Abstract #: 1

Session Type: Poster
Category: Cancer

RADIATION EXPOSURE IN PEDIATRIC SARCOMA PATIENTS RECEIVING INITIAL CURATIVE CHEMOTHERAPY

Presenting Author: Kelsey Danley, BS

Authors: Kelsey Danley (Rush), Nitin Sane (Rush), Paul Kent, MD. (Rush)

References for abstract

Introduction: Regular imaging scans are routinely used in newly diagnosed pediatric sarcoma patients during initial chemotherapy ostensibly to detect the progression of disease and the need to alter therapy. The National Comprehensive Cancer Network (NCCN) and the Children’s Oncology Group (COG) recommend or require lung CTs, CXR, bone scans, and PET scans at checkpoints during chemotherapy for the most common pediatric sarcomas: Osteosarcoma (OST), Ewing's sarcoma (EWS), and Rhabdomyosarcoma (RMS) (1).

Objective: To question the risks/benefits of ionizing radiation imaging during initial systemic chemotherapy for children with sarcoma.

Methods: Results from studies over the last 15 years for the three most common newly diagnosed sarcoma patients, osteosarcoma (OST), Ewing's sarcoma (EWS), and rhabdomyosarcoma (RMS) treated on the Children Oncology Group (COG) open phase III protocols were reviewed. We recorded the number of chest X-Rays, lung CTs, bone scans, and PET scans required for each patient during chemotherapy for each protocol and calculated the total radiation exposure based on chest x-rays delivering 0.2mGy per scan, lung CTs delivering 7.0mGy per scan, bone scans delivering 6.3mGy per scan, and PET delivering 25 mGy per scan (2,3). Additionally, we documented the number of patients who were removed from protocol during chemotherapy (induction or consolidation) because of new or progressive disease detected on required imaging.

Results: Combining all the sarcoma protocols, only 196 out of 5,901 patients were found to have cancer progression detected through imaging during chemotherapy. The percent of patients found to have progressive disease by type of sarcoma was 0.2% of EWS, 6.3% of OST, 0.8% of RMS. Out of the patients without progressive disease, a total of 30036 imaging scans during chemotherapy were done. These radiation exposure events totaled 182,621.5 mGy of radiation, exposing the average child to 32.0mGy.

Conclusion/Significance: In our preliminary meta-analysis early progressive or relapsed disease was only detected 3.3% of the time in 5901 patients, and the average child was exposed to an ionizing radiation dose of 32 mGy. Decreasing or eliminating these exposures during chemotherapy or replacing those deemed necessary with non-ionizing modalities may tip the risk benefit ratio back towards a benefit.
Abstract #: 2

Session Type: Abstract/Podium Award (Student Presentation)
Category: Cancer

INCREASE IN NEUTROPHIL-TO-LYMPHOCYTIC RATIO FOLLOWING STEREOTACTIC BODY RADIOTHERAPY PREDICTS FOR INFERIOR SURVIVAL IN EARLY STAGE LUNG CANCER PATIENTS

Presenting Author: Ritika Dhawan, BS
Authors: Ritika Dhawan (RUMC), Mudit Chowdhary (RUMC), Jeffrey M. Switchenko (EMORY), Sibo Tian (EMORY), Kevin King (RUMC), Marta Batus (RUMC), Mary J. Fidler (RUMC), Philip D. Bonomi (RUMC), Neilayan Sen (RUMC), Kirtesh R. Patel (YALE), Mohammad K. Khan (EMORY), Gaurav Marwaha (RUMC)

Introduction: Systemic inflammation plays an important role in cancer progression. Neutrophil-to-lymphocyte ratio (NLR) is a surrogate for systemic inflammatory response, an elevation of which has shown to be a poor prognostic factor in many malignancies. Tumors treated with stereotactic body radiotherapy (SBRT) can stimulate the immune system to induce a strong antitumor T-cell response.

Objective: The aim of this study is to assess percent change in NLR (PCNLR), before and after SBRT, as a prognostic factor for survival in patients with early-stage lung cancer (ESLC).

Methods: Patients treated with SBRT for ESLC (Stage I-II) from 2012-2018 were retrospectively identified. Pre- and post-treatment NLR was calculated from the most recent full blood counts obtained pre- or post-SBRT. PCNLR was defined as (([pre-post-SBRT NLR] / [pre-SBRT NLR])). Overall survival (OS) was calculated using the Kaplan-Meier method. Application of Multivariable Cox models adjusted for confounders.

Results: 62 patients with calculable pre- and post-SBRT NLR values were available for analysis. The median time interval between blood draw and SBRT was 33 and 55 days for pre- and post-SBRT NLR, respectively. Of the 62 patients, 38 (61.3%) demonstrated an increased NLR following SBRT. Key baseline patient characteristics (age, gender, race, smoking, stage, mutation status) were balanced, except for higher rates of hyperlipidemia and less involvement of right upper lobe in the PCNLR>0 cohort. Treatment characteristics (number of fractions, dose/fraction, total dose) did not differ by cohort. The median follow-up was 25.4 months. A statistically significant OS advantage was seen when stratified by PCNL: 12, 24- and 36-month OS rates were 100% vs. 78.1%, 95.7% vs. 50.0%, and 87.7% vs. 45.0%, amongst patients with PCNL <0 vs. >0, respectively.

Conclusion/Significance: PCNLR, a potential marker for SBRT-induced inflammatory response, is inversely related to OS in patients with ESLC. If prospectively validated, NLR is a simple, systemic marker that can guide subsequent management.
Abstract #: 3

Session Type: Poster
Category: Cancer

OCCURRENCE OF APOPTOTIC COMPENSATORY PROLIFERATION SIGNALING VESICLES (ACPSVS) IN CANCER AND ITS IMPLICATION ON TUMOR GROWTH AND METASTASIS

Presenting Author: Amani Erra, MD
Authors: Kajal Gupta, Amani Erra, Puebla Cassini-Vieira, Faraz Bishehsari, Samer Al-Khudari, and Sasha H. Shafikhani. Department of Medicine, Division of Hematology/Oncology, Department of Otorhinolaryngology, Rush University Medical Center

Introduction: Recently, we reported that when primary cell lines are subjected to apoptosis, they produce specialized CrkI-containing microvesicles that induced proliferation in surrounding cells upon contact. We termed these specialized CrkI microvesicles Apoptotic Compensatory Proliferation Signaling Vesicles (ACPSVs). Given that majority of current cancer therapeutics eradicate tumor cells by apoptosis, we hypothesized that ACPSVs are also formed in cancer cells in response to therapies and could have far-reaching implications on tumor growth and metastasis.

Objective: We aim to assess the occurrence of ACPSVs in a variety of primary and metastatic cancer cells undergoing apoptosis as well as in tumors and blood extracted from cancer patient volunteers with their consent.

Methods: Cancer cells were grown under healthy or apoptotic conditions. Media supernatant were collected and subjected to differential centrifugations. Tumor and blood samples were also collected from patients after obtaining consent. IRB approval was obtained for collection of the same. The tissue fragments were minced and filtered to obtain a supernatant containing ACPSVs which were then subjected to Differential Centrifugation. The 16000 xg sample fractions containing ACPSVs were collected and assessed for their ability to induce proliferation in other adherent cancer cells as published previously.

Results: Our data indicate that while primary tumor cells produce ACPSVs only when undergoing apoptosis, metastatic tumor cells can also produce ACPSVs even when they are healthy, suggesting that the pathway of compensatory proliferation signaling may be hijacked by these cells. We also found high numbers of ACPSVs in all the tumors we examined, as well as in the blood of some cancer patients.

Conclusion/Significance: ACPSVs can be found in human tumor cells. These are also capable of inducing proliferation as noted in the proliferation assay. These vesicles are only produced when cells undergo apoptosis and not when they undergo necrotic type of cell death. This could have important ramification for accelerated tumor growth and metastasis. Current cancer treatment modalities use apoptosis as a means for tumor control, this may in turn pave way for production of these vesicles and thereby leading to proliferation and possibly distant metastasis.
ROLE OF PLASMACYTOID DENDRITIC CELLS-B CELLS CROSSTALK IN PERSISTENT INFLAMMATION AFTER ERADICATION OF HEPATITIS C VIRUS

Presenting Author: Lucas Fass, BS
Authors: Lucas Fass, Alyx Vogel, Miran Kim, Zhibin Zhu, Costica Aloman (Rush)

Introduction: Hepatocellular Carcinoma (HCC) due to hepatitis C virus (HCV) liver cirrhosis is a major cause of morbidity and mortality. Antivirals specific for HCV now achieve sustained viral responses and cure 90% of patients. It is possible that improving treatments and HCV associated inflammation would decrease HCC risk in these patients. Despite HCV cure, hepatic inflammation and HCC development persists. The pathogenesis of chronic liver inflammation after HCV and its role in HCC development is unknown. We have shown that persistent IFNα signatures exist after HCV cure and is being produced by liver plasmacytoid dendritic cells (pDCs).

Objective: In other autoimmune diseases pDCs/B cell crosstalk results in tissue injury. Thus we characterized pDCs/B cells hepatic axis in patients with HCC with or without active HCV.

Methods: Immunohistochemical staining protocols were performed on liver transplant tissues stored by the Rush Pathology Department. Cell markers characterizing cellular immune responses were (1) CD3 to identify T cells, (2) CD19 to map B cells, and (3) CD38 for B cell activation into plasma-blast. For the hepatic microenvironment supporting B cell activation/maturation we used CXCL13. MDA-5 was a surrogate for IFNa activity. Intensity of signal was graded on a 0-3 scale after comparison to unstained control samples.

Results: Samples of explanted liver tissue from nine patients transplanted in 2015 were obtained. Eight had HCC. Among these, two had cured HCV, four had active HCV, one had chronic Hepatitis B, and one had hemochromatosis. One patient without HCC exhibited chronic alcoholic cirrhosis. HCC patients with virally cured HCV at the time of transplant demonstrated more intense staining for MDA-5, CXCL13, and CD19 compared to those with active HCV. Patients with active HCV or non-HCV demonstrated more intense CD38 levels. CD3 levels were highest among active HCV patients at the time of transplant.

Conclusion/Significance: HCV cured patients have persistent MDA-5, CXCL13 protein levels as well as significant B cell infiltrate identified by CD19 expression similar to active HCV patients. This supports the hypothesis that chronic HCV infection induces virus independent changes in the hepatic environment contributing to a persistent inflammatory environment after HCV cure, which may contribute to the pathogenesis of HCC.
IMPACT OF CONTINUOUS ASPIRATION THROMBECTOMY IN MANAGEMENT OF LOWER EXTREMITY ACUTE ARTERIAL THROMBOEMBOLISM

Presenting Author: Demetrios Geanon, BS
Authors: Demetrios Geanon (RU); Co-authors: Bulent Arslan, MD (RUMC), Sreekumar Madassery, MD (RUMC, Rush Oak Park Hospital), David M. Tabriz, MD (RUMC), Jordan C. Tasse, MD (RUMC), Ulku C. Turba, MD, FSIR (RUMC).

Introduction: Mechanical thrombectomy (MT) is an emerging intervention to treat acute ischemia due to thrombus formation. The current practice of tPA thrombolysis for such events, though effective, is associated with numerous adverse effects including systemic hemorrhage. MT offers an alternative to thrombolysis for patients with acute ischemic events with the potential to reduce systemic side effects and improve clinical outcomes.

Objective: Continuous Aspiration Thrombectomy (CAT) system (Penumbra, San Francisco CA) is a relatively new tool in management of acute thromboembolic events. Our aim is to assess the safety and efficacy of CAT with or without concomitant thrombolysis for lower extremity acute arterial thromboembolism.

Methods: All patients who underwent lower extremity continuous aspiration thrombectomy procedures with or without concomitant thrombolysis were identified through our electronic medical reporting system. Patient demographics, comorbidities, thrombus distribution within the lower extremity vascular beds, utilization of thrombolytics, CAT related complications and technical and clinical outcomes were reviewed. Technical success was evaluated in each vascular territory (femoro-popliteal, fem-pop bypass, tibio-peroneal, below ankle) separately. Additionally, long term outcomes including 30-day reintervention rates and one-year limb salvage rates were calculated.

Results: Total of 84 patients underwent 188 CAT procedures in different vascular segments. Technical success rates in each specific vascular territory in CAT and CAT plus thrombolysis groups are demonstrated in Table 1. Overall 41 patients had 115 CAT procedures concomitantly with thrombolysis. Technical success rate in this group was 84.4% with 30-day reintervention and one-year limb salvage rates of 6.96% and 75.65%, respectively. Forty-three patients underwent CAT procedure alone without any thrombolysis. In this group overall technical success rate was 89.0% with 30-day re-intervention and one-year limb salvage rates of 10.96% and 76.71% respectively. There were no CAT related complications.

Conclusion/Significance: Utilization of continuous aspiration thrombectomy in patients with acute lower extremity thromboembolism significantly decreased the need for catheter directed thrombolysis in our patient population. The large number of patients in this review demonstrates a good safety profile and efficacy of this procedure.
ACTIVATION OF INTEGRIN CD11B/CD18 DRIVES ANTI-TUMOR INNATE IMMUNITY IN LUNG CANCER

Presenting Author: Terese Geraghty, BS
Authors: Terese Geraghty (Rush), Anugraha Rajagopalan (Rush), Samia Khan (Rush) and Vineet Gupta (Rush).

Introduction: Lung cancer is the leading cause of cancer related deaths in the United States. With a 5-year survival rate of 18%, lung cancer patients are in immediate need of new therapeutic options. A major problem facing immunotherapy for cancer is the active immune suppression by the tumor. Tumors show presence of large numbers of tumor-associated macrophages (TAMs), which suppress the adaptive immune response, increase neovascularization to the tumor, and promote tumor survival. The heterodimeric integrin CD11b/CD18 is highly expressed on TAMs and is essential for their recruitment and biological functions.

Objective: Reasoning that CD11b/CD18 activity is important for controlling tumor growth, we hypothesized that its functional modulation will alter TAM signaling in the tumor microenvironment (TME) to drive the anti-tumor immune response.

Methods: We transplanted syngeneic Lewis lung carcinoma (LLC) cells in C57B/L6 wild type, CD11b null (CD11b-/-), and in newly created CD11b knock-in transgenic mice and observed tumor growth. We also tested efficacy of a novel small molecule CD11b agonist called leukadherin 1 (LA1), which pharmacologically activates CD11b, in the LLC tumor bearing wildtype mice.

Results: We found that CD11b activation by LA1 significantly reduced tumor growth in wild type mice bearing LLC tumors as early as one week post treatment. Conversely, LLC tumors grew at a faster rate in CD11b-/- mice, compared to wild type mice, showing that CD11b is important for controlling tumor growth. Importantly, LA1 treatment in tumor bearing CD11b-/- mice did not show any efficacy, demonstrating the specificity of LA1 to CD11b. Tumor growth in CD11b KI mice mimicked the slow growing tumors treated with LA1. Further studies revealed that CD11b activation led to decrease in tumor neovascularization and reprogrammed TAMs to a more pro-inflammatory M1 phenotype, which helps to explain how CD11b is driving the anti-tumor response.

Conclusion/Significance: Our approach is novel because it activates CD11b instead of antagonizing or blocking it. These data significantly show that CD11b activation is an important macrophage function needed to elicit a potent anti-tumor immune response. CD11b activation acts as negative regulator of immune suppression and is a novel target for lung cancer immune therapy.
Abstract #: 7
Session Type: Poster
Category: Cancer

TRIPLE IMMUNOTHERAPY: POTENTIAL TREATMENT FOR HIGH RISK FIBROLAMELLAR HEPATOCELLULAR CARCINOMA

Presenting Author: Ariel Gliksberg, MD
Authors: Ariel Gliksberg (Rush)  Paul Kent (Rush)

Introduction: Fibrolamellar Hepatocellular Carcinoma (FLHCC) is a rare cancer (200 cases per year worldwide) primarily affecting young adults, characterized by the DNAJB1-PRKACA chimeric transcript. While localized, completely resected disease can be curative, relapsed/metastatic disease has a predicted 12 month survival with disease recurrence often within 8 weeks. There is no standard systemic therapy to prevent relapse/progression and treatments similar to traditional HCC have poor results. Current approved therapies include: sorafenib or nivolumab (NIV) alone, or combination 5-fluorouracil (5FU) with alpha-interferon 2b (INF). We report treating high risk FLHCC patients (multiple relapsed, refractory, metastatic or unresectable disease), who have failed such therapies with 'triple immunotherapy': 5FU, INF and NIV.

Objective: Describe our experience with immunotherapy in high risk FL-HCC. Six patients received 14 day cycles of: 5FU[200mg/m2 continuous infusion day 1-7], INF[4 million units/m2 SQ days 1,3,5,7], and NIV [3mg/kg IV day 1], followed by 7 days off.

Methods: Our 6 'high risk patients,' (1 metastatic/unresectable/progressive, 5 multiple relapses) each with failed systemic therapies, included 4 females/2 males, median age at diagnosis of 17 (16-30). Five had primary R0 liver surgery, and one 'debulking' surgery. At the time of post-op therapy, 3 had multiple relapses, 4 of 6 had a median of 2.5 (1-4) previous systemic therapies, with the average time to first relapse/progression of 8.4 weeks (1.5-20 wks).

Results: Patients received 59 cycles of immunotherapy, mean of 9.8 cycles (2-17), for an average of 20 weeks (6-110) with radiologic responses in 5 of 6 (3 improvement, 2 with sustained remission, 1 with growth versus 'pseudoprogression') and 4 of 4 with decreasing vitamin B12 levels (known to be a FLHCC tumor marker). Three patients (1 partial bowel obstruction, 1 appendicitis, and 1 colitis) required interruption of therapy. All patients resumed immunotherapy.

Conclusion/Significance: FLHCC has a very high propensity of quick relapse therefore effective systemic therapies are desperately needed. Although SFU/INF/NIV have been used separately, there are no published data with the combination. Most of our patients have shown response, with side effects that were manageable. The triple immunotherapy 5FU/INF/NIV requires more research and experience but may offer hope in high risk FLHCC.
RADIATION TOXICITY REDUCTION WITH A RADIOPAQUE HYDROGEL SPACER IN THE TREATMENT OF GYNECOLOGIC MALIGNANCY

Presenting Author: Cory Hogue, MD
Rush University Medical Center

Introduction: Toxicity from radiation treatment can be minimized using radiopaque hydrogel spacers to protect organs at risk.

Objective: High dose rate (HDR) brachytherapy is often used in the treatment of locally advanced and recurrent gynecologic cancer. Increasing dose for gynecologic malignancy is limited by toxicity to surrounding pelvic structures. Rectal toxicity can be morbid and is often dose limiting. Hydrogel spacers can improve rectal dosimetry and potentially reduce toxicity.

Methods: We present two cases utilizing hydrogel spacers to reduce rectal toxicity in gynecologic malignancy. The first case is a 48-year-old lady with vaginal cancer and the second case is a 57-year-old lady with recurrent endometrial cancer in the vaginal cuff with a prior history of vaginal brachytherapy. Both patients received 45 Gy in 25 fractions to the whole pelvis followed by interstitial HDR brachytherapy boost to 27.5 Gy in 5 fractions. Radiopaque hydrogel spacer was placed prior to treatment.

Results: Dosimetric results were computed and compared to CT based planning with and without the spacer in place. For the first case, the D2cc to the rectum was 1.16Gy with and 5.26Gy without the spacer. For the second case, the D2cc to the rectum was 4.99Gy and 7.72Gy with and without the spacer. At 6 month follow up, no grade 3 or higher rectal toxicity due to radiation was noted.

Conclusion/Significance: CT-guided placement of a radiopaque hydrogel spacer resulted in reduced absolute D2cc to the rectum. This is a reasonable approach for mitigation of normal tissue toxicity without compromising dose to the tumor. This may allow curative intent treatment in both the definitive and salvage settings.
IGF-1 AND TGF-β REGULATE THE EXPRESSION OF IMMUNE-CHECKPOINT MOLECULES IN LUNG ADENOCARCINOMA CELL LINES A549 AND H358

Presenting Author: Hita Moudgalya, MD
Authors: Hita Moudgalya(Rush); Imad Tarhoni(Rush); David Gerard(Rush); and Jeffrey Borgia(Rush).

Introduction: Immune checkpoint inhibitors have revolutionized the therapeutic approach for the treatment of lung cancer with durable and tolerable effects. Only 20% of patients, however, responded to therapy, and the causes of failure in the other 80% are still undetermined. One of the possible mechanisms is the manipulation of the immune-landscape on the tumor surface as the tumor progresses.

Objective: This study demonstrates the impact of microenvironmental TGF-β and IGF-1 on the expression and/or shedding of immune checkpoints (ICs) in lung cancer adenocarcinoma cells.

Methods: A549 and H358 cells were grown in RPMI-1640 containing 2.5% FBS at three treatment conditions for seven days: control (no treatment); 250ng/mL IGF-1; and 20ng/mL TGF-β. Proteins from cell lysates (CL) and conditioned media (CM) were collected and were tested with the Human Immuno-Oncology Checkpoint Protein Panel (MilliporeSigma). This panel consists of BTLA, CD27, CD28, TIM-3, HVEM, CD40, GITR, GITRL, LAG-3, TLR-2, PD-1, PD-L1, CTLA-4, CD80, CD86, and ICOS. All measurements were collected via a Luminex FLEXMAP 3D system, and calculated using xPONENT v4.0.3 software (Luminex Corp).

Results: Except for CD27, TIM-3, CTLA-4, and CD80, all other ICs were at detectable levels in both CL and CM. About 13.7, 8.7, 93, 31, 60, 7.2, and 1.4 percent of cellular CD28, HVEM, GITR, GITRL, PD-1, CD86, and PD-L1, respectively, were released in CM in A549 cells. 15, 5.5, 0.5, 66, 105, 14.9, and 4.3 percent, respectively, were released in CM from H358 cells. The remainder of the measured molecules in CM was less than 2% of their cellular concentration. IGF-1 significantly increased the surface level of LAG3, CD40, PD-1, and PD-L1 in A549 cells; CD40, GITR, GITRL, PD-1, and PD-L1 levels were augmented in H358 cells. TGF-β increased the cellular level of CD28, GITR, GITRL, CD86, PD-1 and PD-L1 in A549 cells, and CD28 in H358 cells. TGF-β decreased the levels of HVEM, CD40, LAG-3, TLR-2 in A549 cells, while HVEM, PD-L1, and CD86 levels were boosted in H358 cells. All measured differences were with p-values of <0.02.

Conclusion/Significance: These results spot the light on the role of IGF-1 and TGF-β in regulating tumor-immune interaction.
Abstract #: 10

Session Type: Poster
Category: Cancer

REGULATION OF MICROTUBULE ACETYLATION IN AUTOPHAGY IN BONE METASTATIC BREAST CANCER CELLS

Presenting Author: Ahmad Othman, MS
Authors: Ahmad H. Othman, Marcus Winogradzki and Jitesh Pratap Department of Cell and Molecular Medicine, Rush University Medical Center, Chicago, IL

Introduction: Bone metastasis of breast cancer causes significant patient mortality. Recent studies suggest that metastatic cancer cells induce autophagy to survive metabolic and hypoxic stress. During autophagy, cytoplasmic components and damaged organelles are captured by autophagosomes followed by lysosomal fusion and degradation, releasing metabolites as energy sources to meet metabolic demands. Although the components of autophagy have been well characterized, the regulatory mechanisms of autophagy in metastatic cancer cells in the bone microenvironment is still unknown.

Objective: Previously, we and others have shown that Runt-related transcription factor-2 (Runx2) promotes cell survival, cell migration and invasion, and tumor growth associated osteolysis. Therefore, we examined whether Runx2 regulates autophagy for increased cell survival in the bone microenvironment.

Methods: To examine autophagy during bone metastasis, we used a bone metastatic isogenic variant of breast cancer MDA-MB-231 cells isolated from a xenograft tumor mouse model of metastasis.

Results: Our results show that Runx2 enhances autophagy in metastatic breast cancer cells. Silencing of Runx2 causes accumulation of autophagic vesicles due to reduced turnover of autophagosomes. Live cell confocal microscopy and biochemical studies show that Runx2 enhances trafficking of autophagic vesicles and increases acetylation of the ß-tubulin (Ac-ßTub) subunit of microtubules. Similar to cancer-related functions of Runx2, elevated levels of Ac-ßTub have been linked with an invasive, migratory, and metastatic phenotype in cancer cells. Ac-ßTub is a marker of the stable fraction of the tubulin cytoskeleton which is utilized for vesicle trafficking. Our studies in Runx2 knockdown cells and treatments with microtubule depolymerizing agents such as Nocodazole and vinblastine showed that depolymerization of stable microtubule fraction decreases autophagic flux and that Runx2 is required for stable fraction of microtubules. Runx2 silencing results in a significant decrease in acetylated microtubule polymer mass. These results suggest that Runx2 enhances autophagy through maintaining cytoskeletal stability which is critical for autophagosome trafficking. Furthermore, immunohistochemical analysis of an autophagy marker LC3B protein in clinical breast cancer specimens showed significant association between high Runx2 and low LC3B protein levels.

Conclusion/Significance: Taken together, our studies reveal a novel function of Runx2 in cytoskeleton and provide molecular insights into the role of autophagy in bone metastatic cancer cells.
Abstract #: 11

Session Type: Poster

Category: Cancer

TUMOR-INDUCED ENDOPLASMIC RETICULAR STRESS MARKER GLUCOSE REGULATED PROTEIN (GRP78) SUPPRESSES ANTI-TUMOR FUNCTIONS OF NK CELLS

Presenting Author: Elizabeth Paris, BA (current PhD candidate)

Authors: Elizabeth Paris, Aparna Yellapa, Seby Edassery, Pincas Bitterman and Animesh Barua

Departments of Cell and Molecular Medicine, Pathology and Obstetrics and Gynecology Rush University, Chicago, IL

Introduction: Ovarian cancer (OVCA) is a fatal malignancy of women associated with high case to death ratio. Available chemotherapeutics are ineffective and toxic and OVCA recurs frequently. Immunotherapies are more effective and safer. OVCA disseminates locally in the peritoneal cavity. Local immune functions, including NK cells, may play important roles in prevention of OVCA progression. Tumors escape anti-tumor immunity by an unknown mechanism. Chronic cellular stress is a hallmark of malignant development and ovarian tissues are exposed to chronic stress as part of reproductive physiology. It is unknown whether tumor-associated stress in the ovary suppresses anti-tumor functions of NK cells.

Objective: The goal of this study was to examine if GRP78, a marker of cellular stress, was associated with the suppression of anti-OVCA NK functions.

Methods: Two experiments were conducted. In the first experiment, changes in expression of GRP78 during OVCA development and progression in patients was examined using normal ovaries, ovarian tumors at early and late stages (N=15, 5 from each group). In the second experiment, association between tumor-associated changes in GRP78 expression and NK cells were examined in laying hen model of spontaneous OVCA (N=15, 5 normal, 5 early and 5 late stage OVCA). Expression of GRP78 and frequency of NK cells was determined by immunohistochemistry and/or Western blotting. Significant differences in the intensity of GRP78 expression and frequency of NK cell among different groups were determined using ANOVA and paired t-tests.

Results: Compared with normal ovaries, expression of GRP78 was significantly higher in OVCA at early and late stages. Although the population of stromal NK cells were increased in association with OVCA development, the frequency of intra-tumoral NK cells did not increase suggesting that tumor-induced GRP78 might have suppressed the influx of NK cells into the tumor and facilitated the tumor progression.

Conclusion/Significance: These results suggest that tumor associated cellular stress is inversely associated with the influx of NK cells and might be a suppressor to anti-tumor NK cell function. The results will serve as a foundation for studies with a larger cohort to develop anti-OVCA immunotherapeutics. Support: Swim Across America (2017)
A MALIGNANCY IN DISGUISE

Presenting Author: Naseem Ravanbakhsh, MD
Authors: Megan Kraemer, DO; Lisa Giordano, MD; Rachel Abrams, MD (RUMC)

Introduction: Priapism is a genitourinary emergency, given the risk of penile necrosis and long-term erectile dysfunction.

Objective: To describe a case of priapism in an adolescent male.

Methods: A 17-year-old male presented to the emergency department complaining of a painful erection for three days. He had a 32 lb weight loss, but denied fever, fatigue and night sweats. He denied any medication or drug use. His exam was significant for marked splenomegaly. He underwent emergent needle decompression with corporal phenylephrine injection resulting in partial detumescence. Laboratory evaluation revealed white blood cell (WBC) of 292,000/ul with a marked left shift and 8% blasts, hemoglobin 10.1 gm/dl, and platelet count of 1,146 K/uL. Intravenous hyper-hydration, hydroxyurea (HU) and allopurinol were started immediately.

Results: Significant detumescence with decreased pain was achieved within eight hours. Marrow evaluation confirmed Philadelphia chromosome-positive (Ph+) chronic myelogenous leukemia (CML), and definitive therapy was initiated with daily imatinib mesylate. Aspirin was provided for prophylaxis against thrombosis due to extreme thrombocytosis.

