF KINEMATIC AND KINETIC VARIABLES ON CARTILAGE SURFACE STIFFNESS AND CHONDROCYTE VIABILITY: A 3-FACTOR CENTRAL COMPOSITE DESIGN OF EXPERIMENTS
25	Bijan	Zarrabi	Podium Presenter	ULTRA-HIGH SENSITIVITY CARDIAC TROPONIN I ELEVATION, MYOCARDIAL MALPERFUSION, AND DIASTOLIC DYSFUNCTION IN WOMEN WITH ISCHEMIA AND NO OBSTRUCTIVE CORONARY ARTERY DISEASE: FROM THE WOMEN'S ISCHEMIA SYNDROME EVALUATION CORONARY VASCULAR DYSFUNCTION PROJECT
144	Siqi	Zhang	Poster	DESIGN SCIENCE METHODS TO ENGAGE WITH RUSH RESEARCH STUDY TEAMS
56	Sara	Zhukovsky	Poster	THE CERVICAL DYSPLASIA WORKSHEET (CDW): A LONGITUDINAL MAP OF CYTOLOGY AND HISTOLOGY OF CERVICAL DYSPLASIA TESTS AND PROCEDURES
21	Allison	Zimmerman	Poster	MECHANICAL DISPERSION IS A PREDICTOR OF 30-DAY PERMANENT PACEMAKER IMPLANTATION AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT
27	Laura	Zimmerman	Poster	DEPARTMENT-LEVEL DATA: AN IMPROVEMENT OF COLLECTION METHODS TO EVALUATE HF READMISSION