Conclusion/Significance: CML in children is rare, encompassing 2-3% of leukemia diagnoses. The hallmark is the Ph+ chromosome, created by reciprocal translocation and fusion of the ABL and BCR genes on chromosomes 9 and 22, respectively. The fusion protein leads to granulocyte overproduction and bone marrow replacement. Patients present with leukocytosis and symptoms of weight loss, fatigue, and night sweats. Imatinib mesylate therapy is first line: studies show complete hematologic response in 96% of pediatric patients. Priapism in children may be caused by various etiologies such as sickle cell disease (65%), trauma (10%), idiopathic (10%), acute leukemia (5%), CML (5%) and medications (5%). Priapism is most commonly ischemic and leads to painful erection. Priapism as a result of hematologic malignancy is most likely caused by venous obstruction from microemboli/thrombi as well as hyperviscosity. Urgent treatment is required to reduce the risk of subsequent impotence. Treatment includes analgesia and addressing the underlying mechanism. Priapism due to CML may respond to hyper-hydration, needle decompression with corporal phenylephrine injection, and initiation of hydroxyurea. If initial measures are unsuccessful, then leukocytapheresis may acutely lower the WBC and relieve symptoms.
A SINGLE INSTITUTIONAL EXPERIENCE TREATING ADIPOCYTIC TUMORS. INCIDENCE, DISEASE-RELATED OUTCOMES, AND THE CLINICAL SIGNIFICANCE OF MDM2 ANALYSIS.

Presenting Author: Saule Tamkus, BS
Authors: Saule Tamkus (Rush University Medical Center) Alan Blank (Rush University Medical Center) Steven Gitelis (Rush University Medical Center) Matthew Colman (Rush University Medical Center)

Introduction: Adipocytic tumors can exist in either a benign or malignant form. The benign variant of these tumors are called lipomas and are composed of fat tissue. They typically develop from superficial fat cells. Liposarcomas are the malignant counterpart. They more often develop in deeper tissues and are the most common soft tissue sarcoma diagnosed. Malignant fat origin tumors exist as a spectrum of diagnoses, each carrying a unique risk of recurrence, metastasis, and survival prognosis. The World Health Organization classifies liposarcomas into five categories: (1) atypical lipomatous tumors/well-differentiated (ALT/WDL); (2) dedifferentiated (DDL); (3) myxoid; (4) round cell; and (5) pleomorphic. Lipomatous tumors are diagnosed based on histology, but they can also be differentiated by MDM2 amplification. MDM2 is a proto-oncogene that encodes a nuclear-localized E3 ubiquitin ligase. The encoded protein can promote tumor formation by targeting tumor suppressor proteins for degradation. Lipomas are differentiated by the absence of MDM2 amplification. ALT/WDL are intermediate-grade, locally aggressive tumors that demonstrate MDM2 amplification. Ten percent of ALT/WDL progress to the more aggressive DDL form. The DDL form has a high capacity to metastasize. The pathogenesis of this progression is unknown. However, previous studies suggest that increased MDM2 amplification may play a role.

Objective: The aim of this study was to evaluate a single institutional experience treating the entire spectrum of fat origin tumors, evaluating disease-related outcomes of each subgroup with the hypothesis that ALTs had a higher risk of local recurrence than lipomas.

Methods: This study retrospectively reviewing 106 charts (70 lipomas, 24 ALTs, 12 liposarcomas) and corresponding pathology reports of patients with excised lipomatous tumors presenting at our institution from years 2013-2017. Twenty-five tumors (6 lipomas, 18 ALTs, 1 liposarcoma) were tested for MDM2 amplification.

Results: Three of these tumors showed recurrence (2 ALTs, 1 liposarcoma), and all three exhibited MDM2 amplification. Three tumors (all liposarcomas) were associated with metastasis. Two out of the three patients with metastatic disease expired with disease-free survival of 4 months and 24 months.

Conclusion/Significance: Because the sample size is small, further research is needed to determine the extent of the effect of MDM2 amplification on prognosis and recurrence.
OPTIMIZATION OF DRIED BLOOD SPOTTING AS A NOVEL TECHNIQUE TO PREDICT LUNG CANCER RECURRENT THROUGH ANALYSIS OF INFLAMMATORY CYTOKINES

Presenting Author: Connor Wakefield, BS
Authors: Connor J. Wakefield (RUMC); Darin B. Bagar (RUMC); Cristina L Fhied (RUMC); Gabriela C. Lobato (RUMC); Jeffrey A. Borgia (RUMC)

Introduction: Lung cancer is the leading cause of cancer-related deaths in United States. There is a need to better detect early stage lung cancer and to predict cancer recurrence through the molecular analysis of circulating biomarkers as a companion diagnostic method for conventional computed tomographic screening.

Objective: The purpose of this study is to review and optimize conditions for the routine evaluation of circulating levels of cytokines associated with systemic inflammation provided via a dried blood spot delivery card.

Methods: Blood from non-malignant patients were extracted from dried blood spot cards upon an overnight vortexing at 4 °C using one of three conditions: 7 3.0mm cored spots with 100 µL of RUMC Extraction Buffer, 2 3.0mm cored spots with 100 µL of RUMC Extraction Buffer, and 2 3.0mm cored spots with 50 µL of RUMC Extraction Buffer. Additionally, 3.0 mm cores were also harvested and were exposed to the following conditions: 7 cored spots with 100 µL of Millipore Lysis Buffer (Millipore Cat #43-040), 2 Cored Spots with 100 µL of Millipore Lysis Buffer, 2 cored spots with 50 µL of Millipore Lysis Buffer, 2 Cored Spots with 100 µL of Northwestern Extraction Buffer for two hours with vortexing. The eluate and extracted cores for all conditions were transferred to Spin-X devices and centrifuged at 3200 RCF for 10 minutes. Eluate was used immediately for Luminex analysis. Evaluation of the concentrations of TNF-α, IL-6, IL-8, and IL-10 were then accomplished using the Human High Sensitivity T Cell Magnetic Bead Panel.

Results: The superior extraction buffer was found to be the Millipore Lysis Buffer. Robust values were readily measured using two 3.0 mm spots with 50 µL of extraction buffer for IL-8 and TNF-α, and all but 1 case for IL-6. Unfortunately, an accurate assessment for IL-10 values remained elusive and were not assignable for any condition tested.

Conclusion/Significance: We were successfully able to evaluated IL-6, IL-8, and TNF-α through dried blood spotting which offers a novel approach to possibly screen for early stage lung cancer or recurrence.
RACIAL DISPARITIES IN BREAST CANCER TREATMENT BASED ON ASCO/NCCN QUALITY GUIDELINES

Presenting Author: Surbhi Warrior, MPH
Authors: Surbhi Agarwal MPH(1), Ruta Rao MD(2), David Ansell MD MPH(3)  
Affiliation:  
1) Rush Medical College, Chicago, IL, USA  
2) Associate Professor of Medicine, Division of Medical Oncology, Department of Medicine, Rush University Medical Center, Chicago, IL USA  
3) Senior Vice President for Community Health Equity, Rush University Medical Center, Chicago, IL, USA

Introduction: ASCO/NCCN quality measures for breast cancer include 1) radiation therapy administered within 1 year of diagnosis for women under age 70 receiving breast-conserving surgery; 2) chemotherapy considered in 4 months of diagnosis for women under 70 with T1c or Stage II/III ER/PR-tumors; 3) endocrine therapy administered within 1 year of diagnosis for women with AJCC T1 or Stage II/III ER/PR+ breast cancer.

Objective: These evidence-based measures promote accountability for providers and allow transparency in quality of care. Black women are less likely than white women to receive these therapies that are associated with a survival benefit. Improving adherence to guidelines can decrease the gap in mortality rates for minority women with breast cancer.

Methods: We performed a retrospective chart review on breast cancer patients between April 2010 and October 2015 at Rush University. Information collected included time of diagnosis, clinical stage, ER/PR status, surgical procedures, radiation, chemotherapy, endocrine therapy, and demographics. Chi-squared analysis was done to compare percent of black versus white women who met each quality guideline.

Results: In total 2,436 women were analyzed, of whom 30.3% were black, 66% were white, and 3.7% were other. Of this cohort, 779 women met inclusion criteria for quality guideline 1, and there was no significant difference between black and white women who did not receive radiation therapy (p=0.21, 24.7% vs 20.4%). For quality guideline 2 (n=382), there was also no significant difference between black and white women who did not get chemotherapy within four months of diagnosis (p=0.32, 36.6% vs 31.4%). However, for quality guideline 3 (n=1,222), there was a statistically significant difference between black and white women who did not get hormone therapy within a year of diagnosis (p=0.0008, 36.9% vs 26.1%).

Conclusion/Significance: Endocrine therapy reduces risk of recurrence and mortality in women with ER/PR positive breast cancer; however, there is a disparity between black versus white women who meet this NCCN quality guideline. Further studies are needed to understand the reason for this gap in quality of care so that specific interventions can be implemented to eliminate this disparity.
DESCRIPTION AND ANALYSIS OF PATIENTS AND OUTCOMES FOLLOWING THIRD TIME HEART TRANSPLANTATION

Presenting Author: Sameer Bhalla, BA
Authors: Sameer Bhalla B.A.(1), Gaurav K. Dubey M.S.(2), Sanjib Basu PhD(3), Sivadasan Kanangat PhD(4), Cosmin Dobrescu M.D.(2), Dilip S. Nath M.D.(2)    Affiliations:  (1)Rush University Medical College, Chicago, IL  (2)Rush Medical Center, Department of Cardiovascular and Thoracic Surgery, Chicago, IL  (3)Rush University, Department of Preventative Medicine, Chicago, IL   (4)Rush University, Department of Pathology, Chicago, IL.

Introduction: Following second heart transplantation (HTx), some patients experience graft failure and require third time heart transplantation. Little data exists to guide decision making with regard to repeat re-transplantation in older patients.

Objective: Our study aims to provide a detailed description of the cohort of all patients undergoing third time HTx, including all age groups, and analyze risk factors for survival.

Methods: We performed a retrospective cohort analysis of patients receiving a third HTx, as identified in the United Network for Organ Sharing (UNOS) database from 1985-2017.

Results: The study cohort consisted of N=60 patients, with an average age of 29 with a standard deviation of ± 18 years. Overall survival for the cohort at 1, 5, and 10 years is 83%, 64%, and 44% respectively. The rate of third time HTxs has steadily increased in all age groups. Patients older than 50 years now account for 18.3% of all third time HTxs. Although this group demonstrated longer average previous graft survival, after third HTx they demonstrate significantly poorer survival outcomes compared to third time HTx recipients younger than 21 (p= 0.05). Age over 50, BMI over 30, and diabetes were all found to be independent risk factors for decreased survival following third HTx.

Conclusion/Significance: We describe trends in patients undergoing third HTx. We highlight subsets of such recipients who exhibit decreased survival.
THE EH-INDUCED MOUSE MODEL OF PULMONARY ARTERIAL HYPERTENSION RECAPITULATES GENDERED DIFFERENCES OF HUMAN DISEASE

Presenting Author: Brandon Carman, PhD
Authors: Brandon Carman (Rush), Shanshan Qin (Rush), Dan Predescu (Rush) and Sanda Predescu (Rush)

Introduction: Pulmonary arterial hypertension (PAH) is a complex disease characterized by elevated pulmonary arterial pressure, pulmonary vascular remodeling and occlusive pulmonary vascular lesions. Furthermore, and creating a gendered paradox in PAH, the lung phenotype of female PAH patients appear more severe compared to male patients, however males have worse outcomes. The therapeutic strategy for PAH remains suboptimal with poor survival rates in both genders.

Objective: A need to identify a mouse model influencing the gendered paradox of PAH remains.

Methods: We took advantage of our recently developed mouse model of plexogenic PAH generated via a two-hit pathophysiological mechanism. Intersectin-1s (ITSN) knockout/heterozygous (KOITSN+/-) mice (16-18 weeks), were transduced via cationic liposomes with an ITSN fragment possessing endothelial cell proliferative potential (EHITSN); the EHITSN is a result of granzyme B cleavage of ITSN under inflammatory conditions associated with PAH and is present in the lungs of PAH animal models and human patients.

Results: Histological and morphometric analyses of lung tissue revealed that EH-KOITSN+/- female mice develop a more severe lung PAH phenotype than EH-KOITSN+/- male mice (i.e. ~22% more muscularization of the small (20-50µm) and medium-sized (51-100µm) pulmonary arteries, and 37.5% more occlusive lesions per lung cross-section). The findings were confirmed by echocardiography to measure pulmonary acceleration time (PAT); lower PAT values were recorded in female (16.41 ms) than male (18.62 ms) EHITSN-transduced KOITSN+/- mice. On the contrary, consistent with the gendered paradox in PAH, EH-KOITSN+/- male mice exhibit higher right ventricular systolic pressure values (29.75 mm Hg), than female EH-KOITSN+/- mice (22.88 mm Hg). Interestingly, the Fulton Index, indicative of right ventricular hypertrophy, shows less drastic differences with 0.279 in male and 0.262 in female EH-KOITSN+/- mice. Moreover, biochemical studies of mouse lung lysates and nuclear extracts revealed that the activation of the p38MAPK, Elk1 transcription factor, and increased c-Fos gene expression correlate with the degree of plexiform arteriopathy and severity of PAH phenotype.

Conclusion/Significance: These studies demonstrate that the lung phenotype of the EHITSN-transduced KOITSN+/- mice recapitulates the gendered differences observed in human PAH, and is mechanistically-linked to signaling pathways implicated in PAH pathogenesis in humans.
Abstract #: 18

Session Type: Poster
Category: Cardiovascular/Pulmonary

STEROID-INDUCED BRADYCARDIA IN A NEWLY DIAGNOSED B-CELL ALL PATIENT WITH HOLT-ORAM SYNDROME

Presenting Author: Bishir Clayton, BS
Authors: Raymond Morales, MD PhD (Rush), Arnaud J Wautlet, MD (Rush), Jessica Chin, BS (Rush), Lisa Giordano, MD (Rush), Hoang Nguyen, MD (Rush), Brieann A Muller, MD (Rush)

Introduction: Holt-Oram syndrome (HOS) is a rare condition with upper extremity malformations as well as cardiac lesions that includes structural defects and conduction anomalies. The condition may be result from autosomal dominant inheritance or spontaneous mutations. There are sparse reports in the literature documenting malignancy in association with HOS. To our knowledge, this is the first known case of B-cell acute lymphoblastic leukemia (ALL) in a patient with HOS. Steroids are essential to the treatment of leukemia, and steroid-induced bradycardia is a rare phenomenon. The incidence of bradycardia in a patient with genetically induced cardiac conduction defects presents as a problematic factor in the context of this steroid requirement.

Objective: N/A

Methods: N/A

Results: A 12 yo female with Holt-Oram Syndrome (HOS) s/p ASD and VSD repair, 1st degree heart block, and bilateral thumb hypoplasia was admitted for persistent pallor with labs concerning for leukemia. Previously, she had been seen by her PCP for pallor with labs significant for anemia and thrombocytopenia. Repeat labs at time of diagnosis was notable for a CBC consisting of lymphocytosis with blasts and neutropenia, anemia, and thrombocytopenia. Bone marrow biopsy confirmed the diagnosis of B-cell ALL and genomic analysis revealed a Philadelphia-like (Ph-like) mutation. Her CSF was free of blasts. Induction chemotherapy was initiated with prednison, daunorubicin, PEG asparaginase and vincristine, as well as intrathecal cytarabine and methotrexate. Dasatinib was added to per treatment protocol due to her Ph-like mutation. On day 3 of induction therapy she had asymptomatic intermittent bradycardia to the mid-40s while awake. 12-lead EKG revealed sinus bradycardia. Continuous telemetry revealed an intermittent wandering pacemaker. No changes were made to therapy protocol and she was monitored closely.

Conclusion/Significance: There are a few cases in the current literature that document an association between HOS and malignancy. Here, we present the incidence of B-Cell ALL in a patient with HOS. Further, development of bradycardia during chemotherapy in an individual with congenital conductional anomalies can complicate treatment course.
Abstract #: 19

Session Type: Poster
Category: Cardiovascular/Pulmonary

**INOSITOL 1,4,5-TRISPHOSPHATE RECEPTOR REGULATION IN ATRIAL MYOCYTE MICRODOMAINS**

**Presenting Author:** Jaime DeSantiago, MD,PhD
**Authors:** Jaime DeSantiago, Disha Varma, Lothar Blatter, Kathrin Banach; RUSH UNIVERSITY MEDICAL CENTER, Chicago IL

**Introduction:** Angiotensin II (AngII), which is increased in tissue of patients with atrial fibrillation (AF) induce an increase in InsP3 induced InsP3 receptor type 2 (InsP3R2) mediated Ca2+ release (IICR) and an increase in the intracellular production of reactive oxygen species (ROS). InsP3R2 is up-regulated in patients with AF and IICR is linked to an increase in premature atrial contractions (PACs).

**Objective:** We hypothesized that InsP3R and NADPH oxidase 2 (NOX2) form a functional signaling domain where NOX2 derived reactive oxygen species (ROS) regulate InsP3R agonist affinity and contractile strength.

**Methods:** Atrial myocytes (AM) were isolated from wild type and NOX2 (gp91phox-/-) deficient mice. Changes in cytoplasmic Ca concentration [Ca]	extsubscript{i}; fluo-4/AM) or ROS (2',7'-dichlorofluorescein, DCF) were monitored by confocal microscopy.

**Results:** We demonstrate for the first time in AMs that agonist induced IICR and PACs depend on ROS production within a signaling domain of InsP3R and NOX2. Superfusion of AMs with AngII (1 \(\mu\)M) significantly increased diastolic [Ca]	extsubscript{i} (F/F0, Ctrl20': 1.0\pm0.01, AngII20': 1.2\pm0.03; n=7; p<0.05), Ca transient amplitude (\(\Delta F/F0\), Ctrl: 2.0\pm0.17, AngII: 2.39\pm0.22, n=7; p<0.05), and PACs (Ctrl: 0 s-1, AngII: 0.15\pm0.05 s-1; n=7; p<0.05). The increases, were suppressed by InsP3R2 blocker 2-aminoethoxydiphenyl-borate (2APB; 1 \(\mu\)M) demonstrating their dependence on IICR. Simultaneously AngII-induced increased in ROS production was sensitive to the NOX2 specific inhibitor gp91ds-tat (1 \(\mu\)M). In the absence of NOX2/ROS (gp91phox-/ - AMs) AngII however failed to increase [Ca]	extsubscript{i} and PACs indicating a sensitization of InsP3R by NOX2/ROS. In saponin (0.005%) permeabilized AMs InsP3 (5 \(\mu\)M) induced spatially defined Ca release events (sparks) that were increased in frequency by superfusion with the peroxide tert-butyl hydroperoxide (tBHP: 5 \(\mu\)M; InsP3: 9.65\pm1.44 sparks*s-1*100 \(\mu\)m-1; InsP3+tBHP: 10.77\pm1.5 sparks*s-1*100 \(\mu\)m-1, n=5, p<0.05). The combined effect of InsP3 + tBHP was entirely suppressed by 2-APB and Xestospongin C (5 \(\mu\)M) suggesting a ROS dependent regulation on the InsP3R2.

**Conclusion/Significance:** Our data show a novel mechanism of InsP3R regulation in the atrial muscle that consisting of a functional signaling domain where InsP3R and NOX2 closely interact. This mechanism could have relevance in a stretch dependent increase in atrial contractile force.
Abstract #: 20

Session Type: Poster
Category: Cardiovascular/Pulmonary

THE ROLE OF SUPAR IN DOXORUBICIN INDUCED CARDIOMYOPATHY IN BREAST CANCER PATIENTS: CAUSATIVE VS PREDICTOR

Presenting Author: Lindsay Friedman, MS
Authors: Sneha Devanesan, M.D. (RUMC), Maryann Madappallil (Loyola University Chicago), Tochukwu M Okwuosa, D.O. (RUMC)

Introduction: The advent of advanced chemotherapeutic agents has allowed cancer survival to increase, however long-term cardiotoxicity is becoming a severe ramification. Cardiovascular disease (CVD) is the leading non-neoplastic cause (59.2%) of death in cancer survivors. Doxorubicin, the leading anthracycline prototype, shows dose-dependent cardiotoxicity developing years after treatment completion. Related to c-reactive protein (CRP), soluble urokinase plasminogen activator receptor (suPAR), has been found as a consistent inflammatory marker. SuPAR's role in doxorubicin-induced cardiotoxicity has not been investigated despite vast potential as a predictor of cardiomyopathy.

Objective: To determine if higher baseline suPAR levels predispose doxorubicin-induced cardiomyopathy and to determine if suPAR is a marker of doxorubicin-induced cardiomyopathy.

Methods: Serum suPAR, pro-BNP, troponin, and CRP were measured by venipuncture at baseline, with each doxorubicin cycle, and three, six, and twelve months after completed treatment. Patients received baseline echocardiograms or MUGA scans to determine LVEF and strain.

Results: At time of analysis, thirty-nine patients had enrolled and eleven completed the six-visit regimen. SuPAR values over six visits averaged at 2.85, 2.78, 2.82, 2.83, 2.85, 2.30 ng/mL respectively. None yielded statistically significant changes in relation to traditional markers. ProBNP levels over six visits averaged 64.15, 69.28, 177.05, 77.40, 70.80, and 82.28 mg/L. Troponin average over six visits was 0.01, 0.012, 0.02, 0.02, 0.01, and 0.01 ng/mL. CRP average over six visits was 6.75, 5.47, 8.02, 4.43, 4.81, 5.40 mg/L. Strain at each visit averaged -20%, -19%, -21%, -19%, -18%, -20%.

Conclusion/Significance: The data suggest suPAR is constant throughout doxorubicin-based chemotherapy regimens. However, there are modest increases in proBNP, troponin, and CRP over the course of treatment. Increases seen in the first 4 measurements of cardiac damage and inflammation may be related to increased cumulative doses of chemotherapy. The subsequent fall in inflammatory markers may be related to treatment completion. Our dataset includes eleven completed patients and twenty-nine with upcoming measurements. Once all visits are conducted, further analyses are required to interpret suPAR implications on cardiotoxicity. Should suPAR be observed as a prognostic marker for or indicate a predisposition to cardiotoxicity, it would change how chemotherapy regimens are tailored to each patient and modify guidelines to prevent CVD.
CORRELATION OF SCREENING EKG, TTE, AND ASCVD RISK SCORE TO 10 YEAR ASCVD OUTCOMES AMONG ASYMPTOMATIC COMMUNITY DWELLING WOMEN

Presenting Author: Joanne Michelle Gomez, MD
Authors: Joanne Michelle Gomez (Rush); Arianne Clare Agdamag (Rush); Nilam Patel (Rush); Maria Isabel Camara (Rosalind Franklin); Simisola Alalade (Rush); Katherine Khazey (WVCOM); Meghna Patiath (Rush); Isabel Kats (Rush); Emma Fleisher (Rush); Estefania Oliveros Soles (Rush); Neelum Aggarwal (Rush); Kim Williams (Rush); Annabelle Volgman (Rush)

Introduction: The efficacy and value of non-traditional screening methods such as electrocardiogram (ECG) and transthoracic echocardiography (TTE) remain unknown.

Objective: In this study, we examined the correlation between initial ECG and TTE findings, and atherosclerotic cardiovascular disease (ASCVD) 10-year risk score with actual 10-year ASCVD outcomes among asymptomatic women from a community-based screening program cohort at Rush University Medical Center.

Methods: A 10-year follow-up survey was conducted in March-September 2018 from the 355 participants from the initial 2BigHearts community screening program in 2007. Demographics, past medical history, ASCVD outcomes (stroke, non-fatal MI, PAD), and self-reported medication lists were obtained from the 107 participants who responded to the survey. Pearson Chi-square Test was used to determine the association of ECG, TTE, and calculated ASCVD risk score with ASCVD outcomes and heart failure (HF).

Results: Amongst the 107 participants (mean age 63+10.6 years, 68.3% Caucasian, 18.3% African American, 8.6% Hispanic, 4.8% Asian), 15% (16/107) had baseline TTE abnormality with chamber enlargement as most common while 29.9% (32/107) had baseline ECG abnormality with conduction abnormalities as most common. The mean ASCVD 10 year risk score was 4.02%+4.5%. Of the 107, 11 had ASCVD score > 7.5% of which 2 developed non-fatal MI and PAD. Other co-morbid conditions included 29% (31/107) hyperlipidemia, 22.4% (24/107) hypertension, 8.4% (9/107) diabetes, 6.5% (7/107) obstructive sleep apnea and 12.1% (13/107) any type of cancer. Chi-square testing showed no statistically significant correlation between ECG or TTE abnormality with ASCVD outcome (p=0.251 ECG, p=0.461 TTE). Baseline ASCVD risk score of >7.5% was associated with 10-year ASCVD outcome (p=0.003) and abnormal TTE at baseline was associated with heart failure in 10-year follow-up (p=0.017).

Conclusion/Significance: This study found no association between abnormal screening ECG and TTE findings with 10-year ASCVD outcomes (stroke, non-fatal MI, PAD). However, abnormal TTE findings are associated with HF. ASCVD pooled cohort equation proved to be better than ECG and TTE in predicting ASCVD outcomes.
Abstract #: 22
Session Type: Poster
Category: Cardiovascular/Pulmonary

EARLY DETECTION OF RIGHT VENTRICULAR DYSFUNCTION AND ASSOCIATIONS WITH ALL-CAUSE MORTALITY AMONG LYMPHOMA PATIENTS TREATED WITH DOXORUBICIN-BASED CHEMOTHERAPY

Presenting Author: Kyaw Zaw Hein, MD, PhD
Authors: Kyaw Zaw Hein (RUMC); Manshad Ahmad (RUMC); Mohamad Hemu (RUMC); Rajiv Varandani (CCOM); Fatima A Ballout (RUMC); Tochukwu M Okwuosa (RUMC)

Introduction: Doxorubicin remains one of the most common causes of cardiotoxicity that leads to significant morbidity and mortality; and early derangements in left ventricular (LV) ejection fraction predict chemotherapy-induced cardiotoxicity and mortality. Several studies show that RV dysfunction has independent prognostic implications and predicts subclinical LV dysfunction in animal models receiving doxorubicin.

Objective: We investigated a dose-dependent doxorubicin-induced RV dysfunction in lymphoma patients and its association with all-cause mortality.

Methods: Thirty-five patients with adult lymphoma treated with doxorubicin were studied. All had normal baseline LV ejection fraction (LVEF >55%), and no known cardiopulmonary disease. We studied the effects of doxorubicin on RV global longitudinal strain by 2D speckle-tracking echocardiography, as well as RV fractional area change (RV FAC), RV free wall strain (RV FWS) and LVEF; measured prior to chemotherapy initiation and compared with same parameters at a 6-month follow-up interval. Images were analyzed offline by two independent observers blinded to the clinical characteristics of the study population. We also assessed all-cause mortality at follow-up. Patients served as their own controls. Comparisons between pre- and post-therapy echo parameters were achieved using paired Student’s t-tests or Chi-Square test. The Interobserver Intraclass Correlation Coefficients for RV GLS, RV FAC and RV FWS, were 0.87, 0.81 and 0.79, respectively.

Results: Mean age was 51±13 years, 40% women, 60% white, mean cumulative doxorubicin dose: 239±104 mg m⁻². From pre- to post-doxorubicin therapy, at a cumulative doxorubicin dose ≥ 200 mg m⁻², we found a significant decline in RV FAC (47.2±4.5% vs. 42.8±3.4%, p=0.0002), RV FWS (-25.1±3.4 vs. -22.2±2.9, p=0.001), and RV GLS (-23.0±4.2 vs. -20.6±3.4, p=0.03); but not at cumulative dose < 200 mg m⁻² (p=NS). Conversely, at the same period, there was no significant decline in LVEF with doxorubicin irrespective of the dose (p=NS). Furthermore, RV dysfunction was associated with all-cause mortality (HR 6.6 (95% CI: 1.2 - 45).

Conclusion/Significance: In this cohort of adult lymphoma patients, doxorubicin-based therapy was associated with subclinical RV dysfunction at a cumulative dose ≥ 200 mg m⁻²; which in turn associated with all-cause mortality. Larger studies evaluating the long-term prognostic implications of RV dysfunction in this population are essential.
Abstract #: 23

Session Type: Poster
Category: Cardiovascular/Pulmonary

RE-EXPANSION PULMONARY EDEMA: AN ATYPICAL PRESENTATION OF AN UNCOMMON COMPLICATION

Presenting Author: Elizabeth Hubbard, MD
Authors: Elizabeth L Hubbard, MD, Camille F. Hawkins, MD, Jacqueline N. Horst, MD and Sara Hanif Mirza, MD, MS

Introduction: Re-expansion pulmonary edema (RPE) is a rare and potentially fatal complication of thoracentesis. Pathogenesis is not well known however risk factors include chronic effusions, large volume fluid removal and rapid lung re-expansion. Management is largely supportive so prompt identification and termination of procedure is critical. We present a rare presentation of RPE following thoracentesis.

Objective: A 38 year old man with complicated cardiac history, including non-ischemic cardiomyopathy and aortic insufficiency, pulmonary hypertension and non-Hodgkin’s lymphoma presented with shortness of breath due to heart failure exacerbation. Chest x ray revealed enlarging right-sided pleural effusion. Thoracentesis was performed and two liters of clear, yellow fluid was aspirated. Near the end of the procedure, the patient developed a persistent cough productive of 3L of frothy, bright yellow sputum. He desaturated to mid-80's on pulse oximeter with increased work of breathing necessitating BiPap and close observation in the intensive care unit. Post procedure chest x-ray showed improvement of the right pleural effusion and new bilateral ground glass opacities consistent with RPE. He was treated with supportive care including supplemental oxygen and diuresis, and subsequently improved.

Methods: N/A

Results: N/A

Conclusion/Significance: RPE is a rare but well-known complication of thoracentesis, seen in less than 1% of patients. However mortality has been documented as high as 20%. The pathogenesis of RPE is not entirely known but risk factors include chronicity of the effusion and the rate at which the lung re-expands. Increasingly negative pleural pressures created during the fluid removal may lead to increased transpleural pressures and pulmonary capillary pressures. Large volume fluid removal was previously thought to be a risk factor, however subsequent studies have demonstrated safety with draining volumes of greater than 1 liter. Clinical presentation can vary from chest pain, cough, dyspnea to respiratory failure. Therefore, prompt identification and management is vital. Our patient demonstrated copious, yellow sputum production and respiratory failure, a rare presentation that has not yet been documented. Immediate termination of the procedure in conjunction with supportive management is the recommended treatment. Our patient’s atypical presentation of copious sputum production as an initial symptom of RPE reminds clinicians to keep this important post-procedure complication in mind.
ARTERIAL THROMBOSIS- UNUSUAL SITE AND ETIOLOGY

Presenting Author: Sheraz Hussain, MD
Authors: Sheraz Hussain MD(1), Claire Scott(2), Saumya Mehta DO(1), Deepthi Busayavalsa MD(1), Muhammad Ali Khan MD (1), Amisha Shah DO(1), Amber Andrade MD(3). Institution Affiliation: Department of Internal Medicine, UIC/Advocate Christ Medical Center(1), Rosalind Franklin University/Chicago Medica(2), Department of Cardiology and Advance Heart Failure, UIC/Advocate Christ Medical Center(3).

Introduction: Arterial thrombosis is a common occurrence mostly in the abdominal aorta, coronary, carotid and popliteal arteries. It is usually associated with contributory risk factors such as smoking, atherosclerosis, hormonal contraceptive use, penetrating trauma and pro-thrombotic autoimmune conditions.

Objective: -

Methods: Case Presentation A middle aged female presented to the hospital with complains of left-sided chest pain since 2 weeks but worse since 1 day. It was accompanied by a sharp pain, pallor, numbness and weakness in the left forearm and hand. She’s a factory worker by profession and reported picking up heavy boxes 2 weeks ago but no history of penetrating trauma or fall. She is a nonsmoker. No recent oral contraceptive use or immobility. Physical exam revealed chest tenderness, absence of ulnar pulse and pallor of left hand fingers with Allen’s test. Thereafter, the patient underwent a computed tomography angiogram (CTA) of chest and left upper extremity (LUE) which revealed a non-occlusive thrombus of left subclavian artery origin and abrupt occlusion of left ulnar artery proximally 3 cm past bifurcation of brachial artery, consistent with an embolic event. Doppler of lower extremities was negative for venous thrombosis. Transthoracic echocardiogram was normal with no septal defects. Vascular surgery was on consult and patient had an extensive arterial thrombosis workup including autoimmune conditions which was negative. Repeat CTA chest and LUE revealed resolution of ulnar embolism following initiation of continuous intravenous heparin but persistence of subclavian thrombus. The patient was deemed high risk for future embolic events and therefore proceeded to the operating room for open surgical balloon catheter thrombectomy and placement of a drug eluting stent to subclavian artery. She was eventually bridged to warfarin and discharged home on 3 months of anti-coagulation.

Results: -

Conclusion/Significance: Discussion Workup of arterial thrombosis involves prothrombotic and autoimmune testing in the setting of no apparent cause. Most common sites of arterial thrombosis are the abdominal aorta followed by coronary and carotid arteries. Our case was unique as it represents a patient with no prothrombotic risk factors and negative extensive autoimmune workup presenting with a thrombus (and embolism) of an uncommon artery following blunt trauma from picking heavy boxes.
CALMODULIN KINASE II INCREASES SUSCEPTIBILITY TO CARDIAC ALTERNANS

Presenting Author: Giedrius Kanaporis, PhD
Authors: Giedrius Kanaporis (Rush) and Lothar A. Blatter (Rush)

Introduction: Cardiac alternans is defined as cyclic, beat-to-beat variations in contraction force, action potential (AP) duration and cytosolic calcium transient (CaT) amplitude at constant stimulation rate. Alternans contributes to generation of proarrhythmic substrate leading to sustained arrhythmias, and is observed under various pathological conditions including heart failure (HF).

Objective: Under pathological conditions the heart attempts to compensate for injury via various cellular pathways that lead to altered electrophysiology, Ca handling and structural changes. Here we investigate mechanisms of remodeled atria in HF that lead to enhanced propensity and severity of alternans.

Methods: Experiments were carried out on single atrial myocytes isolated from control and HF rabbits. Intracellular Ca transients were recorded with fluorescent Ca-sensitive indicator dyes and monitored simultaneously with membrane currents or APs recorded with the patch clamp technique.

Results: Our results demonstrate that in HF atrial myocytes are more susceptible to cardiac alternans and exhibit a higher degree of CaT alternans. Upregulation of calmodulin kinase II (CaMKII) in HF is well documented. Therefore, we tested the hypothesis that changes in CaMKII activity affect susceptibility to alternans in atrial myocytes. The CaMKII inhibitor KN93 effectively abolished or reduced the degree of CaT transient alternans in field stimulated rabbit atrial myocytes, while KN92 (inactive analog of KN93) had no effect on the development of CaT alternans. Furthermore, L-type Ca channel currents which acts as the trigger for intracellular Ca release, were partially suppressed by KN93. Consistent with the KN93 results, suppression of CaMKII activity with the highly selective CaMKII inhibitor autocamtide-2-related inhibitory peptide (AIP) significantly reduced incidents of alternans and shifted the alternans induction threshold to higher pacing rates.

Conclusion/Significance: In summary, the data demonstrate that CaMKII activity promotes development of atrial alternans, and the increase in CaMKII activity might significantly contribute to the increased arrhythmogeneity in heart failure.
A COMPARISON OF CONTINUOUS VERSUS INTERMITTENT DELIVERY OF INHALED EPOPROSTENOL TO ICU PATIENTS

Presenting Author: Jie Li, MS
Authors: Jie Li, MS, RRT-ACCS, RRT-NPS; Ryan Cutro, MS, RRT; Lauren J Harnois, MS, RRT; Payal K Gurnani, PharmD, BCPS, BCCCP; Keith Roberts, MBA, RRT-CPFT; David Vines, PhD(c), RRT, FAARC, FCCP; James B Fink, PhD, RRT, FAARC, FCCP

Introduction: Inhaled epoprostenol (iEPO) is utilized to decrease pulmonary arterial pressure, and improve oxygenation. Two dosing strategies are used to deliver iEPO clinically: continuous with multiple concentrations and intermittent delivery with a single concentration. However, the clinical effects is unknown.

Objective: we evaluated the efficacy and safety of the continuous versus intermittent delivery of iEPO

Methods: The delivery strategy of iEPO was changed from continuous to intermittent nebulization in January 2018. Adult ICU patients receiving iEPO for refractory hypoxemia and pulmonary hypertension (pHTN) were evaluated. Approved by IRB, data was retracted from EMR.

Results: Intermittent iEPO was administered to 52 patients at a single concentration (30 mcg/ml) from January to to July, 2018 compared to 56 patients at multiple concentrations (2.5, 7.5, and 15 mcg/ml) from January to December, 2017. Groups were similar in age, gender, ethnicity, and iEPO indication (Hypoxemia: 78.8% vs 75.9%, p= 0.818; pHTN: 30.8% vs 28.6%, p=0.385). The duration of iEPO [2158(1063, 4246) vs 2177 (1332, 5066) minutes, p=0.389] and pre and post changes in heart rate and blood pressure were similar between groups. For hypoxemia, both delivery strategies significantly improved oxygenation (PaO2/FIO2) within 60 minutes of iEPO administration [intermittent: 60(53.5, 97) vs 91(60.5,133.3), p= 0.006 and continuous: 81.3(61,105.7) vs 113.3(81,202.3), p=0.002]. For pulmonary hypertension, intermittent delivery reduced pulmonary arterial pressure (36.4 ± 7.9 vs 33.0 ± 8.8, p= 0.018) as compared to continuous delivery (30.3 ± 12.7 vs 27.6 ± 11.2, p=0.064). Physicians were more compliant with protocolized weaning of iEPO in the intermittent than continuous delivery group (78.4% vs 55.4%, p=0.042), total number of syringes administered [5(3,10) vs 12(6,22), p=0.001] and medication preparation time [150(90,300) vs 360 (180,660) mins, p=0.001] were reduced as a result of the transition. Cost per patient [$362.8 (217.7, 725.5) vs 427.0 (187.5, 850.6), p=0.8), duration of respiratory support, ICU length of stay and mortality were similar between the groups.

Conclusion/Significance: Intermittent delivery of iEPO with mesh nebulizer a single concentration maintained a clinical benefit and was more efficient than continuous delivery, especially in our pHTN patients. In addition, clinician compliance with protocolized weaning improved with one concentration of iEPO.
CARVEDILOL INHIBITS CARDIAC EXCITATION-CONTRACTION COUPLING BY BLOCKING VOLTAGE GATED NA- AND CA-CURRENTS.

Presenting Author: Elizabeth Martinez-Hernandez, PhD
Authors: Elizabeth Martinez-Hernandez (RMC) & Lothar A. Blatter (RMC)

Introduction: Carvedilol is a FDA-approved β-blocker commonly used for the treatment of high blood pressure, congestive heart failure and cardiac tachyarrhythmias. Recently, it has been shown that carvedilol also reduces the open time of the cardiac ryanodine receptor sarcoplasmic reticulum calcium release channel, and consequently is capable of decreasing spontaneous arrhythmogenic calcium waves.

Objective: In this study we investigated the effect of carvedilol on Ca release and excitation-contraction coupling (ECC) in isolated rabbit atrial myocytes.

Methods: Cytosolic calcium ([Ca]i) was measured with confocal fluorescence microscopy, and effects of carvedilol on membrane currents was investigated with the whole-cell patch clamp technique.

Results: We found that carvedilol (10 µM) disrupts ECC in ~80% of cells. Specifically, carvedilol let to a failure of electrically induced Ca transients. Furthermore, carvedilol blocked voltage-gated Na currents almost completely, and reduced voltage gated L-type Ca channel currents by approximately ~50%. Control experiments with the β-blocker metoprolol suggest that the carvedilol effect on ECC is unlikely the result of its β-blocking property.

Conclusion/Significance: In conclusion, carvedilol has a profound inhibitory effect on atrial ECC by blocking membrane cationic channels responsible for membrane depolarization, action potential formation and ultimately triggering Ca release during ECC.
MITOCHONDRIAL CALCIUM UNIPORTER ACTIVATION PROTECTS AGAINST CALCIUM ALTERNANS IN ATRIAL MYOCYTES

Presenting Author: Yuriana Oropeza-Almazan, PhD
Authors: Yuriana Oropeza-Almazan (RMC) and Lothar A. Blatter (RMC)

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. Previous studies from our group have shown that impairment of mitochondrial Ca sequestration promotes Ca alternans. Mitochondrial Ca uptake occurs by the highly selective Mitochondrial Calcium Uniporter (MCU), and Ca can be extruded through the mitochondrial permeability transition pore (mPTP).

Objective: Test the hypothesis that enhanced mitochondrial Ca sequestration by pharmacological activation of MCU with spermine (Spm) and increased mitochondrial Ca retention after mPTP inhibition with cyclosporin A (CsA) rescues Ca alternans in a model of pacing-induced Ca alternans in rabbit atrial myocytes.

Methods: Single left atrial myocytes from male rabbits were enzymatically isolated using a Langendorff perfusion system. Cytosolic CaTs were recorded with fluorescence microscopy, and Ca alternans was induced by incrementally increasing the pacing frequency until stable Ca alternans was observed. The degree of alternans was quantified as the alternans ratio (AR = 1 – S/L, where S/L is the ratio of the small to the large amplitude of a pair of alternating CaTs). Data are presented as mean±SEM and statistical analysis was determined by Student’s-t-test for paired data.

Results: The MCU activator Spm suppressed Ca alternans. After 60 s Spm exposure AR decreased by 60% (from 0.27±0.04 to 0.11±0.03; p=0.0035, n=9). After 2 min Spm treatment AR further decreased to 0.09±0.04 (p=0.0033 n=7). Similarly, the mPTP inhibitor CsA improved Ca alternans. After 30 s CsA exposure the AR decreased by 53% from 0.31±0.04 to 0.15 ± 0.03 (p=0.0029), and after 60 s AR further decreased to 0.12 ± 0.03 (p=0.0124, n=7).

Conclusion/Significance: Stimulation of mitochondrial Ca uptake and retention rescued pacing-induced Ca alternans. Our results suggest that activation of mitochondrial Ca sequestration could be a target for protective interventions to ameliorate cardiac alternans, thereby reducing a risk factor for AF.
**Abstract #: 29**

**Session Type:** Poster  
**Category:** Cardiovascular/Pulmonary

**Sex Differences in Atrial Arrhythmia: Role of p21-activated Kinase**

**Presenting Author:** Ronen Ostro, BS  
**Authors:** Ronen Ostro (RUSH), Disha Varma (RUSH); Dan J. Bare (RUSH); Jaime DeSantiago (RUSH); Kathrin Banach (RUSH)

**Introduction:** Pre-menopausal women have a reduced risk for atrial arrhythmic events. The underlying mechanism remains to be elucidated. We have shown that p21-activated kinase (Pak1) expression is reduced in a canine model of pacing induced AF and loss of Pak1 promotes atrial arrhythmic activity.

**Objective:** Our goal is to identify the mechanism that promotes gender-disparities in the propensity for atrial arrhythmia. We hypothesize that increased Pak1 signaling in female mice attenuates their propensity for AF, and gender disparities are lost by attenuated Pak1 expression.

**Methods:** Using male ♂ and female ♀ WT and Pak1−/− mice we quantified Pak1 signaling by RT-qPCR and western blotting. Atrial electrophysiological properties were determined by in vivo EKG recordings whereas Ca-handling properties were quantified by INDO-1 measurements in isolated atrial myocytes. All experiments were approved by the RUSH IACUC.

**Results:** Our data demonstrate that Pak1 mRNA is significantly increased in atria of ♀ WT mice, coinciding with increased levels of Pak1 protein expression (WT N=4/4 [♂/♀]). The differences in Pak1 expression, did not translate into gender differences in basal cardiac electrophysiological properties. Also, no significant differences were determined between WT and Pak1−/− ♀ or ♂ mice.

On the single cell level, a significant attenuation was determined in the Ca transient amplitude (♂: 0.17±0.04 vs. ♀: 0.13±0.02; n=18/29; p<0.01) and Ca transient decay constant (τ; ♂: 0.7±0.04 ms vs. ♀: 1.07±0.07 ms; n=18/29; p<0.01) of ♀ WT mice compared to ♂. These gender differences were eliminated in ♂♀ Pak1−/− mice (♂: 0.14±0.01 vs. ♀: 0.12±0.01; n=13/17) which overall exhibited a prolonged τ (τ; ♂: 0.93±0.06 ms vs. ♀: 1.03±0.09 ms; n=13/29; p<0.01) compared to WT. β-adrenergic stimulation (ISO: 100 nM) induced a significant increase in Ca transient amplitude and acceleration of τ. While the ♀ and ♂ Pak1−/− mice exhibited an exaggerated response to ISO, the response of ♀ WT mice was attenuated compared to WT♂.

**Conclusion/Significance:** Overall we demonstrate that loss of Pak1 eliminates gender differences in atrial Ca handling properties and significantly exaggerates the response of ♀ mice to β-adrenergic stimulation.
TRASTUZUMAB INDUCED CARDIAC TOXICITY: IS SERIAL ASSESSMENT OF LEFT VENTRICULAR EJECTION FRACTION NECESSARY?

Presenting Author: Nicole Prabhu, MD
Authors: Nicole Prabhu (RUMC); Lolita Golemi (RUMC); Melody Cobleigh(RUMC); Louis Fogg (RUMC), Tochi Okwuosa (RUMC); Hena Patel (RUMC).

Introduction: Trastuzumab (TZB), used to treat HER2 receptor positive breast cancer, is potentially cardiotoxic, manifesting as an asymptomatic mostly reversible decline in left ventricular ejection fraction (LVEF); uncommonly with heart failure (HF). The clinical utility of serial LVEF monitoring as recommended by consensus statements is controversial; and we qualitatively assessed its prognostic value in long-term HF.

Objective: To determine if serial LVEF monitoring of women with breast cancer who have received trastuzumab therapy has an effect on long-term cardiovascular outcomes

Methods: A single-center retrospective cohort study of HER2-positive stage I-III breast cancer patients treated with TZB from 2011 to 2015 was performed; excluding anthracycline use. Patient perception of quality of life (QoL) and HF symptoms post-TZB were evaluated by the 27-item MD Anderson Symptom Inventory-Heart Failure survey. Chi-square test was used to analyze differences in symptoms among those with serial LVEF monitoring vs. not.

Results: We included women post adjuvant TZB (n=32); mean age 60 years; 94% white; average duration of TZB treatment: 2 years; mean follow-up period post-therapy: 5 years. Seventeen patients (53%) received serial LVEF monitoring; 15 (42%) did not. There were no significant differences in QoL (p=0.11) or typical HF symptoms (p=0.15) between those who did or did not receive serial LVEF monitoring.

Conclusion/Significance: Serial LVEF monitoring does not seem to affect long-term qualitative cardiovascular outcomes with TZB. This pilot study suggests that less frequent monitoring may be justified, though larger studies are required for validation.
Abstract #: 31

Session Type: Poster
Category: Cardiovascular/Pulmonary

PREDICTORS OF CHEST PAIN READMISSIONS AT AN ACADEMIC AND COMMUNITY HOSPITAL: CAN CARDIOLOGY CONSULTATION REDUCE READMISSIONS?

Presenting Author: Anvi Raina, MD
Authors: Anvi Raina (Rush); Hena Patel (Rush); Natasha Rana (Rush); Georges Compagnon ((Rush), Ethan Ritz (Rush); and Proddutur R. Reddy (Rush)

Introduction: Chest pain is a common emergency room presentation and a frequent cause of readmissions. Hospital readmissions are costly and associated with worse quality of life. Excluding patients with acute coronary syndromes (ACS), there remain a large number of low-risk chest pain patients. These patients are a frequent cause of hospital admissions and readmissions. Since there are no practice guidelines for these patients, the diagnostic and management approach vary greatly between different providers and institutions.

Objective: This study aims to identify clinical and demographic predictors for readmission for non-ACS chest pain after index evaluation at two hospitals integrated within a healthcare system. We attempt to identify if readmissions rates are different in an academic (Rush University Medical Center) versus a community (Rush Oak Park Hospital) setting and whether cardiology consultation can decrease these readmissions.

Methods: We conducted a retrospective review of 3,776 consecutive adult patients presenting with chest pain to an academic center and an affiliated community hospital in 2016. IRB approval was obtained. Rates and predictors of 1-year readmission were evaluated. Patients presenting with ACS or decompensated heart failure (HF) were excluded. Negative binominal regression model was used to analyze factors related to readmission.

Results: Mean age was 47.3 with a female predominance. The readmission rate was 6.3%. Factors associated with higher odds of readmission include coronary artery disease (OR=3.3, 95%CI:2.3-4.7), peripheral arterial disease (OR=2.3, 95%CI:1.4-3.8), chronic systolic HF (OR=2.3, 95%CI:1.6-3.3), and hypertension (OR=1.8, 95%CI:1.2-2.7). Cardiology consultation was associated with higher rate of readmissions (OR=2.1, 95%CI:1.3-3.4). However, patients who received consultation were more likely to have CAD (56% vs 21.9%), CHF (31.9% vs 11.2%), obesity (52.6% vs 41.7%), and PAD (12.3% vs 5.0%) versus patients without consultation. Consultation was found to reduce readmissions in patients with diabetes (OR=0.3, 95%CI:0.1-0.8) and of non-white race (OR 0.3, 95%CI:0.1-0.9). Patients admitted to the community hospital were less likely to be readmitted (OR=0.5, 95%CI:0.4-0.8).

Conclusion/Significance: Clinical variables and location of index admission were predictive of chest pain readmission. Cardiology consultation did not reduce readmissions; however, this cohort had more baseline comorbidities. These results need to be validated in larger cohorts.
RELATIONSHIP BETWEEN LONGITUDINAL VITAMIN D STATUS AND PULMONARY EXACERBATIONS AMONG ADULTS PATIENTS WITH CYSTIC FIBROSIS

Presenting Author: Brenna Wallace, BS
Authors: Brenna Wallace (Rush); Kristen Nowak MS, RDN, CNSC, LDN (Rush); Sarah J Peterson MS, RDN, CNSC, LDN (Rush); Kathryn K McAndrews, MSN, APRN, ACNP-BC (Rush); Elaine Chen MD (Rush); and Robert A Balk MD (Rush)

Introduction: Vitamin D deficiency has been associated with immune function, lung function, and inflammation. Cystic fibrosis (CF) patients are prone to vitamin D deficiency due to inability to absorb fat soluble vitamins. Previous research has linked low vitamin D status to increased frequency of CF pulmonary exacerbations.

Objective: The objective of this study was to examine the influence of yearly vitamin D levels on pulmonary exacerbations.

Methods: A retrospective sample of adult CF patients who were followed by the Adult Cystic Fibrosis Center at Rush University Medical Center was utilized. Ten years of vitamin D (25-OH) data was collected (2009-2018) from the electronic medical record, patients were included if at least one vitamin D level was measured during that time. The vitamin D level for each year was recorded, the lowest value was recorded for patients with more than one vitamin D level per year. Frequency of exacerbations per year, defined as Akron Pulmonary Exacerbation Score ≥ 5, was also obtained from the electronic medical record. Additionally, age, sex, pancreatic insufficiency, yearly lowest body mass index (kg/m^2, BMI), and yearly lowest percent predicted forced expiratory volume (FEV1) were collected. Longitudinal associations between pulmonary exacerbations and vitamin D, age, females, pancreatic insufficiency, BMI and were percent predicted FEV1 analyzed using a random effects regression model.

Results: A total of 54 patients were included. For each year of data collection average age ranged from 28-33 years, distribution of females and those with pancreatic insufficiency ranged from 29%-50% and 73-95%, respectively. Average vitamin D, BMI, percent predicted FEV1, and pulmonary exacerbations ranged from 24-30 ng/mL, 21.5-22.8 kg/m^2, 53%-68%, and 0.8-1.2, respectively. In the longitudinal regression, both vitamin D and percent predicted FEV1 were associated with pulmonary exacerbations. A 10 ng/dL increase in vitamin D was associated with a 0.2 decrease in pulmonary exacerbations (p=0.001). Similarly, a 10% increase in percent predicted FEV1 was associated with a 0.3 decrease in pulmonary exacerbations (p<0.001).

Conclusion/Significance: Vitamin D deficiency is prevalent amongst CF patients and is associated with increased exacerbations. Close monitoring and maintenance of optimal vitamin D levels may decrease the frequency of pulmonary exacerbations.
AN EDUCATIONAL INITIATIVE TO ENHANCE INSTITUTIONAL ECHOCARDIOGRAPHY USE

Presenting Author: Rachel Wilson, MD
Authors: Rachel Wilson, MD (RUMC), Manya Gupta, MD(RUMC), Scott Hasler, MD(RUMC), Chad Pendley, MD(RUMC)

Introduction: As healthcare costs have become a focus of national attention, interest has risen in curbing areas of healthcare spending. One of these such areas is cardiac imaging and specifically echocardiogram (TTE) ordering has been identified as a potential means of limiting excessive healthcare costs. This has become a controversial topic after research identified a potential mortality benefit in ordering TTE’s for certain conditions.

Objective: Taking these findings into account, our project aimed to target TTE overuse areas at our institution while acknowledging the importance of TTE ordering for certain essential conditions.

Methods: We reviewed cumulative resource allocation data for our institution over a year period and we identified potential areas of overuse using the Appropriate Use Criteria and recent studies. An educational presentation and curriculum was created for residents at Rush University Medical Center. A conference was held for all residents of the internal medicine class and educational tables were be placed in common workspaces. Also cohorts of residents at the start of an inpatient service month received the curriculum and they were asked to fill out a quiz afterwards to assess for comprehension.

Results: Areas of potential overuse identified included hypertension, fever of unknown origin, atherosclerosis, pulmonary embolus, heart failure and perioperative assessments. Areas of essential TTE ordering included sepsis, acute myocardial infarction, acute stroke, cardiac dysrhythmia and some cases of heart failure.

Conclusion/Significance: Our study is unique in that our intervention targeted areas of TTE overuse specific to our institution using resource allocation data and recent guideline-based and research-driven conclusions. We suggest that other institutional programs to improve TTE usage evaluate local TTE ordering trends also prior to creating their intervention.
Abstract #: 34

Session Type: Poster
Category: Cardiovascular/Pulmonary

SUPPLEMENTAL RADIOFREQUENCY ABLATION TO ACHIEVE PVI AFTER UNSUCCESSFUL CRYOBALLOON ABLATION IS ASSOCIATED WITH RECURRENT ATRIAL FIBRILLATION

Presenting Author: Daniel Yoakum, BS
Authors: Daniel Yoakum (RU), BS, Grzegorz Pietrasik (RUMC), MD, PhD, Kousik Krishnan (RUMC), MD, FHRS, Parikshit S. Sharma (RUMC), MD, FACC, FHRS, Richard Trohman (RUMC), MD, MBA, Henry D.Huang (RUMC), MD, FHRS

Introduction: Cryoballoon ablation is an established rhythm control therapy used for pulmonary vein isolation (PVI) in treatment of atrial fibrillation (AF). Recurrent AF after initial PVI therapy is common and many patients require a second PVI operation to achieve electrical isolation. Limited data exists on the significance of failed initial isolation of PVs using standard technique (ST) and the efficacy of PVI when touch up radiofrequency ablation (RFA) is required to achieve a successful initial PVI.

Objective: To evaluate the clinical significance of failed initial PV isolation using ST (> 2 freeze cycles and/or requiring RFA to achieve PV isolation) upon the efficacy of cryoablation technique.

Methods: We analyzed a retrospective consecutive cohort of patients who underwent cryoballoon PVI. The number of PVs isolated with ST and its association with recurrent AF were analyzed using a two-sample t-test and two-sample Wilcoxon rank-sum tests for normally distributed and skewed variables respectively. End points were analyzed with a Kaplan-Meier estimator and log-rank statistic p-value. A Cox proportional-hazards regression model was used to evaluate the independent contribution of baseline clinical factors, procedural endpoints, and multivariance. A 2-sided P < 0.05 was considered statistically significant. Analyses were performed using Minitab statistical software.

Results: 125 patients undergoing cryoballoon PVI were included in the study. In 38 patients, one or more PVs were not isolated after initial ablation with ST. For complete PVI, 15 patients required > 2 freeze cycles, 20 patients required additional RFA, and 3 patients required both > 2 freeze cycles and RFA. During follow-up, 33 patients experienced AF recurrence. Use of additional RFA was associated with an increased risk of recurrent AF. In the multivariate model, need for RFA was independently associated with a 2-fold increase in risk of AF recurrence (HR 2.16; p = 0.013). Use of > 2 freeze cycles to achieve PV isolation was not associated AF recurrence (HR 1.08; p = 0.872).

Conclusion/Significance: In our study, the need for RFA to achieve PVI following cryoablation was a strong predictor of recurrent AF. Use of > 2 freeze cycles was not associated with AF recurrence.
SCRENNING FOR POTENTIAL OPIOID ABUSE IN THE ACUTE CARE SURGICAL SETTING

Presenting Author: Kathryne Adams, BA
Authors: Kathryne Adams (RMC), Micheal J. Petersen (RMC), Nicole Sipraksy (RUMC)

Introduction: The opioid epidemic has led to changes in the prescription of opioid therapy around the time of surgery. One approach to this challenge adopted within the primary care setting is to identify patients at risk of addiction through pre-prescription screening.

Objective: We conducted a pilot study to determine if the Opioid Risk Tool (ORT) would be effective in the acute surgical setting.

Methods: With institutional review board approval, 24 subjects were recruited into the study. The subject completed the ORT and was prescribed an opioid after surgery. The subject was followed for one month, at which time aberrant behavior was assessed by questionnaire, chart review, and Illinois Prescription Monitoring Program database review.

Results: Using the ORT, 11 subjects (46%) scored moderate to high risk for opioid misuse. Upon discharge, 18 subjects (75%) were prescribed an opioid analgesic; aberrant behavior was displayed by 50% (n=9) of these subjects after discharge. The most frequent aberrant behaviors observed (n=10, 60%) were nondisclosure of previous prescription and additional prescriptions post discharge. Over half of subjects (n=5, 56%) with aberrant behavior scored in the low-risk range on the ORT. Of these, 80% (n=4) were prescribed higher than the cohort's average morphine milligram equivalents (24.7mme).

Conclusion/Significance: The ORT is not a useful tool in identifying acute care surgical patients at risk of aberrant behavior. We found low-risk individuals that displayed aberrant behavior, which is associated with the prescription of higher-than-average morphine milligram equivalents.
Abstract #: 36

Session Type: Poster
Category: Clinical Practice

USING NANDA-I TO LABEL AND DEFINE RESPIRATORY CARE PROBLEMS

Presenting Author: Amnah Alolaiwat, BS
Authors: Amnah Alolaiwat (Rush University) Cameron Iszkula (Rush University) Constance Mussa (Rush University) Ellen Becker (Rush University)

Introduction: It is imperative that respiratory therapists (RTs) formally label and define the care they provide to ensure that it is documented concisely and completely in the electronic health record system. Developing formal respiratory care terminology that can be mapped to existing clinical terminologies such as the Systematized Nomenclature of Medicine - Clinical Terms (SNOMED CT) will enable more efficient indexing, searching, and retrieval of data relevant to the care provided by RTs. The ability to retrieve and aggregate this data will provide a more complete picture of the care a patient receives, and could also facilitate research and patient advocacy.

Objective: To continue the development of a standardized terminology relevant to respiratory care diagnoses (cardiopulmonary problems for which respiratory therapists provide diagnostic and therapeutic interventions).

Methods: Three groups of respiratory care students utilized a mixed methods approach that included informal interviews, focus groups with practicing RTs, and a review of the respiratory care literature to identify twenty unique cardiopulmonary problems per group for which RTs provide diagnostic and therapeutic interventions. These problems were labeled and defined according to the NANDA-I format using guidelines provided by a respiratory care faculty.

Results: Sixty unique cardiopulmonary patient problems related to native and artificial airway, ventilation, oxygenation, skin integrity, and disease self-management, were identified, labeled and defined.

Conclusion/Significance: During the focus groups and interviews, it became evident that RTs can easily identify respiratory care interventions, but struggle to identify patient problems. Similarly we found that respiratory care textbooks do not provide a systematic framework for linking cardiopulmonary problems with respiratory care interventions. Additionally, some of the terms we developed are already defined within terminology systems created by other professions. However, these terms need to be defined differently for the RT to facilitate mapping it to a respiratory care intervention. Consequently, it is essential to organize terminologies to obtain a complete and coherent picture of respiratory problems and their corresponding interventions to ensure optimal patient care.
Abstract #: 37

Session Type: Abstract
Category: Clinical Practice

USE OF THE MODIFIED EARLY WARNING SCORE (MEWS) TO PREDICT MICU READMISSION

Presenting Author: Mufleh Alrougi, MSc, RRT-NPS, RRT-ACCS
Authors: Mufleh Alroughi (Rush University) Constance C. Musa (Rush University) David L. Vines (Rush University)

Introduction: Medical complications that result in patient readmissions to the intensive care unit (ICU) are known to be associated with increased mortality and length of stay. Moreover, ICU readmission raises questions regarding the appropriateness of the medical care provided and is used as a measure of ICU performance. It is possible that clinical deterioration risk stratification tools such as the Modified Early Warning Score (MEWS) can identify patients at risk for being readmitted to the ICU between 24 and 72 hours after discharge to general inpatient wards. The MEWS is a scoring system that employs five physiological parameters commonly documented in the medical record to generate a score that is an objective assessment of a patient’s clinical status. The MEWS facilitates early recognition of a patient’s deteriorating condition before the occurrence of a catastrophic medical event, thereby prompting clinicians to provide appropriate early interventions.

Objective: The purpose of this study was to determine if the MEWS is predictive of medical intensive care unit (MICU) readmission.

Methods: This was a retrospective study that used patient data spanning a 40-day period from September 2016 to November 2016. MEWS scores and values of the parameters that make up the MEWS were collected for patients admitted to the MICU at an academic medical center.

Results: Mann-Whitney U test revealed that there was a significant association (P = 0.013) between MICU readmission and the MEWS score calculated from physiological data entered into the electronic medical record (EMR) one hour before ICU readmission. Additionally, logistic regression analysis showed that this MEWS score predicts MICU readmission (OR 1.8, 95% CI 1.14 to 2.72).

Conclusion/Significance: The MEWS independently predicts the likelihood of MICU readmission. Since the MEWS score can be automatically generated by the EMR, it is prudent for clinicians to use it for frequent monitoring of patients during the first 48 hours of their discharge from the intensive care unit.
Presenting Author: Shirley Ambutas, DNP
Authors: Cindy Luevanos, BSN, RN, CRRN; Sherry L. Liske, MS, RN CRRN; Shirley Ambutas, CCNS, DNP, APN, RN; MaryBeth Busbey, BSN, CRRN; Louis Fogg, Statistician

Introduction: Animal Assisted Therapy (AAT) has been shown to improve patient outcomes as a complementary therapy to traditional rehabilitation therapies. The goal of our intervention is to expand upon the current Animal Assisted Activities (AAA) intervention that is in place at Rush University Medical Center (RUMC) campus and continue these efforts in the Rehabilitation setting.

Objective: To determine AAT effectiveness in reducing pain, anxiety, and fatigue in an adult inpatient acute rehabilitation setting.

Methods: Ongoing study over two years with Canine Therapy Corps dog-handler therapy teams 212 patient participants Pre and Post AAT Surveys Results were stored in a secure Excel file with patient names removed Results were collected and evaluated for experimental and clinical significance Key Informant Interviews

Results: All Participants (n = 212) Before After Pain 2.97 1.87 (p = 0.046) Anxiety 1.90 0.53 (p = 0.015) Energy 4.43 5.03 (p = 0.419)

Conclusion/Significance: AAT performance data showed improvement and statistical significance in measures of pain, fatigue, and anxiety, with all P values at 0.000 in a two-tailed paired sample t-test.
Abstract #: 39

Session Type: Poster

Category: Clinical Practice

PREDICTIVE VALIDITY OF THE GROUP SELECTION QUESTIONNAIRE FOR VETERANS IN INTENSIVE TREATMENT FOR PTSD

Presenting Author: Jenna Bagley, BS, BA

Authors: Jenna Bagley (Rush University Medical Center); Karyna Bravo (RUMC); Brian Klassen (RUMC); Niranjan Karnik (RUMC); Mark Pollack (RUMC); and Philip Held (RUMC)

Introduction: Selecting individuals who interfere with cohesion as little as possible is essential to maximize outcomes of group treatment (Piper, 1994). However, there is a paucity of research to guide clinical decision-making about individuals' appropriateness for group treatment of posttraumatic stress disorder (PTSD; Beck & Sloan, 2014), especially for veterans (Cameron et al., 2018). To address this shortcoming in the literature, the present study evaluated whether the Group Selection Questionnaire (GSQ; Cox et al., 2004) can predict symptom change for veterans in intensive PTSD treatment.

Objective: To evaluate whether the three subscales of the GSQ can predict changes in PTSD and depression symptoms, above and beyond baseline symptom scores, for veterans in a group-based 3-week intensive PTSD treatment program.

Methods: Data were drawn from veterans who completed a 3-week intensive PTSD treatment program that included Cognitive Processing Therapy and Mindfulness-Based Stress Reduction delivered in groups (Rush ORA: 14011508-IRB01). Veterans completed pre-treatment measures assessing PTSD symptoms (PCL-5), depression symptoms (PHQ-9), and readiness for group therapy (GSQ, comprised of three subscales: Expectancy, Demeanor, and Participation). Veterans completed the PCL-5 and PHQ-9 again at post-treatment. Regression analyses were performed with baseline symptom measures (PCL-5 & PHQ-9) and GSQ subscales predicting changes in PCL-5 and PHQ-9 scores.

Results: Higher baseline symptom severity predicted greater change in PCL-5 and PHQ-9 scores (β=.35, R2=.07, p=.002 and β=.42, R2=.15, p<.001, respectively; n=131). Although Expectancy was a significant predictor of change in PHQ-9 (β=.18, p=.037), the other GSQ scores did not significantly predict outcomes (all ps>.05). Moreover, the additional variance explained when the GSQ scores were entered into the regression model was small for both PCL-5 scores (ΔR2=.016) and PHQ-9 scores (ΔR2=.034).

Conclusion/Significance: Evidence of predictive validity of the GSQ in a sample of veterans seeking intensive PTSD treatment was poor. Many of the subscales did not predict outcomes of interest, over and above baseline symptom severity, and the additional variance explained in symptom change over the course of treatment was minimal. Study limitations include generalizability and restriction of range. The GSQ is not recommended for selecting veterans for a cognitive-behavioral-focused, intensive treatment program for PTSD.
Abstract #: 40
Session Type: Poster
Category: Clinical Practice

BENEFITS OF THE PROCALCITONIN ASSAY AS A DIAGNOSTIC BIOMARKER IN RUSH'S CORE LABORATORY

Presenting Author: Safoora Baig, Masters in Medical Laboratory Science
Authors: Safoora Baig, Yolanda S. Garcia, Nadine Lerret, Nicholas M. Moore, Kelly Clark, Affiliations: Rush University Medical Center Department of Medical Laboratory Science

Introduction: A vital component of clinical laboratory tests is to differentiate between various causes of inflammation such as infectious, immunologic, or metabolic/toxic. A biomarker known as procalcitonin (PCT) is found to be an optimal marker for bacterial infections to aid in the course and prognosis of a disease and expedite therapeutic decisions.

Objective: We hypothesized that the detection times for bacterial infections would decrease if procalcitonin is utilized along with routine tests such as blood cultures and other common patient data if this test is brought in house at Rush University Medical Center’s Core Laboratory (vs. current send outs).

Methods: This test is run on the ARCHITECT B-R-A-H-M-S i8200 consisting of chemiluminescent microparticle immunoassay technology which quantitatively determines the concentration of the PCT in human serum and plasma. 50 inpatient samples were selected at random and procalcitonin was run on each sample and analyzed along with the WBC count, lactic acid, RDW (RBC distribution width) and blood culture results (if ordered for the specific patient) from the electronic patient results database. This study did receive IRB approval prior to the collection of data.

Results: The study involved PCT concentrations as low as 0.02ng/mL and as high as 127.36 ng/mL. Interestingly, in patients with PCT >2.0ng/mL, the RDW was also increased. In contrast, in patients with PCT <0.5ng/mL, the RDW was normal. For patients with a positive or negative PCT value, the results for blood cultures had no correlation. There was a total of 27 samples which had an elevated PCT, but only 3 resulted in positive blood cultures.

Conclusion/Significance: If PCT is used along with other prognostic markers such as RDW, an improved diagnosis outcome may be achieved. However, the relative lack of correlation of PCT with the blood cultures implies PCT and blood cultures may not be useful when utilized together. When PCT is used along with other significant laboratory findings, it has high potential as an eminent diagnostic tool in the clinical laboratory.
ADJUNCTIVE LIDOCAINE PATCHES IN NON-RADICULAR LOW-BACK PAIN PATIENTS

Presenting Author: William Bleifuss, BS
Authors: William Bleifuss (RMC)

Introduction: It is estimated that low back pain causes 2.63 million visits to emergency departments in the United States annually, with opioids used in approximately 61% of these encounters. With the current opioid crisis, additional methods of analgesia should be explored. While lidocaine patches are often prescribed as adjunctive therapy in the emergency department, their efficacy in back pain control has not been well studied.

Objective: The goal of this study is to more thoroughly investigate the effectiveness of lidocaine patches in the control of non-radicular acute low back pain following discharge from the emergency department.

Methods: 101 adult patients in an emergency department population meeting specific inclusion and exclusion criteria are being enrolled in a randomized control trial. The treatment group receive a 4 week supply of lidocaine 5% patches for daily use, and placebo patches are provided for the control group, in addition to standard prescription therapy at the discretion of the treating clinician. Pain is recorded on an 11-point scale, and disability on a 24-point back pain scale, with measurements taken at the time of initial treatment, 1 week, and 4 weeks. The difference between control and treatment group mean pain and disability levels was analyzed using a student’s t-test for each interval, with the primary outcome being the difference in pain at the 1 week follow up.

Results: We found that both groups reported improvements in pain and functionality over a 4 week period. With treatment n = 14, control n = 15, and an alpha of 0.05, all p-values for both back pain and disability at 1 week and 4 weeks were not statistically significant.

Conclusion/Significance: We did not find any statistically significant pain reduction between those that received lidocaine patches and those that did not. While both groups did see improvement, this is likely due to other therapies, the natural course of the pain, or a placebo effect. While this preliminary data suggests that the application of lidocaine patches does not provide significant pain relief in an acute low back pain population, the study is too underpowered to detect a meaningful difference at this time.
ABSTRACT

Session Type: Poster
Category: Clinical Practice

A COMPARISON OF DIAGNOSTIC WORKUP FOR PATIENTS WITH PAST PSYCHIATRIC HISTORY IN THE EMERGENCY DEPARTMENT

Presenting Author: Caleb Bragg, MD
Authors: Caleb Bragg (RUMC), Kathryne Adams (RMC), Eitan Kimchi (RUMC), Yanina Purim-Shev-Tov (RUMC)

Introduction: Patients enter the emergency department with a chief complaint that leads to a series of diagnostic tests. The chief complaint for anxiety can range from panic attack to shortness of breath to non-cardiac chest pain. However, the latter two complaints may lead to more extensive testing than the first (Sung et al, 2018). In addition, patients with high levels of anxiety are often quickly discharged from the emergency department (Basara et al, 2015).

Objective: At Rush University Medical Center, our aim was to determine any differences in evaluation between patients with known past psychiatric history and those who do not in the emergency department.

Methods: A retrospective chart review was completed to compare the diagnostic workup and length of stay for patients who left the emergency department with a final diagnosis of anxiety from 2016-2017. The study excluded charts where the patient experience significant trauma and those that were diagnosed with a comorbidity of anxiety and cardiovascular disorder. Seven hundred fifty-five charts were reviewed. The following data points were pulled from each chart: chief complaint, evaluation or consult by a mental health specialist, length of stay, history of psychiatric illness, and the diagnostic workup performed in the emergency department.

Results: As expected, those who received a mental health consult or evaluation had 133.14 minutes longer length of stay than those who did not. Of those evaluated, 136 of the 160 patients had a past psychiatric history (p<0.001). Also, patients with a past psychiatric history received an average number of 2.52 diagnostic tests while those without received 3.06 tests. Those that presented with chest pain and anxiety as a chief complaint had no significant difference between tests received compared to the entire cohort.

Conclusion/Significance: Overall, these results indicate that those who present to the emergency department with a past medical history of psychiatric illness do not receive the same level of testing and they wait longer for evaluation/consult from a mental health specialist. It is a positive step that there is no difference in testing for those with a chief complaint of both chest pain and anxiety compared to the rest of the cohort.
Abstract #: 43

Session Type: Poster
Category: Clinical Practice

IDENTIFICATION OF CENTRAL LINE MANAGEMENT TECHNIQUES

Presenting Author: Cherie Burke, DNP, CRNA, APRN
Authors: Cherie Burke (Rush University)

Introduction: Central line-associated bloodstream infections (CLABSI) occurring in intensive care units (ICUs) are associated with increased morbidity and mortality. The use of proven guidelines to prevent infection of the blood from central lines is required of all hospitals accredited by The Joint Commission as part of the National Patient Safety Goals. Although most hospitals in the United States report adopting the central line bundle recommendations, the CDC estimates 30,000 CLABSI still occur in ICUs and acute care units each year. Previous research regarding CLABSI has focused on compliance or failure to comply with all the steps in the central line bundle recommendations. Research on processes in addition to, or different from, the central line bundle being utilized by ICU RNs is lacking.

Objective: To identify processes used by ICU nurses when managing central lines.

Methods: The methodology for this mini-study was grounded theory. The process was studied from the perspective of four participants. Audio recorded semi-structure interviews were used for data collection. Data analysis was conducted through coding, categorizing, and constant comparison.

Results: The findings of this study revealed the two main themes: 1) lack of adherence to the central line protocol in the operating room, and 2) nursing interventions to rectify operating room lapses in protocol adherence. Patients are arriving in the ICU without occlusive dressings and open infusion ports. Nurses are changing central line dressings upon admission to the ICU during the critical time of assessing and caring for a newly admitted patient.

Conclusion/Significance: Conclusion: While the study size did not allow for the construction of a theory grounded from the data, the findings of this study provide useful information about lack of adherence to central line bundles in the operating room and the additional processes that ICU nurses use to rectify these lapses. Significance: The data provided from this study provides insight to the lack of adherence to the central line bundle in the perioperative setting and suggests the use of intervention and improvement strategies in the OR to potentially decrease the rate of CLABSI.
Abstract #: 44
Session Type: Abstract
Category: Clinical Practice

TRANS-TYMPANIC MEMBRANE DELIVERY OF OTOTOPICAL ANTIBIOTICS

Presenting Author: Emily Chi, BS
Authors: Emily Chi (RMC), Christopher Fry (Argonne National Laboratory), Ashok Jagasia (RMC)

Introduction: Otitis media, or inflammation of the middle ear, affects approximately 16 million children in the United States each year with an annual cost of over four billion dollars (Rosenfeld et al. 2013). Current treatment options for chronic or recurrent otitis media include the surgical placement of tympanostomy tubes into a child's ear to ventilate the middle ear space and allow for topical administration of antibiotics. This surgery is not only costly (approximately $2200 per patient) but is also associated with various complications including persistent otorrhea, tympanic membrane perforation, and formation of granulation tissue (Hoffman et al. 2002).

Objective: In order to devise a non-invasive drug delivery system, we studied the use of programmable peptide amphiphiles to deliver antibiotics (Ciprodex) across the tympanic membrane and into the middle ear.

Methods: Argonne National Laboratory researcher Dr. Christopher Fry previously designed and synthesized peptide amphiphile c16-AHL3K3-CONH2, which is unique in its ability to undergo structural transitions between micelles to fibers dependent on external pH, thus allowing the peptide to better encapsulate and deliver Ciprodex across the tympanic membrane. Preliminary spectroscopy results demonstrated the interaction between peptide fibers and ciprofloxacin as well as the gradual release of Ciprodex over time as it exited the various water channels created by peptide fibers. Following this, ex vivo cellular studies were performed using human epidermal keratinocytes (the primary cell type of the tympanic membrane) to determine the viability and toxicity profile of the drug-loaded peptide amphiphile.

Results: When compared to the growth of keratinocytes alone, the addition of c16-AHL3K3-CONH2 alone (positive control), Ciprodex alone (negative control), and a mixture of the peptide with Ciprodex, elicited a mild toxic response that increased over time (at 24, 48, and 72 hour incubation intervals). Additional studies were performed utilizing fluorescently-labeled peptide (with TAMRA dye), which illustrated the entry of peptide fibers into the cytoplasm of keratinocytes at 24 and 48 hours of incubation, thus suggesting endocytosis or intercellular transport of the peptide.

Conclusion/Significance: Future experiments will be targeted at optimizing cell viability studies as well as passing the drug-loaded peptide through a biosynthetic tympanic membrane.
Abstract #: 45

Session Type: Poster
Category: Clinical Practice

SCREENING PATIENTS FOR INHERITED RETINAL DISEASE-ASSOCIATED GENE MUTATIONS IN A UNIVERSITY AND UNIVERSITY-AFFILIATED RETINA-ONLY PRIVATE PRACTICE

Presenting Author: Alyssa Coleman, BS, BA
Authors: Alyssa M.W. Coleman, M2 (RMC), Rebecca D. Sarran, MD (RUMC), and Mathew MacCumber MD, PhD (RUMC)

Introduction: The novel gene therapy Luxturna™ (voretigene neparvovec) has recently been FDA-approved to diminish vision loss and restore visual function in patients with biallelic RPE65-mediated Leber's Congenital Amaurosis (LCA) Type 2 and retinitis pigmentosa. This recent advancement has fostered interest in having appropriate patients tested for RPE65 as well as other pathologically notable gene mutations.

Objective: This study aims to establish a protocol to effectively screen patients previously diagnosed with degenerative retinal disorders for the presence of retina-associated gene mutations via two testing services: Prevention Genetics and Blueprint Genetics (Foundation Fighting Blindness My Retina Tracker® registry).

Methods: A query was completed of the Illinois Retina Associates (IRA) and Rush University Eye Center Physicians (RU ECP) databases to identify patients with diagnoses representing retinal degenerative diseases, initially by a mutation in RPE65. Patients with retained functional vision are contacted and asked if they would like to receive a dilated fundus exam through insurance in conjunction with free genetic testing. Upon receiving informed consent, samples are collected and sent to either Prevention Genetics (for RPE65 gene testing) or to Blueprint Genetics for a more comprehensive analysis (My Retina Tracker®) with subsequent data reporting. Patients then receive genetic counseling on results.

Results: 487 patients at IRA and 49 patients at RU ECP were determined to have been diagnosed with the appropriate ICD-10 codes H35.52, H35.50 or H35.53 between 1/1/2014 and 2/5/2018. 26 patients have since been tested for retinal specific gene mutations through Prevention Genetics or Blueprint Genetics. 20 patients have testing resulted and 6 patients have pending results. 0/20 (0%) of patients have a positive result for RPE 65. 10/20 (50%) of patients had positive results for heterozygosity in at least one implicated gene. 6/20 (30%) of patients had positive results for variants of unknown significance.

Conclusion/Significance: With the continued development of new therapies for retinal degenerative disorders, it has become increasingly important to provide genetic testing to patients with these progressive debilitating diseases. By conducting more comprehensive genetic studies on these patients, several genetic variants may be identified. Such variants may then be applied to better connect these genes to their corresponding clinical pathology.
VALIDATION AND COST ANALYSIS OF THE PROCALCITONIN ASSAY

Presenting Author: Angela Covington, MS
Authors: Angela Covington (Rush); Dr. Xander Van Wijk (University of Chicago)

Introduction: The U.S. Food and Drug Administration (FDA) has cleared the Brahms procalcitonin assay to determine the risk of progression to septic shock and 28-day mortality risk in sepsis patients. It can also aid in antibiotic stewardship and expanded use of the Brahms assay to direct treatment course in lower respiratory tract infections and safely discontinue antibiotics in septic patients has recently been cleared by the FDA.

Objective: The objectives were to perform a method validation, assess the required turnaround time and workflow of the assay, assess clinicians' interest in PCT testing, and perform a cost benefit analysis.

Methods: The validation study requirements for FDA-approved methods; accuracy, precision, analytical measurement range (AMR), reference interval, and functional sensitivity were conducted. A Deming regression was used to evaluate the data. Accuracy. Forty samples with known PCT values from Mayo Clinic were tested on our assay to ensure it conformed to the true value. Precision. Bio-Rad Lyphocheck quality control samples with different PCT concentrations were used for precision testing and carry over assessment. AMR. PCT validation material from Maine Standards was used to verify that samples across the assay range were measured. Reference interval. Volunteer samples from healthy donors were used to verify the reference range as previously determined by manufacturer. Functional sensitivity. Multiple plasma pools with low concentration were run once a day for 5 days. The PCT concentration at which the CV is 20% is the functional sensitivity.

Results: The %CV was found to be less than 5% for precision, AMR, and functional sensitivity. The mean % difference for the method comparison was -12.8%. The manufacturer's reference range of 0.08 ng/mL was verified for use and the functional sensitivity was found to be 0.029 ng/mL which had a %CV of 18.4%.

Conclusion/Significance: The Brahms assay was found to meet the FDA standards for validation however, the Antibiotic Stewardship Committee was not prepared to go forward with implementation at this time. Appropriate use of the assay would require coordination with the committee, the clinicians and pharmacy department.
Abstract #: 47

Session Type: Poster
Category: Clinical Practice

PERCEPTIONS OF HEALTHCARE EXPERIENCES: RECOGNIZING INEQUITY A CRITICAL STEP IN DISABILITY HEALTH LITERACY

Presenting Author: Abby Draper, BA, OTS
Authors: Abby Draper (Rush University); Jocelynn Carey (Rush University); Lauren Follansbee (Rush University); and Laura VanPuymbrouck (Rush University)

Introduction: The Americans with Disabilities Act (ADA) has made access to public spaces easier for people with disabilities (PWD) (Singer, Dickman, & Rosenfeld, 2017). However, medical and diagnostic equipment in primary and preventive healthcare settings is often inaccessible, requiring PWD to request accommodations to receive care others receive readily (Stillman, Bertocci, Smalley, Williams, & Frost, 2017). Research has shown disparate care may go unnoticed by providers and by those receiving the care (VanPuymbrouck, 2018). Receiving an appropriate accommodation may require PWD to have the health literacy to recognize its necessity as an initial step to receiving equitable care.

Objective: Do individuals with disabilities without knowledge in disability rights recognize disparate care or discrimination when it is occurring in a healthcare setting?

Methods: Following IRB approval and participant informed consent, data was collected using an open-ended question guide in semi-structured focus groups. First cycle analysis of the focus groups used descriptive, in-vivo, and process coding. Second cycle analysis used pattern coding to identify emergent themes.

Results: Participants included three males and three females who are older than 18, identify as a PWD in need of a mobility aide, have had a primary healthcare visit in the past year, and speak English. The exclusion criterion was belonging to a disability advocacy group. Themes from the coding cycles emerged in groups along a continuum of how participants perceived inequity and advocated for their health. Participants described differences in how they reacted to disparate care or inadequate accommodations based on their own understandings of their healthcare experiences. Themes along the continuum begin with 'not naming differences as disparate' and build up to 'learning how to self-advocate.'

Conclusion/Significance: These pilot study findings expose that if and how clients with disabilities recognize and interpret a lack of accommodation can inform provider interventions to circumvent inequitable care delivery. To promote best practices in providing accommodations, professionals should understand their clients could be at any place on this self-advocacy continuum. This reinforces the need for a universal approach to disability health literacy to achieve equitable healthcare for all people.
EFFECT OF PRICE DISPLAY IN EMR ON RESIDENT ORDERING HABITS

Presenting Author: Patrick Duncan, MD  
Authors: Patrick Duncan (RUMC), Allison Rzepczysnki (RUMC), Manya Gupta (RUMC)

Introduction: The United States spends approximately twice as much as other high income nations on medical care, yet utilization rates are largely similar to other nations (Papanicolas, Woskie and Jha 2018). With the adoption of Electronic Medical Records (EMR) at most medical centers, one review article characterized displaying costs in the EMR as 'potentially one of the most rapidly scalable strategies for reducing healthcare spending' (Silvestri, et al. 2016). Another review found displaying costs of orders resulted in a significant reduction in cost or number of orders in seven of nine clinically based studies (Goetz, et al. 2015). Physicians have been found to have poor awareness in regard to the relative price of drugs, non-drug therapeutics, and diagnostic testing they order for their patients (Allan and Lexchin 2008) (Kullgren, Duey and Werner 2013). This lack of awareness can often lead to increased cost burden to patients. The Accreditation Council for Graduate Medical Education acknowledges this is an issue and prioritizes cost awareness education for residents in its Common Program Requirements (ACGME 2017). There have been few studies looking at the best way to incorporate cost education into residency training, and no studies that we are aware of looking at how displaying costs of orders increases residents' awareness of cost.

Objective: To determine if the display of costs in EMR affect residents' ordering habits.

Methods: A retrospective cohort study will be performed examining the ordering habits of residents within the two-month period prior to RUMC epic upgrade (which included quantitative cost display for medications and qualitative cost display for imaging orders) compared with the ordering habits of residents post upgrade.

Results: Results pending further investigation.

Conclusion/Significance: It remains to be seen pending the results of the study. It will provide more information on whether cost display in the EMR affects clinical practices for residents.
FACILITATORS AND BARRIERS TO IMPLEMENTATION OF A TABLET-BASED PARENT TRAINING PROGRAM IN PEDIATRIC PRIMARY CARE

Presenting Author: Caitlin Fehrenbacher, BSN, RN-BC
Authors: Caitlin Fehrenbacher, BSN, RN-BC (Rush University) (presenting/first author) Katherine C. Rosemeyer, BS (Rush University) Susan M. Breitenstein, PhD, RN, FAAN (Ohio State University)

Introduction: The ezParent program is a tablet-based behavioral parent training program designed to promote positive parenting skills and improve child behavior for low income and minority parents. Program delivery via technology bridges several barriers to parent access, however implementing within a busy primary care clinic may introduce other potential challenges.

Objective: As part of a randomized controlled trial (n= 287) ezParent was delivered in four pediatric primary care sites. Primary care providers implemented the procedures with 7% to 52% of eligible parents in the four practices. The purpose of this study was to learn the barriers and facilitators that providers and staff experienced during the implementation of ezParent into their pediatric practice.

Methods: A qualitative exploratory design with focus group methodology was used. The program was implemented at 4 pediatric primary care clinics. Providers and staff introduced the program to patients. Post implementation, researchers verbally invited clinic providers/staff to participate in follow-up focus groups. The interview guide included questions on facilitators and barriers to implementation and elicited suggestions for increasing participation. Two research staff wrote detailed notes. Three coders independently examined the notes and identified themes. Qualitative themes were identified based on the Consolidated Framework for Implementation Research's domains (intervention, inner/outer setting, individuals involved, and process by which implementation is accomplished) affecting the success of healthcare projects.

Results: Ten focus groups were held (average 9 participants/group). Participants included physicians, nurse practitioners, nurses, unit managers, medical assistants, and ancillary staff. Intervention themes involved staff awareness, provider/administrative support, and positive opinions about intervention benefits. Setting themes related to the need for additional staff training and lack of time to implement. Individual involvement themes included staff role confusion and perception of more effective implementation when the process was supported by the primary provider. Suggestions for improving implementation included having a dedicated staff person, integration into the medical record, and clarification of staff/provider roles.

Conclusion/Significance: The program was perceived as positive for patients, but clarification regarding individual roles in implementation is needed. These findings provide important information to direct research and implementation efforts to support sustainability of ezParent in primary care.
SHORT-TERM EFFICACY OF GONIOTOMY WITH KAHOOK DUAL BLADE

Presenting Author: Alexandra Feldner, BA
Authors: Alexandra Feldner (Rush); Hreem Patel, MD (Rush)

Introduction: Decreasing intraocular pressure (IOP) is the only proven method to treat glaucoma. One strategy for this is goniotomy with the Kahook Dual Blade (KDB) by New World Medical, Inc., which surgically removes the trabecular meshwork to increase aqueous outflow. Limited data exist regarding outcomes of this procedure, especially related to different glaucoma severities.

Objective: The purpose of this study is to evaluate the short-term efficacy of KDB goniotomy in lowering IOP and medication need in patients with different glaucoma severities. We hypothesize that KDB goniotomy will decrease IOP and glaucoma medication need and that surgery will be equally effective regardless of glaucoma severity.

Methods: Retrospectively, we analyzed IOP, glaucoma medication number, and glaucoma severity (mild, moderate, or severe defined by ICD-9) of all patients who underwent KDB goniotomy in a private practice setting from July 2017 to July 2018. With IRB approval, we examined preoperative data as a baseline and one day and six month postoperative data. T-tests were used to evaluate IOP change one day and six months postoperative and medication change six months postoperative when compared to baseline. ANOVA and the Tukey test were used to analyze differences between severity classifications for changes in both IOP and medication number.

Results: We analyzed 26 cases total and 21 cases with six month postoperative data. Using t-tests, we reject the null hypotheses of no change and accept the alternative hypotheses that mean changes in IOP one day and six months postoperative and medication number change six months postoperative were less than 0 (p=0.04, 0.01, and 0.02, respectively). From ANOVA with the Tukey test, there is a significant difference in medication decrease at six months between mild and moderate groups (p=0.05), with the mild group having a greater decrease.

Conclusion/Significance: The data show that KDB goniotomy likely lowers IOP and medication need in glaucoma patients of varying severity. Surgery may be more effective in lowering medication need in mild glaucoma than in moderate glaucoma. We hope to analyze more cases in order to create a larger data set.
DETERMINATION OF CLINICALLY IMPORTANT CUT-OFF VALUES OF PAIN CATASTROPHIZING FOR PREDICTING INCREASED POSTOPERATIVE PAIN FOLLOWING TOTAL KNEE ARTHROPLASTY

Presenting Author: Nathaniel Froikin, BS
Authors: Nathaniel D. Froikin, B.S., Lauren N. Kret, B.A., Robert J. McCarthy, Pharm D  Rush University Medical Center, Chicago, IL

Introduction: Pain catastrophizing has been identified as independent predictor for the development of acute postoperative pain following total knee arthroplasty (TKA). Currently no clinically relevant risk stratification based on assessed values for pain catastrophizing has been identified.

Objective: To determine clinically important cut-off values for the association of pain catastrophizing with risk assessment for the development of acute postoperative pain following TKA.

Methods: Following IRB approval, patients under primary TKA were included. Baseline psychological assessment of catastrophizing (Pain Catastrophizing Scale - PCS), anxiety and depression were performed. The PCS is a 13-question instrument scored on a Likert scale 0 to 4, with 0 representing not at all to 4 representing all the time. Patients received standard perioperative management. NRS pain scores were recorded every 4-6 h. Increased postoperative pain was defined as a weighted mean NRS pain (WMP) > 4 in the first 72 hours postoperatively. The association of PCS scores with acute pain was determined using logistic regression. Cut-off values for PCS were determined based on the maximization of the accuracy area and for minimization of the misclassification rate.

Results: 245 data sets were analyzed. The PCS was associated WMP > 4, odds ratio 1.05 95% CI 1.02 to 1.08, P<0.002. The AUC for the PCS for predicting a WMP > 4 was 0.67 (95% CI 0.60 to 0.75). PCS cut off values for maximization of the accuracy area and minimization of the misclassification rate were 14 and 48, respectively. At a cut-off of 14 and 48, sensitivity, specificity, PPV and NPV were 59%, 66%, 38% and 82% and 6%, 99%, 80% and 75%, respectively.

Conclusion/Significance: The important finding of this study was that although the increased PCS scores were associated with increased postoperative pain, the PCS has low predictive utility for identifying patients at risk for increased acute postoperative pain. For clinical screening purposes our findings suggest that PCS values < 14 have reasonable predictive accuracy for identifying patients at low risk for increased WMP following TKA.
Abstract #: 52

Session Type: Poster
Category: Clinical Practice

RECONCEPTUALIZING CARE FOR A LEANER SEXUAL ASSAULT RESPONSE: AN URBAN ED EXPERIENCE

Presenting Author: Marites Gonzaga-Reardon, DNP, APRN, CCNS, CEN
Authors: Marites Gonzaga-Reardon, DNP, APRN, CCNS, CEN - clinical nurse specialist, rush university medical center (Role: Primary Author) Anna Candoleza, BSN, RN, CEN - SANE Coordinator; Staff Nurse, Rush University Medical Center (Role: Co-author) Yanina Purim Shem Tov, MD, MS, FACEP - Vice Chairperson, Associate Professor, Faculty Development and Research, Medical Director of Chest Pain Center, Department of Emergency Medicine, Rush University Medical Center (Role: Co-author) Patricia Altman, MSN, RN, CEN - Director, Rush University Medical Center (Role: Co-author) Lola Coke, PhD, ACNS-BC, RN-BC, FAHA, FPCNA, FAAN - Associate Professor and Clinical Nurse Specialist, Adult Health and Gerontological Nursing Board of Directors, Preventive CV Nurses Association, Rush University (Role: Co-author)

Introduction: Sexual assault survivors (SAS) are usually directed to emergency departments as first point of contact after the assault for immediate care. In institutions where care of sexual assault survivors (SAS) follows the traditional nurse/physician model, ED physicians and nurses often find it difficult to provide the level of care necessary for sexual assault patients while continuing to manage the rest of patients. Care of SAS presenting to the emergency department (ED) can be challenging to patient flow and ED throughput.

Objective: To describe the experience of this ED on the stepwise implementation and evaluation of a Sexual Assault Nurse Examiner (SANE) program and patient characteristics of SAS in a large urban academic medical center utilizing lean interventions over a 2-year period.

Methods: Retrospective chart review of patients evaluated in the ED with diagnosis of sexual assault and forensic evidence collection kit completed and discharged from the ED. Data collected was pre (January-June 2016) and post (January-June 2018) implementation. A lean process improvement methodology (RUSH Way stands for Ready, Understand, Solve and Hold) and lean tool using five S (Sort, Set in order, Shine, Standardize and Sustain) for eliminating waste and improving flow was adapted to process map interventions and to evaluate the project.

Results: Preliminary results showed an overall decrease trend in median LOS of SAS pre (389 minutes) and post (281 minutes) implementation. Results from a two-sample t-Test showed statistically significance (P (T<=t) two-tail= 0.03624) when forensic exams performed by SANE versus SANE trained nurses post implementation.

Conclusion/Significance: Re-conceptualizing care by altering practices has positive impact on the ED throughput and quality of care for SAS in the emergency department. Eliminating non value added time utilizing S S as a lean tool have tangible benefits in decreasing the length of stay while providing a sensitive and respectful care of sexual assault patients presenting to emergency department. Further studies are recommended in understanding effects of lean interventions in relation to patient experiences, outcomes related to accompaniment of discharge instructions and advocacy medical services as well as staff and provider satisfaction.
DON’T HOLD YOUR BREATH: AN INTERDISCIPLINARY APPROACH TO OPTIMIZE OXYGEN THERAPY AND THE OXYGEN DISCHARGE PROCESS FOR GENERAL MEDICINE PATIENTS

Presenting Author: Michael Grant, MD
Authors: Michael Grant (Rush); Sara Mirza (Rush); Keith Roberts (Rush); Jessica Margwarth (Rush); Ankeet Patel (Rush); Manya Gupta (Rush)

Introduction: Oxygen is a vital therapy used on many hospitalized patients. While oxygen is one of the most widely used therapies in the hospital, it is commonly administered without a prescription or a written order. Because of this, the usage of oxygen is often not documented or monitored in a standardized manner. For this reason, discharging patients on oxygen can be difficult. If oxygen usage is not monitored and documented in a standardized fashion, it is frustrating and confusing for providers to coordinate patients' discharges with appropriate home oxygen prescriptions and follow-ups.

Objective: Using an interdisciplinary team of hospitalists, pulmonologists, respiratory therapists, nursing, and case management, we aimed to better evaluate patients' oxygen needs and standardize supplemental oxygen.

Methods: We developed a standardized oxygen therapy policy, which dictates appropriate supplemental oxygen indications for hospitalized patients. If a patient requires supplemental oxygen therapy, nursing will automatically perform a standardized daily weaning trial, and document the trial in a templated progress note. The provider will review the progress note on a daily basis, and discuss the patient's oxygen needs with case management during daily multi-disciplinary discharge rounds. If a patient cannot be weaned off oxygen, and discharge is imminent, the policy prompts the provider to place an order for 'Home Oxygen Reconciliation' which triggers an evaluation by respiratory therapy, who evaluates patient's specific oxygen needs for the home health orders. At discharge, case management also ensures that any patient going home with oxygen receives an automatic referral to pulmonary.

Results: We have piloted our policy on some of our general medical floors. Metrics we plan to measure and compare include: 1) total hospital time spent on supplemental oxygen; 2) percentage of patients who follow up in pulmonary clinic after being discharged with home oxygen; 3) provider satisfaction with the overall oxygen discharge process; 4) general medicine hospital length of stay; 5) total oxygen costs to our organization.

Conclusion/Significance: Our goal is to bring a greater focus on our usage of supplemental oxygen, reduce the unnecessary use of oxygen therapy, and streamline the discharge process for patients going home with oxygen.
A DELAYED HEMOLYTIC TRANSFUSION REACTION IN A PEDIATRIC PATIENT WITH SICKLE CELL DISEASE

Presenting Author: Deanna Hano, BS
Authors: Deanna Hano (Rush Medical College), Mary Elizabeth Calabrese DO (RUCH), Pooja Mehta DO (RUCH), Lisa Giordano MD (RUCH)

Introduction: A delayed hemolytic transfusion reaction (DHTR) may occur as a result of antibodies to minor blood group antigens anywhere between 24 hours and 4 weeks after a blood transfusion, and patients may be asymptomatic or develop a life-threatening hemolysis.

Objective: To describe the evaluation and management of DHTR in an adolescent with sickle cell disease.

Methods: A 14-year-old male with sickle cell disease (HbSS) presented from an outside hospital (OSH) after a 5-day admission for bilateral lower leg pain. Initial hemoglobin (Hb) at OSH was 5.7 gm/dl. The patient had known anti-Fy3, anti-S, anti-Jkb, anti-C, and anti-M alloantibodies, and these were identified by the OSH. He was transfused a total of 3 units of matched leukoreduced packed red blood cells (pRBCs) and Hb increased to 8.9 gm/dl. The patient also developed a fever of 102F and had persistent distal right leg pain, prompting a concern for osteomyelitis. He received a 5-day course of Ceftriaxone and blood cultures and a follow-up leg x-ray were unremarkable. The patient was subsequently transferred to Rush University Children's Hospital (RUCH) with fever of 100.9F and Hb of 9.1gm/dl, which steadily dropped during hospitalization with a nadir of 5.4 gm/dl on RUCH day 4. LDH and bilirubin on RUCH day 4 were elevated to 777 U/L and 4.6 mg/dl, respectively. Antibody screen of the patient's plasma was positive for anti-C, anti-Jkb, and anti-S, as well as an auto-antibody. Historical anti-Fy3 not evaluated at this time.

Results: The patient was treated with IVIG 0.4g/kg/day for three days and IV methylprednisolone which was transitioned to prednisone with a slow taper over two weeks to avoid rebound vaso-occlusive pain. Hb was 7.6 gm/dl, retic was 33%, and pain was significantly decreased on the day of discharge.

Conclusion/Significance: Clinical symptoms of DHTR may be subtle, and in patients with sickle cell disease may resemble a vaso-occlusive pain episode, potentially leading to delayed diagnosis. DHTR should be suspected when there is a significant drop in Hb level in a patient who has had a recent blood transfusion.
A RUSH COLLABORATION: A QUALITY IMPROVEMENT PROJECT IN A RESIDENT INTERNAL MEDICINE-PEDIATRICS CLINIC IN DEVELOPMENT OF UNIVERSAL, SYSTEM-WIDE SCREENING FOR ADVERSE CHILDHOOD EXPERIENCES AND SOCIAL DETERMINANTS OF HEALTH

Presenting Author: Aaron Hart, MD
Authors: Aaron Hart, MD, Varun Shetty, MD, MBA, MS, Robyn Golden, LCSW, MA, Christopher Nolan, MPA, Rachel Smith, MBA, Jennifer McDonnell, MD (Rush University Medical Center)

Introduction: At Rush University Medical Center, the institutional Community Health Needs Assessment identified a 16 year life-expectancy gap among distinct neighborhoods in Rush's service area. As part of its Community Health Implementation Plan, Rush set an institutional goal of screening all at-risk patients for Adverse Childhood Experiences (ACEs) and Social Determinants of Health (SDHs) and partner with community organizations to connect patients to needed resources.

Objective: Through a quality improvement process and working in collaboration with an interprofessional team, in our Internal Medicine-Pediatrics clinic we aim to (1) conduct screenings at 50% of well visit exams for specific Unmet Social Needs (USNs) and provide referrals for 80% of positive screens, and (2) increase self-assessed provider frequency of screening for specific USNs and knowledge of community partners that address these needs in Rush's service area.

Methods: Providers were surveyed prior to intervention on frequency of screening for specific USNs (food, housing, transport, utilities) and their familiarity with community partners. Providers were trained on a screening and referral tool (integrated into the electronic medical record) with an online Chicago community resource database that is managed by a third party with ongoing feedback from an interprofessional Rush collaboration. Three cycles of two month iterations of universal screens at well visits were completed, with interval meetings with providers, staff, and institutional collaborators to assess screening and referral frequency, address barriers and devise solutions. Interventions also included monthly introduction to community partners via site visits or presentations. Post-intervention survey of providers was completed.

Results: We were (1) unsuccessful at achieving a 50% rate of screening for USNs at well visits, with the rate of screening actually decreasing with each PDSA cycle. We were successful at (2) improving self-assessed provider frequency of screening for USNs and familiarity with community resources for specific USNs, with several measures reaching statistical significance as shown by 2-tailed T testing.

Conclusion/Significance: Universal screening for USNs remains a significant challenge to implement in clinical practice, with barriers including time management, provider attitudes, provider discomfort, and technical limitations. Continued collaboration is needed to reach the goal of system-wide universal screening for ACEs and SDHs at Rush.
IMPROVING COMMUNICATION OF DISCHARGE PLANS AMONGST RESIDENTS, NURSES, AND PATIENTS: A QUALITY IMPROVEMENT PROJECT

Presenting Author: Camille Hawkins, MD
Authors: Camille Hawkins, MD (RUMC); Arianne Agdamag, MD (RUMC); Manya Gupta, MD, FHM (RUMC)

Introduction: Discharge of hospitalized patients is a multistep process, involving communication amongst numerous healthcare providers. Delays in discharge cause a backlog of patients in the ED and ICUs, leading to prolonged wait times. Furthermore, many discharges occur in the evening, under covering providers. Our institution has no standardized protocol on relaying discharge instructions to patients.

Objective: In this project, our goal was to determine the baseline perception of the discharge process and implement a mandatory, standardized discharge instruction checklist accessible to nurses, residents, and patients.

Methods: Baseline surveys regarding the discharge process were sent via email to nurses and to Internal Medicine residents. A discharge checklist was developed based on the issues identified. The checklist was launched during a resident safety conference, and the list was included in patients' discharge paperwork, which is visible to patients and providers. Residents were required to complete this checklist prior to printing the AVS.

Results: The survey was completed by 86 nursing staff and 48 residents. For both residents and nurses, >95% have encountered discharge related issues. For nurses, 84.9% found inconsistencies in discharge documentation, 89.5% have been contacted by patients after discharge and the most common issues were: discharge medication, transportation, and follow-up. Among residents, 91.7% had been contacted by nurses during cross cover to clarify discharge plans, 95.8% were willing to complete a discharge checklist and the most common issues were: medication refills, opioid prescriptions and follow-up. Both nurses (94.2%) and residents (81.3%) agreed that a standardized discharge template would be beneficial.

Conclusion/Significance: The majority of nurses and residents perceive a lack of standardized discharge communication. This ineffective communication can have a significant impact on a patient's health as mentioned in prior studies. The discharge related issues seen in the survey, specifically medication related questions, were similar to reports in literature. The openness of nursing and residents in the implementation of a standardized checklist is key for improvement. Our checklist includes the reason for admission, medication changes, follow-up and contact person after discharge, all written in patient-friendly language. To determine its efficacy, a post-intervention survey is being developed for residents and nurses.
SECURITY INTERACTIONS WITH PATIENTS WITH AUTISM SPECTRUM DISORDERS WITH AND WITHOUT INTELLECTUAL DISABILITIES

Presenting Author: David Hellrung, MSN
Authors: David Hellrung (RU); Caroline Roestel (RU); Sarah Ailey (RU); Cathy Catrambone (RU)

Introduction: Patients with autism spectrum disorder with and without intellectual disabilities (ASD/ID) at times exhibit heightened responses to crisis situations, particularly in the Emergency Department (ED). Due to increasing numbers of interactions with this patient population, security department management reached out to a medical center committee charged with improving the care of patients with ASD/ID. Insufficient staff knowledge, communication problems, and deficient care coordination were identified by the security department as factors related to negative patient and staff experiences. The Agency for Healthcare Research and Quality Care Coordination Framework was used to guide this quality improvement project.

Objective: The objectives of the training are to educate security personnel on the identification of characteristic behaviors of ASD/ID and to improve confidence in recognition of and interactions with patients with ASD/ID.

Methods: Using input from interviews with security personnel, an education program was developed based on literature and elements from an evidence-based education program designed for first responders and ED personnel, focusing on recognition of ASD behaviors and education in interaction techniques. Educational sessions were held for 70 security personnel. Security personnel's level of knowledge and confidence in interactions was assessed using a pre- and post-educational survey, with the post survey administered immediately following the intervention and one month later.

Results: Of the security personnel who attended the training, 68 officers completed the pre-test with a mean score of 88%, 65 officers completed the post-test with a mean score of 94%, which resulted in an overall knowledge gain of 3.3%. T-test performed on the data resulted in a statistically significant T-score of 2.782 and a p-score of 0.007. Officer reported overall gains in comfort levels in recognizing and interacting with patients with ASD/ID.

Conclusion/Significance: Security officers' overall knowledge of ASD/ID and reported comfort levels recognizing and interacting this population improved with the training. This project has the potential to improve care for patients with ASD/ID. Results of this initiative will be used to develop additional educational materials for hospital staff, interdisciplinary training and care coordination between security and hospital staff when caring for the ASD population.
Abstract #: 58
Session Type: Poster
Category: Clinical Practice

SOCIAL MEDIA AND MEDICINE; IS IT REALLY SO BLACK AND WHITE?

Presenting Author: Kyrie Herring, MD
Authors: Hungerford, Kyrie, MD (Rush); Gupta, Manya, MD (Rush)

Introduction: Social media has become intertwined within the medical field and subsequently rules and regulations on providers' usage of social media has been developed. Across institutions the major rule for all medical staff, including residents, has been 'do not violate HIPPA.' This seems easy for most residents to understand, however there are many gray areas where it becomes hard to navigate. It's unclear how institutions should handle these areas. For those healthcare providers who use social media, many have either themselves posted, or seen others post something on social media that does not violate HIPPA, but may still not be appropriate. Whether it's a chest X-ray without patient identifiers, a replication of a patient conversation without any identifiers, or photos of simply being in the hospital, there is a debate on whether these types of posts violate ethical boundaries of patient care, and whether they should be on the internet. How and when should institutions intervene? And what are fair and appropriate policies around posts that do not violate HIPPA?

Objective: Assess resident/attending knowledge of Rush's existing social media policy  Educate residents/attendings on appropriate media content  Develop a policy for GME regarding social media rules and regulations   Guide a framework of repercussions for GME for violators of this policy

Methods: Use Google survey with multiple choice questions to assess resident knowledge of Rush's social media policy  Provide examples of non-HIPPA social media posts and assess responses (provided via survey and focus group sessions)

Results: No data available (will have soon)

Conclusion/Significance: If we are able to develop a social media policy for non-HIPPA violations for GME then will be able to educate residents/attendings on these best practices. We also hope to help develop guidelines for when and how program leadership should intervene when residents are posting inappropriate content, and to develop a a process for setting guidelines without taking away individual liberties. Some limitations of our study include, individual basis based on each resident/attendings personal values, interpretation of opinion in focus groups and ability to educate all residents' given scheduling differences.
Abstract #: 59

Session Type: Poster
Category: Clinical Practice

MYCHART BEDSIDE & THE PATIENT EXPERIENCE

Presenting Author: Cyril Iskander, BS, MS-HSM in progress
Authors: Jordan Dale, MD (Rush University Medical Center) Francis Fullam, MA (Rush University) Tricia Johnson, PhD (Rush University) Irwin Press, PhD (Rush University & University of Notre Dame)

Introduction: In the U.S. healthcare system, reimbursement models have shifted from fee-for-service to value-based care. The Centers for Medicare and Medicaid Services has placed increased emphasis on the patient experience by including a patient experience measure accounting for 25% of value-based payment reimbursements. As a result, health systems are looking for new ways to deliver care while keeping the patient experience in mind. The use of other technology-facilitated processes to provide patient education, such as centralized white board and patients portals, have been associated with better patient satisfaction scores. In an effort to further improve the patient experience, Epic has combined the white board and patient portal technology into a patient facing iPad application called, MyChart Bedside.

Objective: To test the association between Epic’s MyChart Bedside Activation status and patient satisfaction scores, in the inpatient setting.

Methods: This study is a retrospective, cross sectional study including both activated and non-activated adult patients that were admitted and discharged from the Oncology and Neuroscience units and also completed a patient satisfaction survey. Our analysis will evaluate top-box scores for each Press Ganey/HCAHPS question between January 1st, 2018 and December 31st, 2018. A 'top-box score' is defined as the highest possible rating a patient can select when completing the satisfaction survey (HCAHPS top box: 4, Press Ganey: 5). Binary logistic regression models will be used to analyze the strength of the association between activation status, and the patient satisfaction scores for each of the questions individually, while controlling for demographic and clinical variables.

Results: We expect a sample size of ~40 activated patients and ~150 non-activated patients. A preliminary bivariate analysis demonstrated that of the 22 activated patients, 18 (81%) patients were 'always' satisfied with nurses' explanation, compared to the 70 (78.7%) of 89 'always' satisfied non-activated patients.

Conclusion/Significance: Patients who activate and use Epic’s MyChart Bedside respond with higher patient satisfaction scores, in pertinence to provider/nurse communication. There are three main implications of this study: increased hospital reimbursement, better patient education, and an overall decreased nurse workload. Limitations include administrative burden on nurses, patient resistance, and low MyChart Bedside activation rates.
Abstract #: 60

Session Type: Poster
Category: Clinical Practice

INCREASED QUANTITY AND DOSAGE OF OPIOID PRESCRIPTIONS FOLLOWING INGUINAL HERNIA REPAIR

Presenting Author: Zachary Lawrence, BA
Authors: Zachary Lawrence (Rush); John Tierney, MD (Rush); Lilia Schulenberg (Rush); Julia Coughlin, MD (Rush); Konstantin Tchalukov (Rush); and Javeria Qureshi, MD, MPH (Rush)

Introduction: The staggering number of opioid related deaths and reported amount of opioid addiction in the United States over the past two decades has prompted an opioid epidemic. Unclear guidelines for postoperative pain management have led surgeons to inadvertently prescribe excessive amounts of opioid medications, increasing the potential for prescription drug abuse and overdose. Despite recent efforts to standardize this process, optimal guidelines have yet to be achieved and risk factors for prolonged use of opioids following surgery remains poorly understood.

Objective: Determine factors that may contribute to long-term opioid use following general surgical procedures and thus assist policy efforts for opioid prescription guidelines.

Methods: A retrospective systematic review was performed for 778 patients who underwent general surgical procedures at two public urban hospitals within the Cook County Health & Hospital System (CCHHS) between the dates of July 1, 2015 and June 30, 2017. Patient records were obtained from the CCHHS electronic medical record following the approval of the CCHHS Institutional Review Board, and data was categorized into groups based on diagnosis: acute cholecystitis (AC), symptomatic cholelithiasis (SC), acute appendicitis (AA), and unilateral inguinal hernia (UIH). Descriptive statistics were analyzed between groups using R 3.3.2 and comparisons were made using Fisher’s exact test. All opioid prescriptions were converted to Oral Morphine Equivalents (OME) using the conversion factors listed by the Centers for Medicare and Medicaid Services.

Results: UIH patients were 6.8% more likely than any other group to require an additional refill of opioid medication after the initial postoperative prescription (P = 0.009; Fisher’s exact test, FET). Of groups that were found to have multiple patients that required refills in the 31-90 day period after surgery, UIH patients were prescribed higher mean dosages of opioids at 27.9 (7.4) OME compared to 18.3 (7.3) OME in the SC group (P = 0.004, FET).

Conclusion/Significance: Patients who underwent unilateral inguinal hernia repair at two public urban hospitals were more likely to require a refill of opioid prescription medications and received higher dosages than other general surgery patients. Further studies focused on finding effective non-opioid pain management strategies as alternative therapy following hernia interventions are warranted.
A MULTIDISCIPLINARY ABDOMINAL HEALTH & PELVIC FLOOR CLINIC

Presenting Author: Hanna Legator, BA
Authors: Hanna Legator (RUMC), Sarah Jochum (RUMC), Theodore Saclarides (RUMC), Joanne Favuzza (RUMC), Dana Hayden (RUMC), Kenika Robinson (RUMC), Sheila Dugan (RUMC), Cynthia Brincat (RUMC)

Introduction: Pelvic floor dysfunction (PFD) and abdominal health are often intrinsically linked resulting in complex clinical pictures that involve multiple organ systems and result in reduced quality of life (QOL). Given the complexity of these issues, individual providers can be limited in their ability to independently treat these conditions. To overcome these challenges, we have embraced a bi-monthly multidisciplinary programmatic approach to treat patients with these complex problems.

Objective: To examine the function of the comprehensive care provided at the Program for Abdominal and Pelvic Health multidisciplinary clinic at Rush University Medical Center.

Methods: After IRB approval, we abstracted data from the first 100 new patients between 12/2017 - 10/2018 into a prospective database in REDCap and performed descriptive statistical analyses.

Results: 93% of the patients were women. Mean age was 49 years (±17.4), mean BMI was 27.5 (±7.2) and 27% were obese (BMI≥30). 41% had chronic conditions. Most common presenting concerns included pelvic pain (45%) constipation (30%), abdominal pain (23%), high-tone PFD (23%), and fecal (23%) and urinary (27%) incontinence, with 76% having multiple presenting symptoms. 25% were taking narcotic pain medication prior to their first visit. We noted diverse referring patterns, with 11 patients being entirely new to our institution. Patients travelled a mean distance of 24 (±32.4) miles to the clinic. A median of 2 providers was seen per visit, although 5 patients saw 4 providers. 56% of patients saw GI, 45% PM&R, 31% PT, 25% urogynecology, 19% behavioral health, 18% urology, 13% and colorectal surgery. 57% have returned to the clinic or have followed up with their individual providers.

Conclusion/Significance: In the first 10 months, this clinic proved a successful model and generated downstream revenue with new patient referrals to our institution and significant return for follow-up. Further analysis beyond proof of concept will illustrate the benefits of a truly multidisciplinary approach with continued growth, increased revenue, improved clinical outcomes, development of evidence-based protocols and enhanced patient satisfaction, including better QOL. As the incidence of PFD is projected to rise, we must develop better strategies to care for patients with pelvic floor disorders.
Abstract #: 62
Session Type: Poster
Category: Clinical Practice

EVALUATION OF ENVARSUS XR IN AFRICAN AMERICAN KIDNEY TRANSPLANT RECIPIENTS

Presenting Author: Lance Lineberger, PharmD
Authors: Lance Lineberger (Rush), Pharm.D., Edward Hollinger (Rush), MD, PhD, Nicole Kenyon (Rush), Pharm.D., Marissa Brokhof (Rush), Pharm.D., Nicole Alvey (Rush), Pharm.D.

Introduction: This study is being conducted to evaluate the impact of the utilization of tacrolimus LCP (TAC-LCP) compared to tacrolimus immediate release (TAC-IR) in African Americans as a part of de novo maintenance immunosuppression.

Objective: African American kidney transplant recipients have traditionally demonstrated elevated tacrolimus metabolism, potentially leading to subtherapeutic trough levels and suboptimal immunosuppression. Extended release tacrolimus (TAC-LCP) has demonstrated a smoother pharmacokinetic profile in African American patients. The clinical outcomes of utilizing TAC-LCP in this patient population have not been evaluated in current literature.

Methods: Single-center, retrospective chart review comparing the outcomes of African American kidney transplant recipients who received TAC-LCP to those who received TAC-IR between March 1, 2013 and March 1, 2018. Per institutional protocol, African American kidney transplant recipients are initiated on TAC-LCP dosed at 4mg daily. The primary efficacy endpoint of this study was treated acute rejection within 12 months after transplant. Time to therapeutic tacrolimus trough, incidence of cytomegalovirus (CMV) and BK infection, and eGFR 6 and 12 months post-transplant were additional outcomes.

Results: A total of 300 patients were screened for inclusion with 86 patients meeting inclusion criteria: 23 in the TAC-LCP and 63 in the TAC-IR arm. The majority of patients were excluded due to being of non-African American ethnicity. No statistically significant difference was found in treated acute rejection between the TAC-LCP and TAC-IR arms (14.3% vs 9.5%; P=0.684). Median time to therapeutic tacrolimus trough was 17 (IR 13-22) and 14 days (IR 9.3-21.8; P=0.333). A trend towards lower rates of CMV (4.7% vs 15.8%; P=0.227) and BK (14.2% vs 30%; P=0.251) infections was observed in the TAC-LCP compared to the TAC-IR arm. No significant difference was found in median eGFR between arms at 6 months (61 (IR 49-81) vs 61.65 (IR 45-77.5) ml/min/1.73m2; P=0.320) or 12 months post-transplant (63.15 (51.43-76.93) vs 67.6 (IR 46-78.9) ml/min/1.73m2; P=0.771).

Conclusion/Significance: The use of TAC-LCP in the African American kidney transplant patients as part of de novo maintenance immunosuppression resulted in similar acute rejection rates and time to therapeutic troughs compared to TAC-IR. The incidence of infectious complications and overall renal function were also similar between groups.
Abstract #: 63

Session Type: Abstract/Podium Award (Deans’ Award)
Category: Clinical Practice

A SHARED DECISION-MAKING TOOL FOR OPIOID PRESCRIBING FOLLOWING CESAREAN DELIVERY: AN INTERVENTION TO DECREASE THE RESERVOIR OF OPIOIDS

Presenting Author: Elizabeth Loomis, DNP
Authors: Elizabeth A. Loomis (RU)  Dr. Diane McNaughton (RU)  Cheryl Genord (SJMAA)

Introduction: Misuse of prescription opioids is a public health crisis in the United States. In 2016, it was estimated that 3.3 million Americans were misusing prescription opioids (SAMHSA, 2017) and nearly 63,632 deaths were due to prescription opioid misuse. From 1999 through 2010, the number of prescription opioid drugs sold to health care facilities from pharmaceutical companies, nearly quadrupled. Cesarean delivery is the most common surgical procedure performed in the United States and opioids are most often chosen to manage post-operative pain. Research has shown that women, who deliver via cesarean section, are prescribed an excess of opioid tablets upon discharge and often store them in unsecure locations. Furthermore, the vast majority, are not disposed of properly.

Objective: The purpose of this quality improvement project was to assess whether a shared decision-making tool between a provider and women following cesarean delivery can reduce the pool of unused opioids in the community.

Methods: A one-group pre-survey-post-survey design was used. A shared decision-making session was implemented on a computer-based tablet, led by the discharge provider and woman following cesarean section on day of discharge. The tool focused on pain expectations, multi-modal methods (both pharmacological and non-pharmacological) to manage pain, and safe storage and disposal of excess medication. Women chose the number of 5mg Oxycodone tablets they would be prescribed, up to the institutional standard of 30. Women were provided a home opioid deactivation system to dispose of any excess tablets. A follow-up phone call was completed two weeks following discharge.

Results: Sixty women participated in the initiative. The median number of 5mg Oxycodone tablets prescribed was 18.53. Women consumed a median of 14 tablets, with 5.73 remaining. Sixty-five percent (n=33) of women disposed of their excess tablets, 33% utilizing the opioid deactivation system provided. The initiative resulted in a 38% decrease in the number of opioid tablets prescribed postoperatively.

Conclusion/Significance: Engaging post-operative patients in decisions regarding pain management, educating women on multi-modal methods to manage pain, and providing women with a means to properly dispose of excess tablets, can reduce opioid tablets available for misuse and diversion in the community.
THE IMPACT OF INTEGRATING AN ADVANCE CARE PLANNING MODEL IN HOME HEALTH

Presenting Author: Jessica Mauleon, RN
Authors: Jessica Mauleon, RN, CHPN (Rush University); Beth Staffileno, PhD, FAHA

Introduction: Many older adults are never offered an opportunity for advance care planning (ACP) conversations and lack advance directives (ADs) that outline their end-of-life (EOL) treatment preferences. At a Midwest, suburban-based home health (HH) agency, only 2.3% older adult patients had documented ADs, compared to 28% nationally. Of concern, this HH agency lacked standardized procedures for ACP and ADs leading to inadequate staff knowledge regarding EOL conversations, avoidable hospital readmissions, and untimely transitions into hospice care. Lack of ADs is directly correlated to higher hospital readmission rates and lower hospice length-of-stay which is particularly concerning for individuals identified as high-risk for readmission at EOL.

Objective: Evidence-based procedures were developed to: 1) provide staff education, 2) increase ACP conversations offered and completed among high-risk HH patients, 3) increase Practitioner Orders for Life-Sustaining Treatment (POLST) rates, 4) reduce 60-day hospital readmissions, and 5) support hospice care admissions.

Methods: This quality initiative adapted Respecting Choices, an evidence-based ACP model. Staff received 2-5 educational sessions and role playing exercises, based on discipline specific roles in ACP/ADs. The Knowledge-Attitudinal-Experiential Survey on Advance Directives (KAESAD), an 89-item instrument, was used to assess staff knowledge, confidence and attitudes towards ACP/ADs. Standardized tools were created and used in the electronic medical record to track ACP conversations offered and completed, POLST rates, 60-day hospital readmissions, and hospice admissions. Chi square analyses were used to compare changes pre- and 3-months post implementation.

Results: Data demonstrate: increases for ACP offered 6% to 80%, p < 0.001); ACP conversations 4% to 31%, p < 0.001); POLST rates 26% to 43.6%, p = 0.059); decrease for 60-day hospital readmissions 40% to 20%, p = 0.025); while transitions into hospice care was not impacted ranging from 10% to 5.5%, p = 0.381). The KAESAD survey is currently being analyzed for 75 staff (100%).

Conclusion/Significance: HH agencies play a critical role in preventing avoidable hospital readmissions. The ACP model, Respecting Choices, serves as an effective framework for providing staff education and developing standard procedures that significantly increase ACP conversations, improve POLST rates, and reduce 60-day hospital readmissions.
INTRODUCTION: Cholesteatomas are non-cancerous cystic lesions in the middle ear that, without proper detection and treatment, can increase in size, invading intratemporal structures and potentially resulting in serious complications. They occur in both the pediatric and adult population, however cholesteatomas in pediatric population are more aggressive, with a higher recurrence rate. Non-echo planar diffusion weighted MRI has been shown to be successful at detecting post-operative cholesteatoma in the adult population, but largely has not been applied for the more aggressive cholesteatomas of the pediatric population.

OBJECTIVE: To determine the usefulness of non-echo planar weighted (non-EP DWI) MRI on the detection of pre and post operative cholesteatomas in the pediatric population.

METHODS: A retrospective review of 13 pediatric patients who underwent non-echo planar DWI-MRI for the pre or post-operative detection of cholesteatoma from 2014-2018 was performed.

RESULTS: 13 pediatric patients had 18 non-echo planar DWI-MRIs done for detection of cholesteatoma, either pre-operatively (4) or post-operatively (14). Findings were either positive (5), negative (12), or 'atypical' (1). Surgery was completed following 11 of the MRIs, either to remove the cholesteatoma found or to do a second-look surgery to confirm the absence of cholesteatoma. In 3 patients, the negative MRIs (6) were not confirmed by surgery. Of the studies confirmed by surgery, the overall sensitivity, specificity, positive and negative predictive values were 83.3%, 100%, 100%, and 83.3% respectively.

CONCLUSION/SIGNIFICANCE: DWI-MRI can be used to accurately detect cholesteatomas in the pediatric patient population. However, more studies with a larger patient sample are necessary to confirm these results. Cholesteatoma can only be treated with surgical excision, is difficult to diagnose, and has a high level of recurrence. There are many complications associated both with delayed diagnosis of an active cholesteatoma, and the surgery to remove a cholesteatoma. If DWI MRI is successful at detection of cholesteatomas in the pediatric population, it could reduce the risk of these complications through early pre-operative detection, post-operative detection of possible recurrence, and avoidance of unnecessary surgery.
SEQUENTIAL COMPRESSION DEVICE ADHERENCE FOR NEUROSCIENCE PATIENTS

Presenting Author: Dallal Nijem, MSN, RN
Authors: Dallal Nijem (Rush University) Jacob Vermeer (Rush University)

Introduction: Neuroscience patients are at high risk for venous thromboembolism (VTE) due to an inability to use chemical prophylaxis for diagnoses such as brain hemorrhage. Furthermore, stroke patients with a paralytic limb have an increased risk of developing a VTE. Despite evidence for the importance of mechanical prophylaxis, sequential compression device (SCD) adherence is low on neuroscience units.

Objective: The purpose of this quality improvement project was to identify barriers to SCD adherence in order to prevent deep vein thrombosis and pulmonary embolism and provide better outcomes for neuroscience patients.

Methods: The theoretical framework used to guide the intervention was the Transtheoretical Model. This framework outlined the cycle of change from pre-contemplation, assessing the microsystems, and moved to contemplation in which nurses and patient care technicians/nursing assistants (PCTs/NAs) were made aware of the problem. The project moved into a state of preparation after assessment of SCD adherence on each unit. Audits were conducted to determine potential barriers to SCD adherence. An auditing tool was developed to identify the top barriers to adherence on each microsystem. VTE occurrence was collected for three quarters from the quality dashboard on both microsystems. Interdisciplinary focus groups were conducted involving nurses and PCTs/NAs to discuss key barriers to SCD adherence.

Results: Data from the unit audits on 11W Neuroscience ICU revealed that the average adherence rate was 76.6% (n=64). On 12W Neuroscience the average adherence rate was 62.4% (n=74). The top three barriers identified were: SCDs not charted appropriately, SCDs applied but machine not turned on, and SCDs not being reapplied after toileting, transport, diagnostic testing or other activities.

Conclusion/Significance: Based on these results, the following recommendations were made: 1) adding SCD checks into the standard work for PCTs/NAs during handoff and during the shift; 2) removing 'SQ anticoagulation' for SCD documentation from electronic medical record; 3) adding educational flyers to the quality boards and unit bathrooms to increase SCD awareness; and 4) providing additional training to a PCT/NA to oversee the training of PCTs and NAs on the units.
TAKING SOCIAL MEDICINE FROM FREE TIME TO PRIME TIME: SCREENING FOR SOCIAL DETERMINANTS OF HEALTH IN A LARGE URBAN PRIMARY CARE CLINIC

Presenting Author: Coralie Pardo, BA

Introduction: Rush University Internists (RUI) is a primary care clinic on Chicago's West Side. RUI's patients experience high rates of chronic diseases often influenced by social factors, but these social factors are infrequently discussed during appointments.

Objective: To better address social determinants of health (SDoH) during medical appointments, medical students piloted a screening protocol in RUI. The project assesses feasibility and optimization of student-led SDoH screening in primary care.

Methods: The SDoH questionnaire contains ten items addressing food security, housing, transportation, health insurance, and PCP access. When patients screen positive, resources are provided through a community resource database, NowPow, linked to the electronic medical record (Epic). NowPow identifies community resources close to where each patient lives. The protocol includes escalation to social work as needed. Screenings were assessed for average time spent, as well as number of patients screening positive for SDoH metrics.

Results: Between March and May of 2018, 43 patients were screened by six students, with the average screening time of five minutes. 56% of patients (26) screened positive for one or more SDoH: food insecurity (17), utilities interruptions (14), transportation issues (9), insurance status (5), housing insecurity (2). Twelve patients were referred to social work. Overall, patients endorsed these efforts, as one stated 'I'm glad you're asking these questions'.

Conclusion/Significance: SDoH screening in primary care is feasible, and rates of needs related to social determinants of health may exceed providers' expectations. Student screening offsets the workload of other staff. However, student schedules may limit screening large volumes of patients. Further exploration is needed to determine the most sustainable way to screen and connect patients with resources.
RELATIONSHIP BETWEEN MUSCLE MASS WITH HANDGRIP AND RESPIRATORY MUSCLE STRENGTH

Presenting Author: Jessica Park, BS
Authors: Jessica Park (Rush)  Hillary Zellner MS, RD (Rush)  Stephanie Hicks MS, RT (Rush)  Ellen Moran MS, RT (Rush)  Ellen Becker PhD, RT (Rush)  Sarah Peterson PhD, RD (Rush)  Sharon Foley PhD, RD (Rush)

Introduction: Muscle mass is an important determinant of overall nutritional status, but difficult to measure in the clinical setting. Measurement of handgrip and respiratory muscle strength, including sniff nasal inspiratory pressure (SNIP), maximal inspiratory pressure (MIP), and maximal expiratory pressure (MEP), can be easily measured and may be related to muscle mass.

Objective: The purpose of this study was to determine the relationship between muscle mass with handgrip strength, SNIP, MIP, and MEP.

Methods: Patients admitted to Rush University Medical Center were consented to participate. Within 48 hours of admission, handgrip strength was measured using a dynamometer, the average of three measurements of the dominant hand was recorded (kg). Additionally, measures of SNIP, MIP, and MEP, were obtained and reported as absolute (cm H2O) and percent predicted (% predicted) values. Patients had an abdominal diagnostic CT scan completed within 7 days of admission. Skeletal muscles within the L3 region were identified using Hounsfield Unit values of -29 to +150 and muscle cross-sectional area (cm2) was calculated. Additionally, age, sex, and body mass index (BMI, kilograms/meters2) was collected. Data were summarized using median (interquartile range 25th, 75th percentile). Spearman (Rs) correlation was used to identify the relationship between muscle cross-sectional area with handgrip and respiratory muscle strength.

Results: A total of 37 patients were included. The median age and BMI was 57 years and 26.1 kg/m2, respectively; 54% were female. Median muscle cross sectional area was 119 cm2, median handgrip strength was 26.6 kg, median SNIP was 60 cm H2O (66 % predicted), median MIP was 70 cm H2O (79% predicted), and median MEP was 100 cm H2O (56% predicted). A significant correlation was observed between L3 cross-sectional muscle area with handgrip strength (Rs=0.66, p<0.001), absolute SNIP (Rs=0.38, p=0.02) and absolute MEP (Rs=0.59, p<0.001). No correlation was observed between absolute MIP, % predicted MIP, % predicted SNIP, and % predicted MEP.

Conclusion/Significance: Within this small sample of patients, cross-sectional muscle area was correlated with handgrip strength and absolute SNIP and MEP. More research is needed to determine if these measure of strength can identify patients with low muscle mass.
Abstract #: 69

Session Type: Poster
Category: Clinical Practice

THICKNESS SEGMENTATION MEASUREMENTS AND DISORGANIZATION OF THE INNER RETINAL LAYERS ON OPTICAL COHERENCE TOMOGRAPHY AS PRE-OPERATIVE INDICATORS OF VISUAL OUTCOME FOLLOWING VITRECTOMY WITH EPIRETINAL MEMBRANE PEELING

Presenting Author: Paul Parker, BS, MSE
Authors: Paul R. Parker (Rush University); John C. Zeyer (Rush University, Illinois Retina Associates); Mathew W. MacCumber (Rush University, Illinois Retina Associates)

Introduction: Utility of various measurements on pre-operative optical coherence tomography (OCT) in stratifying patients with epiretinal membrane (ERM) is unclear.

Objective: To assess thickness and disorganization of the inner retinal layers measurements on OCT as predictive indicators of post-operative visual recovery following vitrectomy for visually significant ERM to aid in pre-operative assessment.

Methods: 31 eyes in 31 patients who underwent pars plana vitrectomy with ERM and internal limiting membrane (ILM) peeling in the year 2015 were retrospectively reviewed. Inclusion criteria required a pre-op visual acuity of at least 20/200 and complete pre-op five-line Raster OCT imaging. Change from baseline visual acuity at one-year follow up was calculated using LogMAR equivalent and lines of vision. The vertical distance from the ILM to the inner nuclear layer (INL) and from the ILM to the outer plexiform layer (OPL) were measured on four non-central, non-foveal cross-sections; the mean of these four values was calculated. Disorganization of the inner retinal layers (DRIL) was defined as loss of normal distinction between the inner plexiform layer (IPL) and INL on the foveal cross-section. The results within each group were compared via two-tailed T test.

Results: Patients with a mean pre-op ILM to INL thickness of ≥230 μm had a mean 2.5 lines of vision gained (p=0.037) and a mean LogMAR change of -0.25 (p=0.029) as compared to patients with <230 μm who showed a mean 0.23 lines gained and mean LogMAR change of -0.029. Central macular thickness between groups was equivocal (p=0.24), as was pre-op visual acuity. Correlation between ILM to OPL thickness and vision gain was not significant. DRIL was observed in 4 eyes (13%); its presence/absence failed to achieve significance both in lines gained (1.2 in eyes without DRIL vs. 2.1 in eyes with DRIL; p=0.54) and LogMAR (-0.1 vs. -0.2; p=0.37).

Conclusion/Significance: Mean pre-op ILM to INL thickness of ≥230 μm on macular OCT correlated with a more favorable post-operative visual result after vitrectomy for symptomatic ERM. Central macular thickness, ILM to OPL thickness and presence of DRIL did not significantly correlate with visual outcome in our dataset. A larger and higher-powered study would help confirm these findings.
Abstract #: 70
Session Type: Poster
Category: Clinical Practice

CONTENT VALIDITY OF A PEDIATRIC ACUTE CARE HEALTH PROFESSIONAL MOTHER’S MILK FEEDING KNOWLEDGE, ATTITUDES, AND BELIEFS QUESTIONNAIRE

Presenting Author: Kathleen Piotrowski-Walters, PhD student -- MSN, RN
Authors: Kathleen Piotrowski-Walters, MSN, RN, PCNS-BC, CCRN (Rush University)

Introduction: Although mother’s milk feeding (MMF) is the optimal source of nutrition for all infants, little is known about the MMF knowledge, attitudes, and beliefs (KAB) of pediatric acute care (PAC) health professionals (HP). The published studies on MMF KAB of HP lack descriptions of instrument construction including content domains, item generation, and reliability and validity assessments. Furthermore, instruments developed for maternal-child, neonatal, and ambulatory care settings do not account for the unique HP, breastfeeding dyads, and barriers to MMF in the PAC setting.

Objective: This study assesses content validity and user feedback on an instrument developed to measure the MMF KAB of PAC HP.

Methods: Questionnaire items were extrapolated from the United States Breastfeeding Committee Core Competencies in Breastfeeding Care and Services for All Health Professionals, and a literature review of existing instruments measuring MMF KAB of HP. A content validity survey containing questionnaire items was administered to a sample of pediatric nursing staff, nursing leadership, advanced practice nurses, and attending physicians with clinical practice on a university medical center’s pediatric general care unit or pediatric intensive care unit. The PAC HP survey respondents will evaluate the item-level content validity by rating the relevance of each item. Furthermore, the respondents will rate the clarity of each item; and provide feedback on individual item relevance and clarity, and the overall relevance and clarity of the instrument. The interrater agreement (IRA) and item-level content validity (I-CVI) will be calculated.

Results: Items with IRA less than 0.7 and I-CVIs less than 0.79 will be evaluated and rewritten considering the respondents’ feedback. The rewritten items will be resubmitted to the respondents for representativeness and clarity grading and IRA and I-CVI calculation. After the second content validity survey submission, items with IRA less than 0.7 and I-CVI less than 0.7 will be eliminated.

Conclusion/Significance: The survey findings will support that each questionnaire item measures concepts representative of MMF KAB in PAC practice and the resulting questionnaire is a valid instrument to quantify MMF KAB in PAC HP.
Abstract #: 71

Session Type: Poster
Category: Clinical Practice

DETERMINING STANDARDS OF USE IN PREMIXED VERSUS INDIVIDUALLY COMPOUNDED PARENTERAL NUTRITION SOLUTIONS AMONGST GREATER CHICAGO AREA HOSPITALS

Presenting Author: Neltje Ribbens, BS
Authors: Lydia Chau (Rush); Neli Ribbens (Rush); Brenna Wallace (Rush); Kristen Nowak MS, RDN, CNSC, LDN (Rush); Kelly Roehl MS, RDN-AP, CNSC, LDN (Rush); Stephanie Send MS, RDN, CNSC, LDN (Rush); Chris Hartney MS, RDN, FAND, LDN (Rush)

Introduction: Parenteral nutrition (PN) is a life-saving, critical medication for those unable to tolerate nutrition via the gastrointestinal tract. National guidelines recommend use of customized, compounded PN to better reflect patients' individual daily needs. Complexity of compounding and costs associated with PN led to production of commercially-available premixed PN solutions; however, use of customized versus premixed solutions remains unclear.

Objective: The purpose of this process improvement project was to identify PN practices in Chicagoland hospitals, and to identify perceived risks and benefits of compounded and premixed PN solutions.

Methods: A convenience sample of nutrition support professionals was used and recruited via email. Participants completed an online REDCAP survey. Descriptive statistics were used to describe the sample and survey responses.

Results: The survey was sent to 126 participants, with a 29% response rate (n=37); 73% (n=27) were registered dietitian nutritionists (RDNs), 62% (n=23) were certified nutrition support clinicians (CNSC), 22% (n=8) were pharmacists (PharmDs), and 5% (n=2) were physicians (MD/DO), with a median of 8 years (IQR=18.8) PN experience. Median PN duration and daily PN census were 7 days (IQR=8), and 9 patients/day (IQR=6.5), respectively. Sixteen (49%) reported availability of premixed PN at their institution. Use of premixed solution was most prevalent during drug shortages (67%), as a bridge to customized PN (11%), at small institutions (11%), or due to cost (11%). Cost was the most perceived barrier to compounded PN (33%), while customization was identified as the largest benefit (77%). Inability to meet nutrient/electrolyte needs (60%) was the most perceived barrier to premixed PN, while use during shortages (44%) and ease of process were considered benefits (33%).

Conclusion/Significance: Although premixed PN solutions may offer a financial benefit, it likely comes at the cost of inability to customize to meet nutrient needs, resulting in need for customized PN. This study evaluated use of PN at comparable Chicagoland hospitals to identify barriers/benefits of premixed versus compounded PN. Given clinical complexity of patients deemed appropriate for PN, to provide the best individualized care, and to remain competitive with area hospitals, we recommend maintaining current practice of customized, compounded PN.
VALUE OF AN INTERACTIVE PHONE APPLICATION IN AN ENHANCED RECOVERY PROGRAM

Presenting Author: Devan Schlund, MD
Authors: Schlund, D.1; Jochum, S.B. 1; Poirier, J.1; Hayden, D. M.1; Saclarides, T.1; Orkin, B. A.2; Favuzza, J.1 Devan Schlund (RUMC), Sarah Jochum (RUMC), Jennifer Poirier (RUMC), Dana Hayden (RUMC), Theodore Saclarides (RUMC), Bruce Orkin (RUMC), Joanne Favuzza (RUMC)

Introduction: An interactive phone application, SeamlessMD, was added to our established colorectal enhanced recovery after surgery (ERAS) program.

Objective: The aim of this study was to determine the impact of this application on readmission rates, length of stay (LOS) and total costs of patients undergoing elective colorectal surgery.

Methods: We identified patients undergoing elective colorectal surgery between 02/2017-07/2018 at RUMC with an established ERAS protocol. Patients were grouped with and without application enrollment. Statistical analyses were performed with R.

Results: The cohort contained a total of 291 patients, 147 enrolled and 144 not enrolled in the application. There were no significant differences between enrollees in terms of sex (p= 0.45) or race (p= 0.72). The mean age of patients who enrolled in the application was 52.7 (±16.2) compared to 58.5 (±14.1) for patients not enrolled in the application (p=0.001). Due to the significant difference in ages between these two groups, all subsequent analyses were controlled for age. 110 patients underwent laparoscopic procedures versus 181 patients who underwent open procedures. Readmission rates, LOS, and total costs for those undergoing laparoscopic procedures were not significantly different between those who enrolled in application (10.1%; means: 3.8 days and $10,623) and those who did not (2.4%; means: 4.0 days and $10,885; p=0.19, 0.58, and 0.60). In contrast, among patients undergoing open procedures, the mean LOS for those who enrolled in the application was 4.9 (±2.8) days, as compared to 7.4 (±6.9) days for those without the application (p=0.003). The readmission rates and total costs for open procedures with and without application did not significantly differ (17.9% and $12,338 versus 13.6% and $15,091; p=0.052 and 0.11).

Conclusion/Significance: Use of an interactive phone application is a useful adjunct in an established enhanced recovery program with a significant reduction in LOS and trend toward decreased readmission rates in patients undergoing open colorectal procedures without increasing total cost.
INSULIN DOSE CALCULATOR IN A PEDIATRIC HOSPITAL

Presenting Author: Sarah Shaaban, MD
Authors: Sarah Shaaban, MD, (RUMC)  Sara Ruddock-Walker, MD (RUMC)  Sara Brown, PharmD, BCPPS (RUMC)  Laura Meltzer, MD (RUMC)  Stelios Mantis, MD (RUMC)  Carla Z. Minutti, MD (RUMC)

Introduction: To decrease delays in inpatient insulin ordering and administration, our children's hospital implemented an insulin-dose-calculator (IDC) imbedded in the electronic health record. A multidisciplinary team developed the IDC, modeling it after a similar tool in place at another children's hospital.

Objective: This calculator provides an innovative approach to the complex and time-consuming process of dosing, ordering, and administering rapid-acting insulin in the inpatient setting. Prior to implementation of the IDC, rapid acting insulin dosing, ordering, and administration required 7-steps with 6 identified areas of delay. The IDC streamlined this into a 4-step process, eliminating 5 out of 6 areas of delay. Here, we describe the benefits of an insulin dose calculator in terms of efficiency, safety, and overall streamlining of inpatient care of insulin-dependent diabetic patients.

Methods: This pre- and post- implementation cohort study measured delays between (1) point-of-care (POC) glucose testing and insulin ordering and (2) between POC glucose testing and insulin administration. The pre-implementation cohort included pediatric patients receiving insulin admitted to our hospital between 2011 and 2017 (n=644). Those who received insulin via the IDC will be included in the post-implementation cohort. Pre- and post-implementation delays were compared to determine the impact of the tool on patient care and hospital efficiency. Additionally, pre- and post-implementation surveys were completed by the pediatric nursing staff to capture data on nursing and patient satisfaction. Finally, insulin-related safety events were collected pre- and post-implementation.

Results: Prior to implementation of the IDC, the average delay between POC glucose testing and insulin ordering was 22 minutes. The average delay between POC glucose testing and insulin administration was 37 minutes. Preliminary data at the time of this abstract submission supports a decrease in the delay between POC glucose testing and insulin administration after implementation of the IDC tool. Results from the pre-implementation nursing survey revealed that 75% of nurses were dissatisfied with the previous process and that they perceived most patients were dissatisfied as well.

Conclusion/Significance: Implementation of an IDC tool will minimize delays in ordering and administering of rapid-acting insulin, as well as increase nursing satisfaction, while maintaining a safe system for insulin dosing.
IMPLEMENTATION OF A PROJECT TO REDUCE UNPLANNED NASOENTERIC REMOVALS IN ADULT INTENSIVE CARE UNITS

Presenting Author: Thomas Starr, DNP, RN, NEA-BC, CNL, CCRN-CMC
Authors: Thomas Starr (Rush), DNP, RN, NEA-BC, CNL, CCRN-CMC, Melinda Earle (Rush), DNP, NEA-BC, FACHE, Amber Kujath (Rush), PhD, RN, ONC

Introduction: Unplanned nasoenteric removals (UNRs) are a significant problem in intensive care settings. UNRs are common causes for enteral feeding delays, increases in patient length of stays, pneumothorax, and intestinal damage. In the Neuroscience Intensive Care Unit (ICU), data collected over a one year period indicated that nasoenteric tubes were the most common unplanned device removal (55%) when compared to other unplanned device removals. From patient safety event data collected over a one-year period at the urban academic medical center, findings showed 49 UNR events occurred in the Neuroscience ICU, 20 in the Surgical ICU, 16 in the Medical ICU, and 5 in the Cardiac ICU.

Objective: The purpose of the project was to reduce the number of unplanned removals in four intensive care units by 25% in the first three-months of the project.

Methods: The UNR Reduction Project was piloted in the Neuroscience ICU which provided a curriculum on UNR reduction methods including prevention interventions such as nasoenteral bridling tube securement. The UNR Prevention Bundle Checklist and UNR Post-Event Debriefing Tool were two forms that were standardized in the four ICUs based on successful interventions in the literature. The UNR Prevention Bundle Checklist includes information on the use of restraints, agitation and delirium, careful patient repositioning, and bridle application. A nurse driven Clinical Pathway for Bridle Determination was created to guide appropriate application of the bridle. The UNR Post-Event Debriefing Tool encourages use of the bundle after removal.

Results: In the first 3-months of the project, there were 7 nasoenteric removals resulting in a 68% reduction in UNRs from the four ICUs; much fewer than the 22 removals or 25% expected. Bridling was the most common intervention used to prevent UNRs and was performed for 16 patients in the study. Fourteen bridles were placed before, and 2 bridles were placed after tube removal. Pre-intervention, zero bridles were used from the baseline data.

Conclusion/Significance: Early management of UNRs is important in decreasing nutritional delay, preventing pneumothorax, and preventing intestinal damage. Evidence based practice interventions to impact quality patient outcomes for UNRs are instituted in the four ICUs in the academic medical center.
IMPLEMENTATION OF A PROTOCOL TO INCREASE GASTROSTOMY TUBE PLACEMENT FOR HEAD AND NECK CANCER PATIENTS UNDERGOING RADIATION TREATMENT

Presenting Author: Amy Stringfellow, BS
Authors: Amy Stringfellow BS (Rush)  Marisa Mozer MS, RD, CSO, LDN, CNSC (Rush)  Sarah Peterson Ph.D, RD, LDN (Rush)

Introduction: Among Head and Neck Cancer (HNC) patients, the combination of progressive disease and aggressive treatment impacts a patient's nutritional status, often leading to malnutrition. Impaired nutritional status is a significant side effect that can negatively influence a patient's course of treatment, recovery, quality of life, and outcome. Placement of a gastrostomy tube and initiation of enteral nutrition may decrease these risks.

Objective: The purpose of this study was to determine if the implementation of a validated gastrostomy tube placement protocol in HNC patients increases the number of high nutritional risk patients who receive a gastrostomy tube.

Methods: A quasi-experimental design was utilized to evaluate the efficacy of a gastrostomy tube placement protocol implemented in July 2018. Data were collected on HNC patients seen at Rush University Medical Center from July-December 2018. A retrospective sample of HNC patients seen from July-December 2017 was used as a comparison group. For all patients type of cancer, age, sex, HNC, staging, treatment course, change in weight, and placement of tube were recorded.

Results: A total of 131 HNC patients were seen during the July-December 2017 (n=53) and July-December 2018 (n=78) timeframe. Participants seen in 2017 had a mean age of 66 years, 74% were male and had a primary diagnosis of oral cavity with T4N2 staging. In 2018, the mean age was 62 years, 63% were male with a diagnosis of oral cavity and T3N2 staging. The number of patients who received a gastrostomy tube increased from 2017 to 2018 after implementation of the protocol (27% vs. 55%, p=0.05).

Conclusion/Significance: Implementation of a validated protocol among HNC patients significantly increased the number of patients who received a gastrostomy tube from July-December 2017 to 2018. An increase of gastrostomy tubes placed led to an increase in the number of high nutritional risk patients receiving enteral nutrition.
Abstract #: 76

Session Type: Poster
Category: Clinical Practice

THE MYSTERY OF CHRONIC HEMOLYSIS: A CASE REPORT OF ADOLESCENT BOY WITH HEREDITARY XEROCYTOSIS

Presenting Author: Lakshmi Sundaresan, BS
Authors: Kelsey T. Danley(1), Lakshmi Sundaresan(1), Lisa Giordano MD(2).  (1)Rush Medical College, Rush University, Chicago, IL, USA  (2)Pediatric Hematology/Oncology, Department of Pediatrics, Rush University Children’s Hospital, Chicago, IL, USA

Introduction: Chronic hemolysis may be secondary to abnormalities intrinsic to the erythrocyte (membrane, hemoglobin, enzymes), or abnormalities in the environment of the erythrocyte (immune vs. non-immune).

Objective: To describe a rare cause of chronic hemolysis in an adolescent boy.

Methods: A thirteen year old African American male presented to the Rush Pediatric Hematology clinic for an evaluation of chronic hemolytic anemia. The patient denied jaundice or fatigue. His review of symptoms was positive for occasional right upper quadrant abdominal pain. He was well appearing with normal vital signs. The conjunctivae were pale, but there was no jaundice, abdominal tenderness or hepatosplenomegaly on exam.

Results: The laboratory evaluation over many years showed hemoglobin (Hb) 9-11 gm, MCV 89-102, MCHC 36-37, reticulocyte count 4-11%, platelets 600-800K, LDH 230-291, and total bilirubin 0.6-0.9. G6PD assay, direct anti-globulin test, B12/folate/methylmalonic acid/homocysteine levels, osmotic fragility and thyroid studies were normal/negative. A marrow exam was significant only for increased erythropoiesis. Hb electrophoresis revealed an elevated Hb F at 6.7%. The peripheral blood smear showed no consistent erythrocyte dysmorphology including absence of stomatocytes. Paroxysmal nocturnal hemoglobinuria was ruled out by flow cytometry. Erythrocyte enzymopathy panel was normal. A Hereditary Hemolytic Anemia Comprehensive Sequencing panel revealed a heterogenous mutation in the PIEZO1 gene consistent with hereditary xerocytosis (HX). This gain-of-function mutation leads to a loss of potassium ions that is greater than the sodium influx, resulting in cellular dehydration. HX generally follows a dominant inheritance pattern. Patients with the heterozygous PIEZO1 mutation generally have mild to moderate macrocytic anemia with significant reticulocytosis. Complications of HX may include splenomegaly, elevated bilirubin levels, and iron overload. As with chronic hemolysis from other etiologies, patients are at risk for gallstones and aplastic crisis due to parvovirus infection. Splenectomy is contraindicated in patients with hereditary xerocytosis due to the high risk of thromboembolic complications.

Conclusion/Significance: This case report demonstrates a young male with chronic hemolysis who required an extensive evaluation to determine the underlying cause. It is important to ascertain the etiology of chronic hemolysis so as to inform clinical care, monitor for complications, and provide genetic counseling.
Introduction: The Therakos Photopheresis System procedure is a medical procedure in which blood is collected and separated. The white blood cells undergo treatment and are returned to the patient. This process is a therapy for Cutaneous T-Cell Lymphoma and for Graft versus Host Disease. Therakos supplies thousands of photopheresis kits to healthcare facilities across the world. Each shipment contains multiple layers of packaging.

Objective: The purpose of this study is to look at how much waste is created at a single institution from these shipments and to find alternatives usages for this waste instead of being sent to a landfill or waste site.

Methods: Data was collected from RUSH University Medical Center. Kit usage for 2016 was analyzed for the number of cardboard dividers that were provided for safe packaging and transport of kits. Other methods for reusing or recycling the packaging were then researched.

Results: According to the data reviewed, 386 photopheresis treatments were done at RUSH University Medical Center in 2016. Each kit is packaged with one cardboard divider. The total area required for these cardboard dividers alone is 577 square feet. However, other means of recycling the material were discovered and one such method is being used at RUSH University Medical Center.

Conclusion/Significance: Large volumes of waste are created by photopheresis kits annually. The area of one football field could be covered by the cardboard dividers sent to RUSH Hospital Medical Center in 2016. However, there are alternatives to sending it to waste sites or landfills. One such alternative method used by RUSH University Medical Center is sending safe, reusable cardboard to local schools for arts and crafts projects. If healthcare facilities are able to find and implement more effective recycling methods, thousands of square feet of cardboard can avoid entering landfills and waste sites.
ASSESSING THE VALIDITY AND RELIABILITY OF COMPUTER-BASED CASE SIMULATIONS IN A NURSE ANESTHESIA SPECIALTY

Presenting Author: Robyn Ward, PhD, CRNA
Authors: Robyn C. Ward, PhD, CRNA  Barbara A. Swanson, PhD, RN, FAAN, ACRN, Dean, Nursing Science Studies  Michael J. Kremer, PhD, CRNA, FAAN, Professor, Co-Director, Rush Center for Clinical Skills and Simulation  Michael Schoeny, PhD, Assistant Professor, College of Nursing

Introduction: The misuse of, and addiction to, opioids is a public health crisis. Certified registered nurse anesthetists (CRNAs) who practice nonsurgical pain management (NSPM) (administration of regional blocks and use of pain strategies and techniques for management of chronic pain outside of the operating room) are in a unique position to help address this problem. However, scope of practice and reimbursement issues have threatened patients' access to chronic pain care by CRNAs. In response, the National Board of Certification and Recertification for Nurse Anesthetists developed a voluntary NSPM certification to support this subspecialty area. Since 2015, 41 CRNAs have taken the certification examination, but validity and reliability still need to be established.

Objective: The purpose of this study was to assess the psychometric properties (validity/reliability) of the NSPM certification examination for CRNAs. Miller's Pyramid of Clinical Competence was used to guide the psychometric evaluation of the NSPM examination based on its hierarchical progression of assessment methods from foundational knowledge to performance in practice.

Methods: A descriptive design was used. Data were obtained from the 32 CRNAs who took the examination between January 2015 and May 2017. The examination includes two components: 1) foundational knowledge of pain management (134 multiple choice items); and 2) performance of clinical decision-making with two computer-based case simulations, consisting of 5 content domains each. Validity assessed for both components included: construct (exploratory factor analysis), convergent (bivariate correlation between components) and discriminant (bivariate correlation between time in practice and component scores). Reliability for both components was assessed with Cronbach's alpha.

Results: Exploratory factor analysis yielded a two-factor solution for foundational knowledge and a three-factor solution for performance of clinical decision-making. The correlations between the two examination components, and between time in practice and the two components, were not significant. Cronbach's alphas for the foundational knowledge factors were 0.66 and 0.30 and for performance factors were 0.58, 0.35, and 0.41.

Conclusion/Significance: These findings suggest that CRNA NSPM competence may be best evaluated using a multimodal approach, such as practice outcome data and peer attestations of competent performance.
EVALUATION OF SEVEN ASSAYS FOR LABORATORY DIAGNOSIS OF EBV ASSOCIATED INFECTIOUS MONONUCLEOSIS

Presenting Author: Sharon Wei, BS
Authors: Sharon Wei (Rush University), Wei Huang (Lurie Children's Hospital), Mohamed Farah (Lurie Children's Hospital), Xiaotian Zheng (Lurie Children's Hospital)

Introduction: Infectious Mononucleosis (IM) can be multi-etiological but is most commonly caused by Epstein-Barr Virus (EBV). To assist in the diagnosis of IM, several types of rapid Monospot laboratory assays are available. FDA cleared assays employ different immunoassay formats such as agglutination and lateral flow, but there has been insufficient study in literature about their performance.

Objective: The goals of our study was to therefore compare several assay types for their performance, runtime, and cost using ELISA IgM as the reference test, in order to look for any significant differences in assay performance among the various test principles and methods.

Methods: Frozen serum samples were used from pediatric patients with suspected IM initially submitted for routine monospot testing. Seven Monospot assays that are widely used were selected for evaluation: Remel Color Slide II, OSOM Mono Test, Meridian Monospot Latex, Sure-Vue Mono, LifeSign Status Mono, Acceava Mono Cassette, and Clearview Mono. EBV VCA specific IgM was performed with automated ELISA method. Samples with discrepant results were further tested by EBV DNA using quantitative PCR. Pooled positive samples were serial diluted for comparing the ability of each assays' end-point detection.

Results: The overall prevalence of EBV IgM in tested samples was 15.1%. The sensitivities for these 7 assays ranged from 68.4 - 89.5% and specificity ranged from 86.9 - 100%. Results of testing serial diluted positive samples showed significant differences in end-point detection for these assays. Average hands-on time ranged from 1 - 2 minutes and average set-up time ranged from 5 - 9.4 minutes for these assays.

Conclusion/Significance: Sensitivity and specificity between the seven monospot assays testing for IM caused by EBV infection were different when compared with IgM reference test; the Remel Color Slide II had the lowest sensitivity, specificity and accuracy compared to other assays. The prevalence of EBV IgM when looking at our sample group by ages were very similar. This study aims to provide data to clinical laboratories to aid with their choice of monospot assays.
SOCIOECONOMIC FACTORS AFFECT THE TREATMENT OF MANDIBULAR FRACTURES

Presenting Author: Thomas Xu, MD
Authors: Thomas Q. Xu, MD (RUMC); Taylor J. Jarazcewski, MS (Loyola); Aaron L. Wiegmans, MD (RUMC); Ethan M. Ritz, MS (RUMC); Todd Beck, MS (RUMC); Carlos A. Q. Santos, MD, MPHS (RUMC); Christina Tragos, MD (RUMC); Amir H. Dorafshar, MBChB (RUMC)

Introduction: Health care disparities have been reported throughout medicine for decades. While blatant explicit bias is not prevalent, a substantial body of research has been published suggesting that systemic biases related to sex, race, income, and insurance status likely exist. To our knowledge, no study has assessed the effect of patient socioeconomic status on clinical decision-making in facial fracture repair.

Objective: The objective of this project was to assess if socioeconomic factors impact whether patients obtain open versus closed treatment of mandibular fractures.

Methods: Data were extracted from the 2012 and 2013 National Inpatient Sample (NIS). Patients that had either open or closed treatment were included for analysis. Patients who had a length of stay longer than three days or died during their inpatient stay were excluded. These criteria were used to exclude patients with polytrauma as well as complicated fractures. Chi-squared tests were performed to test for univariate associations between race, sex, insurance payer and procedure done. A logistic model was then used to test for these factors simultaneously.

Results: Initial data provided a total of 2481 patients who underwent open and 933 patients who underwent closed treatment. Statistically significant differences were present within the race, sex and insurance payer status groups (p < 0.05). Patients of black and Hispanic race had decreased odds of undergoing closed treatment (OR = 0.775, 0.725 respectively) compared to patients of white race. Further, self-paying patients had decreased odds of undergoing closed treatment (OR = 0.818) compared to privately insured patients. Finally, we found that female patients had increased odds of undergoing closed treatment (OR = 1.511).

Conclusion/Significance: Our results reveal that certain socioeconomic factors do affect the management of mandibular fractures. Specifically, patients who are female, white or have private insurance have a higher likelihood of being treated with closed treatment. Further analysis will be needed to determine the underlying etiology of these socioeconomic and sex disparities.
IMPROVING ADHERENCE TO TREATMENT PLAN IN CHRONIC PAIN PATIENTS

Presenting Author: Wuan-Chwin Yu, BA, MSN
Authors: W.C. Janice Yu (Rush); Masako Mayahara (Rush); Magdalena Anitescu (U of C)

Introduction: Non-adherence among chronic pain patients is a public health concern. Chronic pain is one of the most frequent and costly medical conditions in the US. Furthermore, poorly controlled chronic pain can lead to long-term disability, decreased quality of life and physical functioning, loss of work, sleep disturbances, and low social functioning. Many chronic pain patients who receive care from the Pain Management Clinic affiliated with the University of Chicago experience difficulties in adhering to their treatment recommendations and frequently contact the clinic with treatment related questions. Reviewing patient treatment recommendations with patients before they leave the clinic may increase patients’ understanding of their treatment plans and improve their adherence to the treatment recommendations.

Objective: The purpose of this quality improvement project is to improve patient adherence to the treatment plan through a post-visit review intervention. The specific aims of this project are to increase patient knowledge, skill to navigate the complex health system, and confidence and motivation for self-management, which will likely affect overall patient satisfaction in the care received.

Methods: A pre-post longitudinal test design will be used. All chronic patients who receive care at PMC will be invited to participate. The post-visit review intervention will be two-fold: 1) distribution of a tailored take-home treatment plan sheet for the patient and 2) post-visit review time to go over each component of the treatment plan, answering any questions, offering any necessary guidance for follow-through, and assessing for patient comprehension.

Results: The success of the intervention will be measured by comparing pre- and post-intervention patient satisfaction and activation scores, treatment adherence scores, and pain control as well as patient message data and assessing if there is an improvement in the scores and a decrease in the number of patient messages that relate to their treatment plan.

Conclusion/Significance: Positive results could contribute to improved discharge processes for outpatient visits for clinics beyond pain management.
Abstract #: 82

Session Type: Poster
Category: Communication Health

BIG DATA: HELPING US UNDERSTAND THE POPULATION WE SERVE

Presenting Author: Edwin Dovigi, MS, BS
Authors: Edwin Dovigi, Chad Pendley

Introduction: The advent of electronic health records (EHRs) has created a wealth of information that has helped drive large-scale epidemiological, clinical and quality improvement studies. In 2014, a group of Chicago-based healthcare providers created a large regional database abbreviated CAPriCORN to help spur sustainable clinical and quality improvement research using EHRs. One of the primary barriers to conducting large-scale EHR-based investigations has been making data accessible to researchers. A limited number of professionals with both clinical and informatics training can create a significant barrier to engaging in EHR-based studies.

Objective: The goal of this project is to create an easily accessible, visual dashboard housing patient demographic information for 284 diseases diagnosed at Rush.

Methods: Structured Query Language (SQL) was used to extract patient demographic information from de-identified CAPriCORN database for 284 diseases. Diseases were identified using ICD-9 and ICD-10 codes compiled by the Global Burden of Disease project, a large effort to standardize the extraction of EHR data. Patient demographic information extracted include: age, sex, ethnicity, and race. A category of 'all diseases' was also created to allow clinicians to compare their disease of interest to the greater Rush patient population. Data was then entered into Tableau software to produce graphs and count tables. A dashboard is currently being generated to be hosted via the Rush intranet.

Results: Patient demographic and count data were generated for 284 diseases. Over 800,000 unique patients were collated in this study. The diagnosis categories with the highest patient burden across the Rush patient population include: 'Other digestive diseases' (n=151,981), 'Other infectious disease' (n=134,369), and 'Other respiratory diseases' (n=128,528). Other notable diagnostic categories with a high patient burden include, 'Drug use disorder' with n=97,170 patients-almost as many patients as those with upper respiratory infections (n=107,794).

Conclusion/Significance: This repository will present clinicians with quantifiable data on the population they serve. This information could be useful in identifying health disparities as well, and could thus be used to prompt and justify community outreach initiatives. Furthermore, the information presented in this dashboard will be valuable to researchers who are in the process of applying for grant funding.
COMMUNICATION BARRIERS RELATED TO LANGUAGE IN THE INTENSIVE CARE UNIT

Presenting Author: Kristen Nicole Figueroa, MSN
Authors: Kristen Nicole Figueroa (Rush University); Jennifer Hahn (Rush University)

Introduction: When the intensive care unit (ICU) healthcare staff at Rush Oak Park Hospital (ROPH) encounter cases where patients have limited English proficiency (LEP), they rarely use the available interpreter services due to factors associated with ineffectiveness; consequently, these language barriers can lead to adverse patient health outcomes such as safety sentinel events. Although this microsystem issue has been ongoing, there is currently no assessment data on how the ROPH ICU healthcare staff perceive and utilize the interpreter services. Additionally, data from Epic Systems on how often the staff utilize the available interpreter services has not yet been collected.

Objective: The purpose of this project is to assess and improve quality measures related to language barriers between the healthcare staff and LEP patients in the ROPH ICU. The main objectives are to assess the healthcare staff’s perceptions of the interpreter services for LEP patients and assess how often language services are used in the ROPH ICU through data from Epic.

Methods: A descriptive, cross-sectional study to assess the issue related to language barriers in the ICU. Online three-week Google Forms survey of the ICU healthcare staff. Separate descriptive analysis of Epic data flowsheets.

Results: While 53.8% of the 26 total respondents always use the language interpreter services when caring for LEP patients, 19.2% of respondents never use the services. Over 88% of the respondents sometimes use family members as interpreters. Only 30.8% are satisfied about the effectiveness of the available services. Responses varied for the additional comments section of the survey. A need for interpreter services for LEP patients was not always documented on Epic.

Conclusion/Significance: Language barriers can lead to negative outcomes for LEP patients. The results show that LEP patients in the ROPH ICU do not adequately receive the appropriate language interpreter services at all times. Future projects to further address and implement evidence-based interventions are needed to overcome language barriers and improve patient outcomes for LEP patients.
PROFESSIONAL BOUNDARIES: WHEN LINES BLUR BETWEEN THE NURSE'S POWER AND THE PATIENT'S VULNERABILITY

Presenting Author: Judy Friedrichs, DNP, RN
Authors: Judy Friedrichs (Rush); Amy Levin (Rush); Christie Lawrence (Rush); Kelsey Schmitt (Rush); Kelsey Goring (Rush); Noelle Shallcross (Rush-retired)

Introduction: Children are born into a family, not a clinical unit. Crossing professional boundaries in patient/family relationships can have a direct connection to compassion fatigue in professionals and a consequence in the family network.

Objective: This presentation shows the process taken by a nurse-led interdisciplinary team to change the philosophy of a department.

Methods: A department wide conversation was sparked by a guest presentation on Professional Boundaries regarding the assumptions made on what families needed and social media connections with families. An interdisciplinary task force then focused on the challenges in each of the five Women's and Children's units, as well as the concerns around the number of newer staff leaving hospital nursing. The task force identified a definition of professional boundaries; created a survey to assess staff awareness; developed a collaborative learning opportunity on the consequences of crossing professional boundaries; the ANA, NCSBN, and hospital recommendations for use of social media; and the roadblocks experienced by staff. In addition to increased awareness on effects of boundary crossing, the task force looked at psychosocial activities that focused on one family vs. all families in our care and creating a resource for staff who desired guidance related to professional boundaries.

Results: Learning conversations revealed 50% of staff could not define professional boundaries and saw social media use as a problem. Department wide survey with 193 responses confirmed the need for additional education including the desire for an anonymous resource for advice. The department has moved away from holiday adopt one family, to a all families receiving a gift and a Professional Boundaries email is being implemented.

Conclusion/Significance: Our goal is to help the 'whole patient' achieve independence. When we step outside the professional boundaries to individually assist financially/socially... we create mutual dependency. Our need for acknowledgment can create role confusion and compassion fatigue. We need to find different ways to get a sense of success and significance in our work, while providing support that maintains professionalism and establishing a safety net of support within their family and community.
INITIAL IMPACT OF NURSE LEADER ROUNDING UTILIZING POINT OF CARE TECHNOLOGY ON PATIENT'S SAFETY, CARE COORDINATION, AND OVERALL EXPERIENCE

Presenting Author: Mary Heitschmidt, PhD, RN, APN, CCRN-K
Authors: Mary Heitschmidt, RU; Timothy Carrigan, RUMC; Philip Shaw, RUMC; Francis Fullam, RU; Lou Fogg, RU; Angelique Richard, RUMC

Introduction: Health outcomes are likely to be better and health care costs reduced, when patients are engaged in their hospitalized care. Nurse rounding has shown to have dramatic effects on a hospital's patient satisfaction scores, primarily measured through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. Purposeful nurse leader rounding focuses on improving the patient experience by engaging patients with nurse leaders during their hospitalization. However, its use and impact on patient safety, length of stay, and the overall hospital experience is not known. Real time technology utilized during nurse leader communication at a large Midwest academic medical center allows for coordination of patient care with the multidisciplinary team and is an innovative approach that may improve the patient's quality of care.

Objective: The objective of this study is to evaluate the effectiveness of a new paradigm, using real time technology, for point of care nurse leader rounding (NLR), on patient's quality of care, safety, care coordination, and overall experience.

Methods: A longitudinal design, standardized process, and outcome level metrics were used. Data obtained during NLR is entered into an i-Pad at the time of contact with the patient. Data from all subjects who participate in NLR was analyzed to determine its effects on experience (HCAHPS communication questions and pain data) and safety outcomes (falls/falls with injury; hospital-acquired infections).

Results: From November 2016 to December 2017 a total of 36,769 NLR were completed and 21,675 patients were rounded on. Initial results show positive clinical outcomes trends, specifically a decrease in: falls, falls with injury, and central line-associated bloodstream infections a since initiating. Improvement in hospital rating was unit specific.

Conclusion/Significance: NLR using point of care technology is an innovative way to impact patient experience- quality, safety, & care coordination. The study offers implications towards nurse leader utilization in inpatient units and can shed light on the best practices revolving around technology based NLR and its impact on patient experience. Further evaluation of technology based inpatient NLR and its impact on patient experience and clinical outcomes is needed.
Abstract #: 86

Session Type: Poster
Category: Communication Health

FROM THE CLASSROOM TO THE COMMUNITY: ANALYZING NEEDS ASSESSMENT RESULTS AT URBAN, HOMELESS SHELTER TO IMPROVE STUDENT-RUN CLINIC

Presenting Author: Paul Marqui, BS
Authors: Paul Marqui (Rush University), Daniel Gore (Rush University), Steven K. Rothschild, MD (Rush University Medical Center)

Introduction: The Rush Franciscan Clinic (RFC) is a student-lead initiative that provides acute care to homeless populations on Tuesdays at the Franciscan House of Mary and Joseph. The health clinic offers limited medications and non-invasive physical exams, but does not provide prescription medications or laboratory tests. Despite its limited service provision, many Franciscan residents rely on the Franciscan clinic as their primary healthcare source. Considering the multiple comorbidities and health barriers affecting homeless populations, it is clear Franciscan residents do not have their medical and social needs met by the RFC.

Objective: To identify the unmet medical needs of Franciscan residents and adjust RFC services to better address those needs.

Methods: Volunteers conducted anonymous, biobehavioral surveys among consenting Franciscan residents with half of the female residents and one third of male residents in in August, 2018. Residents were recruited through random sampling procedures and informed consent was collected. Survey components asked about previous diagnoses, current healthcare usage and access, and medical service preferences. Blood pressure and BMI metrics were collected prior to survey administration. IRB approval was provided by Rush University.

Results: Of the 170 recruited residents, 104 (61.2%) completed the survey (22 women, 82 men). In completed surveys, 66 (63.5%) identified as Black/ African American, 28 (26.9%) White, 3 (2.9%) Asian, 4 (3.8%) Native American/ Alaskan Native, 7 (6.7%). Eighteen (17.3%) had history of asthma, 14 (13.5%) of chronic lung conditions, 26 (25.0%) of chronic pain disorders, 36 (34.6%) of mood disorders, 19 (18.3%) of anxiety disorder, 15 (14.4%) of diabetes. Seventy three (70.2%) used the emergency room at least once in the past 12 months. Fifty three (51%) had no PCP outside of Franciscan. Seventy nine (76.0%) said they 'definitely would use' free socks if offered, 71 (68.3%) said the same for dental care, 69 (66.3%) for eye care, 67 (64.4%) for foot care, and 63 (60.6%) for general health check-ups.

Conclusion/Significance: Multiple services must be expanded at Franciscan to accommodate patient needs. The RFC must increase selection of asthma drugs, analgesics, and diabetes drugs. Franciscan must improve linkage to mental health services, PCPs, podiatrists, dentists, and optometrists.
Abstract #: 87

Session Type: Poster  
Category: Communication Health

INCREASING COMMUNITY ENGAGEMENT TO PROMOTE PARTICIPATION IN THE WEST SIDE WALK FOR WELLNESS PROGRAM

Presenting Author: Leah Petrucelli, Medical Student  
Authors: Leah Petrucelli, Medical Student  Dr. Sheila Dugan, MD  LaDawne Jenkins, Office of Community Engagement  Kimberly Johnson, Office of Community Engagement

Introduction: The Walk A Doc program was created in order to fight the rising burden of chronic disease, which impacts 6.7 million people in Illinois, with increased burden faced by people of color. In 2017, Rush initiated this program as part of its long-term goal of addressing the life expectancy gap on the West Side of Chicago.

Objective: Our primary objective was to see if we could engage more community members in 2018.

Methods: We arranged 8 walks at 10am on Saturdays at West Garfield Park. We promoted events by utilizing the relationships we previously built and increasing our marketing around Rush, and reaching out to the Garfield Park alderman.

Results: We had a total of 178 unique walkers (compared to 125 last year) over the course of our 8 weeks program. We had 22.6% participation from Rush faculty/students, 32.1% from Garfield Park community, and 45.3% from other West Side communities. Ages ranged from 10-86.

Conclusion/Significance: Our outreach efforts were reflected by the 42.4% increase in participation. Building off the relationships we developed last year as well as targeting different community members proved to be the most effective. During one of the walks participants recorded their stress level on a 10-point Likert scale before and after the walk. This small pilot survey demonstrated that stress levels decreased 56.4%, increased 27.3%, and did not change in 16.4% of walkers. Our goals this year were to not only increase our program’s numbers, but to also talk about mental health, fight the stigmas against it, and empower walkers with mindfulness tools. Further work to encourage participation as well as decrease stress is still needed.
Abstract #: 88

Session Type: Poster
Category: Community Health

EVALUATION OF ACCESS TO AUTISM CARE RESOURCES

Presenting Author: Joseph Budenske, BS - Biomedical Engineering
Authors: Joseph W Budenske (Rush University)  Allison Wainer (Rush University)

Introduction: Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by difficulty with social interaction and communication, and the presence of restricted or repetitive behaviors and interests. Because ASD is chronic and pervasive, intervention plans must be customized for each patient depending on the symptoms experienced and the severity of functional impairment. An individual treatment plan for someone with ASD may include a range of therapies (behavioral and communication therapy, educational therapy, family therapy), and medication supplementation. It can be challenging for families to prioritize, arrange, and access all of these services, and the impact of this challenge on the caregiver and family is unknown.

Objective: The goal of this study is to build upon this prior research by obtaining information about the amount of time families are spending attempting to access ASD care and how this 'lost' time affects their family dynamic and well-being.

Methods: This study used a series of survey questionnaires to collect information about two main variables: (1) the ratio of ASD services sought vs accessed by families, and (2) the extra effort caregivers put into coordinating their child's care plan. The ratio of ASD services sought vs accessed by families, and the extra effort put into care coordination were correlated with other variables related to ASD using a linear regression model. Other variables measured included demographics, ASD symptom severity, and family wellness.

Results: This is an ongoing study; however preliminary data at (n=11) suggests a weak positive linear association between the ratio of ASD services sought vs accessed by families with a child diagnosed with ASD, and family quality of life with r=0.236. Data suggests little or no correlation between extra parental ASD care coordination effort and family quality of life with r=-0.016

Conclusion/Significance: The correlation coefficients suggest no significant relationship between difficulty accessing ASD care, extra time spent on care coordination, and family quality of life. This might be because family wellness can be affected by a number of different factors aside from the burden of finding or participating in ASD services.
PRIMARY CARE ACCESS AND USE AMONG PERSONS EXPERIENCING HOMELESSNESS

Presenting Author: Kirsten Dickins, AM, MSN, FNP-C
Authors: Kirsten Dickins, AM, MSN, FNP-C Rush University College of Nursing, Chicago, IL Susan Weber Buchholz, PhD, ANP-BC, FAANP Rush University College of Nursing, Chicago, IL Diana Ingram, PhD, MPH, BSP Rush University College of Nursing, Chicago, IL Lynne T. Braun, PhD, CNP, FAHA, FAANP, FPCNA, FAAN Rush University College of Nursing, Chicago, IL Niranjan S. Karnik, MD, PhD, FAPA, DFAACAP Rush Medical College Department of Psychiatry & Rush University College of Nursing, Chicago, IL Rebekah J. Hamilton, PhD, RN, CNL, FAAN Rush University College of Nursing, Chicago, IL Melinda Earle, DNP, RN, NEA-BC, FACHE Rush University College of Nursing, Chicago, IL

Introduction: The Affordable Care Act (ACA) has expanded healthcare coverage to many previously uninsured homeless persons. Since the implementation of the ACA, little is known about the perspectives of homeless persons and their healthcare teams regarding access and use of primary care.

Objective: To describe how homeless individuals access and use primary care services from their perspectives and the perspectives of providers/staff.

Methods: A qualitative design with semi-structured interviews was used. Settings included three homeless shelters. Patient inclusion criteria were: > 18 years, English speaking, registered at shelter, able to consent. Participants were recruited in shelter lobbies. Providers/staff were employed at a shelter-affiliated clinic. Interview guides covered topics related to healthcare access and use, probing for elaboration on contextual and individual characteristics. Patient interviews focused on: reasons for seeking care, clinic choice, experience with care, and experience of obtaining and having medical insurance. Provider/staff interviews focused on: supports and impediments to provision of care, and how clinics address challenges of being homeless. Interviews were audio-recorded, transcribed, and coded using thematic analysis.

Results: Fifteen homeless individuals and 11 providers/staff were interviewed. Three themes related to access and use of healthcare were employed: individual characteristics, health behaviors, and outcomes. Individual characteristics included residential instability, occupational instability, healthcare system distrust, worry about costs of services, worry about costs of medication, chronic pain as a motivator to seek care, and unsuccessfully addressed mental illness. Health behaviors included personal health practices (substance use disorders, challenges to self-care, sub-optimal nutritional access), process of medical care (shared decision-making, trauma-informed care, challenges related to preventive care), and use of personal health services (importance of shelter-based care, difficulties accessing specialty care, heightened reliance on emergency departments). Outcomes included desire for civil interactions and treatment discrepancies based on insurance status.

Conclusion/Significance: Homeless persons have unique and varied experiences accessing and using primary care. Greater understanding of the multiple perspectives held by homeless persons and providers/staff will help to better inform practice and policy to improve primary care.
THE EFFECT OF POSTTRAUMATIC STRESS DISORDER (PTSD) ON BODY MASS INDEX (BMI) AND THE GENERAL PHYSICAL HEALTH OF INNER CITY WOMEN

Presenting Author: Conor Flavin, BS
Authors: Conor Flavin B.S. (Rush University Medical Center); Shelby Weber B.A., B.S., (Idaho State University); Linzy Pinkerton B.S. (Rush University Medical Center); Frances Aranda Ph.D., MPH, M.S. (Rush University Medical Center); Yanina A. Purim-Shem-Tov M.D., M.S., FACEP (Rush University Medical Center); John W. Burns Ph.D. (Rush University Medical Center)

Introduction: Posttraumatic stress disorder (PTSD) has been shown to be significantly correlated with elevated BMI among diverse populations; however, according to a large meta-analysis one population that had been understudied is inner-city minority women. We hypothesize, first, that inner-city women with a probable PTSD diagnosis will have an elevated BMI, and second, their higher BMI mediates the relationship between probable PTSD diagnosis and poorer general health.

Objective: The purpose of this study is to examine 1) if inner-city women with a probable PTSD diagnosis have significantly elevated BMIs and 2) if higher BMI is related to overall physical health.

Methods: Cross sectional data (N=409) from an ongoing study assessing inner-city women between the ages of 18-40 was used. From this dataset, the Posttraumatic Stress Checklist for DSM-5 (PCL-5) was used to assess self-reported PTSD symptoms, Body Mass Index (BMI) was used to indicate the subjects’ weight category and self-reported histories of hypertension and diabetes were used to assess for the subjects’ general physical health. A logistic regression was used to compare PTSD, BMI and general health. We controlled for education level, race, income, and previous diagnosis of depression, as these factors have been shown to influence BMI in this population.

Results: A chi-square test indicated that individuals with a probable PTSD diagnosis were, in fact, more likely to have significantly elevated BMIs' X2 (3, N= 409) =8.97, p = 0.03. The results of our second hypothesis indicated a significant correlation between elevated BMIs predicting both hypertension (OR = 2.40, p = 0.001) and diabetes (OR = 2.25, p = 0.013), and a significant correlation between probable PTSD diagnosis predicting hypertension (OR = 2.61, p = 0.01).

Conclusion/Significance: These results indicate that a probable PTSD diagnosis is correlated to an increased BMI, and an elevated BMI may be a confounding variable in the relationship between a probable PTSD diagnoses and hypertension within this sample of inner-city women. Any factor that contributes to a high BMI, such as a diagnosis of PTSD, is a significant health concern that needs to be addressed to prevent the development of serious chronic medical conditions.
Abstract #: 91

Session Type: Poster
Category: Community Health

CAPACITY BUILDING FOR COMMUNITY HEALTH: LESSONS LEARNED FROM BUILDING HEALTHY URBAN COMMUNITIES, THE FIRST FIVE YEARS

Presenting Author: Angela Freeman, MPH
Authors: Shweta Ubhayakar, MBBS, MS-HSM, Tricia Johnson, PhD

Introduction: The West Side of Chicago is home to 480,000 residents who disproportionately face chronic economic hardships that include high unemployment rates, low high school graduation rates and low college matriculation rates. Residents face complex health, economic, and other inequities that prevent their communities from thriving. The west side of Chicago is also home to one of the largest concentrations of healthcare institutions and organizations in the region, and the epicenter for providing students with career-oriented education in the health sciences. In 2013, BMO Harris Bank and Rush University Medical Center embarked together on a project of unprecedented scope. Over the past five years, Building Healthy Urban Communities, a collaboration among Rush, Medical Home Network (MHN) and Malcolm X College has brought together donors, community partners, and other stakeholders to collectively develop, implement and evaluate programs on the West and South Sides of Chicago aimed at improving education, employment, health outcomes, and creating sustainable and replicable models of training and healthcare delivery to improve health.

Objective: The purpose of this study is to identify and evaluate unique aspects of collaborations between academic medical centers, affordable care organizations, educational and community partners towards improved education, employment, and health outcomes of underserved communities.

Methods: The study of BHUC is a mixed methods design process examining 5 independent domains linked together by overall purpose: better training, better care teams, better patient outcomes, better data and measurement, and the BMO Harris Bank Health Disparities Research Fellowship. Analysis centers on the values, perceptions and level of participation needed from stakeholders and we synthesize the various mechanisms of this collaborative environment and our capacity to design and implement programming and better understand and address barriers to achieving long-term sustainability and replication.

Results: The integrated findings point to change in perceived attitudes on multi-program, cross-Institutional cooperation towards community health improvement.

Conclusion/Significance: This work has positioned Building Healthy Urban Communities as a template for academic institutions interested in piloting and evaluating innovative post-secondary workforce development initiatives aimed at strengthening the pipeline to careers in the health sciences. This framework has informed Rush organizational strategy and catalyzed greater cross-sectoral collaborations towards healthier communities.
Abstract #: 92

Session Type: Poster
Category: Community Health

PROMOTING ANNUAL COGNITIVE ASSESSMENT AT OLDER ADULT DAY CENTER

Presenting Author: Kelly Grant, BA
Authors: Kelly Grant (Rush); Dana Henderson (Rush); Kelsey Forkin (Rush); Ashley Holm (Rush); Elizabeth Paschall (Rush); Kara Smith (Rush)

Introduction: The growing number of older adults with dementia is a significant public health issue. Older adult day programs support dementia patients and their caregivers by providing daytime activities and supervision. The goal of older adult services is to prevent or slow cognitive decline of their clients. However, clients' cognitive status is rarely assessed after the initial Mini Mental State Examination (MMSE).

Objective: The purpose of this quality improvement project was to create a trigger for annual MMSE administration and a sustainable system to track MMSE scores.

Methods: The project was implemented at a small community-based older adult day service with a daily census of between 40 and 60 clients. Feasibility was assessed with 53 clients who utilized the services on Thursdays. A standardized MMSE administration protocol was created to provide easy access to scoring guidelines, along with prompt cards for use in test administration. The score tracking system included instructions, client index, and individual score logs. The client index was organized by clients' names along with date of admission and their MMSE scores at baseline, 3-month reassessment, and yearly reassessment. A feasibility survey was distributed to staff at the end of the project.

Results: A total of 4 MMSEs were administered. The mean age of the client was 81.1 years old. The majority (72.5%) were female and the majority (84%) had mild to moderate cognitive impairment. The mean initial MMSE score was 16.8 and the reassessment score was 9.5. The survey indicated that 83.3% of staff were very satisfied and 16.7% were satisfied with the protocol and the system. All staff (n=6) felt the MMSE protocol and tracking system were easy to understand and use. Perceived benefits included increased documentation, consistency of MMSE scoring, and better matching clients to appropriate activities.

Conclusion/Significance: Findings suggest that the MMSE administration protocol and tracking system is a feasible method to increase MMSE testing and tracking in a community care setting. MMSE scores are important in determining how effective older adult day services are in slowing cognitive decline.
Abstract #: 93

Session Type: Poster
Category: Community Health

EARLY LIFE SOCIOECONOMIC STATUS AND MOTOR FUNCTION DECLINE IN OLDER, COMMUNITY-DWELLING AFRICAN AMERICANS

Presenting Author: Abhishek Jain, BA
Authors: Abhishek Jain (RU, MUSC), Raj Shah (RU), Ana Capuano (RU), Robert Wilson (RU), Aron Buchman (RU), Lisa Barnes (RU)

Introduction: Parental socioeconomic status (SES) has been associated with changes in fine motor function in children. However, currently no studies have examined the effect of early life SES on motor function (MF) decline.

Objective: The study examines whether early life SES is related to MF decline in older, community-dwelling African Americans.

Methods: We used data from 620 non-demented, older African Americans participating in a community-based cohort study of chronic conditions of aging (Minority Aging Research Study). Structured annual motor testing included 10 performances summarized as a global motor score. Early life SES is a previously published measure which summarizes paternal education, maternal education, and the negative value of number of siblings. We used linear-mixed effect models which controlled for age, sex, education, and BMI to examine the association of SES with the annual rate of change in MF.

Results: Participants (n=620, 25.3% male) had a mean age of 73.4 years (SD=6.1) and mean education level of 14.7 years (SD=3.4). Mean early life SES score was -0.014 (SD=0.732, Range=-2.4, 2.3). Mean baseline MF score was 1.01 (SD=0.17, Range=0.53, 1.41). During an average of 6.3 years of follow-up, MF declined in 0.024 units/year (SE=0.001, p<0.001). Each unit increase in baseline early life SES was associated with a 12.5% slower rate of MF score decline (SE=0.001, p = 0.034) over time.

Conclusion/Significance: In older, community dwelling African Americans, higher reported early life SES is associated with a slower rate of MF decline. Further work needs to be conducted to determine the basis of this association.
Abstract #: 94

Session Type: Poster
Category: Community Health

INCREASING ACCESS TO SEXUALLY TRANSMITTED INFECTION SCREENING FOR ADOLESCENTS

Presenting Author: Hannah Keel, DNP, BSN
Authors: Hannah Keel (Rush University)

Introduction: Adolescents ages 15-24 have the highest rates of Sexually Transmitted Infections (STIs) locally and nationally. Stakeholder interviews, patient survey, literature review, and data analysis identified that adolescents in Evanston, Illinois are susceptible to STIs due, in part, to barriers to seeking care. Untreated STIs can lead to complications such as pelvic inflammatory disease, infertility, further spread of STIs, and increased cost burden on the United States healthcare system. Erie Family Health Centers- Evanston/Skokie site (hereafter referred to as Erie Evanston), a community health center that serves the Evanston, Illinois community, is committed to increasing access to existing sexual and reproductive health services for adolescents.

Objective: The goals of the intervention were to increase access to existing adolescent sexual health services at Erie Evanston, prevent the spread of STIs by treating when indicated, and increase the number of STI tests performed at Erie Evanston, specifically among adolescents aged 15-24 years. This pilot intervention program targeted adolescents ages 15-24 that were already patients of Erie Evanston, as well as adolescent members of the Evanston community, through outreach with Erie's community partner organizations.

Methods: The Health Belief Model (HBM) was the guiding framework behind the research and development of the intervention. Methods to increase STI testing involved instituting walk-in STI testing-only hours at the clinic accompanied by a marketing campaign disseminated to community partner organizations. To evaluate the intervention, walk-in visits, STI tests, marketing outreach, and patient satisfaction were all tracked using Electronic Medical Record reports and evaluation questionnaires.

Results: Eight total clients utilized the walk-in clinic with a majority reporting satisfaction with the clinic. Marketing materials designed by this program were primarily responsible for attendance. A walk-in training manual for clinic staff was created to help sustain the initiative. Clinic leadership and staff support are also key to sustaining the intervention.

Conclusion/Significance: This intervention serves as a mechanism to increase access to existing sexual and reproductive health services for adolescents in Evanston, Illinois. Recommendations include to: continue marketing efforts, expand walk-in hours with client base, pilot at other Erie clinics, and perform assessment of client behavior change and risk self-assessment for intervention participants. Â€
Abstract #: 95

Session Type: Poster
Category: Community Health

IMPROVING HEALTH AND ECONOMIC VITALITY IN AUSTIN, GARFIELD PARK, LITTLE VILLAGE, NORTH LAWNDALE, AND PILSEN: THE TOUR DE WEST SIDE.

Presenting Author: Shivaliben Patel, BS
Authors: Shivaliben Patel (RUSH); Kaitlyn Fruin (RUSH); and David Ansell (RUSH)

Introduction: Health and economic disparities across Chicago neighborhoods are dramatic. The City of Chicago’s neighborhood tourism strategy excludes the majority of high-poverty neighborhoods including Austin, Garfield Park, and North Lawndale, further limiting investment in these communities.

Objective: Rush partnered with the neighborhood 5k walk/runs in Austin, Garfield Park, Lawndale, Little Village, and Pilsen to evaluate whether marketing their 5k walk/runs and local assets could help increase tourism and economic investment across our West Side service area.

Methods: Registrations questions were included in each of the 5ks' registration forms assessing which of the five Tour de West Side communities and three control communities (Lincoln Park, Oak Park, and West Loop) registrants had visited during the past six months. We conducted a sub-analysis of the responses of Rush employees, students, and their family and friends (N=775) comparing the aggregate baseline tourism pattern to the sample's post-intervention pattern using 5k walk/run registrations as a proxy for community visitorship during the intervention period.

Results: Rush participation at each 5K Pilsen, n=330; Austin, n=74; Lawndale, n=147; Garfield Park, n=142; Little Village, n=82. Individuals who stated they had not visited the neighborhoods in more than a year or have never visited were subcategorized, Pilsen, n=49 (49/330=14.8%); Austin, n=46 (46/74=62.2%); Lawndale, n=61 (61/147=41.5%); Garfield Park, n=30 (30/142=21.1%); Little Village, n=31 (31/82=37.8%).

Conclusion/Significance: The neighborhoods of Austin and Lawndale showed the greatest percent increase in visitorship post-Tour de West Side marketing campaign likely due to the fact that there were no pre-existing Rush programs. Furthermore, Garfield Park did not see a large increase in visitorship possibly as a result of Rush's West Side Walk for Wellness program in Garfield Park. Lastly, percentage increases were also less significant for Pilsen and Little Village. They may be due to the fact that Choose Chicago's website includes tourism information about both communities.
DEMENTIA: THE IMPACT OF MUSIC THERAPY

Presenting Author: Richard Schlattmann, MSN Student
Authors: Richard Schlattmann (Rush University), Josh Allee (Rush University), Dennis Knoch (Rush University), Jonathan Manley (Rush University)

Introduction: As part of a public health clinical rotation at a Senior Day Center, music therapy, in combination with reminiscence therapy, was found to open and improve communication with clients who were challenged by varying degrees of dementia.

Objective: To demonstrate that by choosing age-appropriate and personally relevant music and incorporating it during weekly health-related educational programming, communication with clients with dementia could be improved.

Methods: Music that was popular and widely known when clients were young was chosen and incorporated in various dance, exercise, singing and reminiscence activities, delivered in a one-hour session on a weekly basis over the course of the term.

Results: Clients reported very much enjoying all the sessions and actively participated in them, and in the case of clients with dementia, including some with quite advanced dementia, communication and engagement significantly improved.

Conclusion/Significance: Incorporating age-appropriate music, especially music of personal preference and past significance, can be used to enhance communication and engagement with persons with dementia.
HYPER-LOCAL FARMERS’ MARKET COMMUNITY NEEDS ASSESSMENT IN LITTLE VILLAGE, CHICAGO

Presenting Author: Rebecca Wornhoff, BA
Authors: Rebecca Wornhoff (Rush); Amanda Benitez (Enlace Chicago); Maria Brown, DO (Rush); Baruc Saucedo (Enlace Chicago); Juan de Dios Garcia (Enlace Chicago, Malcolm X City College); Katia Garcia (Enlace Chicago); Stephanie Mora (Enlace Chicago, Harold Washington City College)

Introduction: Prior community research suggests that the development of chronic disease, specifically diabetes, could be addressed by improved access to fresh produce. Little Village, a predominantly Mexican-American community on Chicago's West Side, is one of the only neighborhoods in the city without a farmers' market where community members can buy and sell local produce.

Objective: The Little Village Gardeners Coalition, a grassroots community organization, commissioned a needs assessment with at least 400 participants to determine community interest in moving forward with the development of a neighborhood farmers’ market.

Methods: With youth from a local summer program, anonymous 10 question surveys were conducted throughout the community from July-August 2018 on Android tablets with Rush IRB approval. People were asked if they would support a farmers' market in the community and when, where, and what types of products they would like to see in a market.

Results: Of the 424 persons approached in the community, 70% were women, 75% were residents of Little Village, and 64% chose to answer the survey in Spanish. Of the respondents, 57% were very likely to attend a market if one was held in the neighborhood, while another 36% were somewhat likely to attend. There was an especial interest among residents of Little Village (59% of them very likely to attend), women (59% very likely to attend), and adults over age 50 (61% very likely to attend).

Conclusion/Significance: The results indicated an overall interest for a market in the community and provided other guidelines to the Coalition on times, locations, and products desired moving forward. While the survey is subject to selection bias as a volunteer convenience sample with an over-representation of women, the Little Village Gardeners Coalition is utilizing these results to apply for grants and explore moving forward with the proposed market in a manner compatible with the community's wishes as expressed in the survey.
MEDICATION COSTS BEFORE AND AFTER BARIATRIC SURGERY

Presenting Author: Eduardo Vaca, BS
Authors: Eduardo Vaca (Rush); Phillip Omotosho, MD (Rush); Naomi Parrella, MD (Rush)

Introduction: It is well established that bariatric surgery for morbid obesity can help correct several comorbid conditions, including diabetes and hypertension. In a large portion of patients, this will result in a reduction or discontinuation of their corresponding prescription medications. As so, patients who undergo bariatric surgery should theoretically see a significant reduction in health care spending after the operation.

Objective: In patients who have undergone bariatric surgery, we seek to compare the amount spent on diabetes and hypertension medications before and after bariatric surgery. We will include patients who have undergone both sleeve gastrectomy and gastric bypass.

Methods: This study is a purely retrospective chart review, examined and approved by the IRB. Patient data was obtained from a database retrieved by the Department of Bariatric Surgery at Rush University and waiver for informed consent was granted. The number of prescription medications for diabetes, hypertension, and other comorbidities being used prior to and after surgery for each patient with a diagnosis of diabetes and/or hypertension was recorded. Prices were attributed to each medication based on the standardized pricing guide provided by Drugs.com. Amount spent on medications before and after surgery was calculated accordingly. Cost spent on medications was examined at 3 and 6 months post-surgery.

Results: Data was collected from 210 patients (F=162, M=48). Preliminary results showed an average BMI of 48 kg/m^2 prior to surgery and 40 kg/m^2, and 38 kg/m^2, at 3 and 6 months after surgery, respectively. On average, patients spent $225 on diabetes medications and $71 on hypertensive medications pre-operatively. Post-operatively, diabetes medication costs were reduced to $80 (p <.005), and $70 (p <.005) at 3 and 6 months, and hypertensive medication costs were reduced to $54 (p <.005), and $47 (p <.005) at 3 and 6 months. Significance was analyzed by paired t-test.

Conclusion/Significance: Bariatric surgery can reduce prescription medication requirements resulting in cost savings that are not-dependent on weight loss alone. It is important for insurers, physicians, and patients to consider the potential financial impact of bariatric surgery in addition to its health benefits when deciding whether to pursue the operation.
Abstract #: 99

Session Type: Poster
Category: Education

IMPROVEMENT IN TIMELINESS OF NUTRITION EDUCATION TO PATIENTS WITH GESTATIONAL DIABETES

Presenting Author: Kristina Bowman, BS
Authors: Kristina Bowman (Rush University); Dr. Sharon Foley, Ph.D., RDN (Rush University); Andrea Domas, MS, RDN, CDE, LDN (RUMC)

Introduction: Gestational Diabetes Mellitus (GDM) is a type of diabetes that is first recognized during a woman's second or third trimester of pregnancy and is characterized by glucose intolerance. If left untreated or uncontrolled it can result in maternal high blood pressure, increased need for a C-section, macrosomia and difficult delivery, difficulty breathing for the newborn, newborn hypoglycemia, and jaundice. A key role of managing GDM is medical nutrition therapy, including dietary changes, meal planning, and increased physical activity. Upon diagnosis, patients at the Rush Associates in Women's Health (RAWH) and Gynecological Care Group (GCG) clinics may not receive nutrition counseling in a timely fashion.

Objective: The purpose of this project was to review and improve the process in which patient with GDM receive nutrition education in the clinics.

Methods: A process improvement project was employed. The Registered Dietitian Nutritionist (RDN), Registered Nurse (RN) and Supervising Clinic Physician worked to flowchart the process. Patients coded with one of four ICD 10 codes for GDM between July and November 2017 were requested from RUMC Information Services to obtain time (days) between initial diagnosis of GDM and scheduled visit with the RDN.

Results: Pre-measure results showed the mean (SD) time between GDM diagnosis and RDN visit in the RAWH clinic (n=22) was 20 days (12.6 days) and was 16 days (13.5 days) in the GCG clinic (n = 12). Of those, 4 (18.2%) RAWH patients and 3 (25%) GCG patients did not schedule an appointment with an RDN.

Conclusion/Significance: The team reviewed the notification process to the patients, met with the medical providers, and worked to standardize the process. The team created a shared patient list in EPIC for better communication between staff and also made adjustments to the scheduling of patient with the RDN in both clinics to allow for more time slots. Post measures of time between GDM diagnosis and RDN visit will be obtained in the same manner from Jan- March 2019. To determine if there was a difference in time between pre- and post- measures, an independent t-test or Mann Whitney U test will be used depending on the normality of distribution.
Introduction: In academic teaching hospitals, morning rounds are an essential part of patient care and learning for residents and medical students. During rounds, some of the most important decisions are made and communicated with the healthcare team, as well as the patient and their family. Hospitals have used several different tools to help facilitate and organize patient care, such as standardized sign-out/handoff tools, various checklists, and personalizable patient lists. Given the importance of rounds to patient care, special attention should also be paid to the time devoted to preparation for rounds, or ‘pre-rounding,’ as this is the foundation for successful and meaningful rounds. During pre-rounding, information is gathered to present on rounds, such as new physical exam findings, overnight events, vitals, new labs, or other pertinent information that would be needed to formulate the new plan for the day.

Objective: Currently, this information has to be pulled, and often hand-copied, from many different sources, so it can be time consuming, frustrating, and inefficient, and often some aspects are missed. This leads to less time being spent to engage and digest information, which could cause inefficiency during rounds as well. Few studies have examined the impact of a designated or standardized pre-rounding tool designed to improve the efficiency of the pre-rounding process and subsequently optimize the rounding process itself.

Methods: Our study aims to examine the impact of an electronically generated pre-rounding tool on pre-rounding efficiency and effectiveness. We have designed a tool with input from Internal Medicine Residents for use on our medical floor rotations. Our tool will be created by EPIC and will auto-populate previously discussed data identified by residents as important. Our tool will be piloted among residents during their general floor rotation. These residents will be surveyed pre and post implementation.

Results: We plan to use this tool to evaluate both subjectively and objectively the amount of time spent users during the time frame typically reserved for pre-rounding.

Conclusion/Significance: In addition, we hope to capture and explore levels of perceived resident efficiency, time spent in direct patient care, and confidence in data presented on rounds.
CREATION OF A MEDICAL STUDENT TRAINING TO IMPROVE CONFIDENCE PROVIDING TRAUMA-SENSITIVE CARE TO SEXUAL ASSAULT SURVIVORS

Presenting Author: Daniel Gore, BA
Authors: Daniel Gore (M2, RMC), Melissa Prusky (M1, RMC), Chloe J. E. Solomon, MS (M2, RMC), Kaitlynn P. Tracy (M2, RMC), Jaclyn Rodriguez, RN, SANE-A (Office of the Illinois Attorney General), Brittny Blackwood, MSW (Resilience), Paul Kent, MD (Department of Pediatric Hematology-Oncology, RMC)

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 was to develop a training module that improves medical student understanding of providing trauma-sensitive care to sexual assault survivors. This module focused 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 workshops where medical students practiced communication skills via role plays with subsequent class debriefs. Students anonymously completed identical pre- and post-educational session surveys, featuring nine 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.
Abstract #: 102

Session Type: Poster
Category: Education

DNP PROJECTS IN AN ACADEMIC-PRACTICE PARTNERSHIP: BUILDING A SUSTAINABLE MODEL

Presenting Author: Barbara Hinch, DNP, RN, ACNP
Authors: Barbara Hinch; Sarah Livesay; Frederick Brown; Janet Stifter; Melissa Browning; MaryCarol Racelis; Lillian Hall; Susan Hossli; Mary Heitschmidt, Mary Johnson; Bridget O'Brien, Thomas Starr (All Rush)

Introduction: DNP programs are encouraged to follow the Academic-Practice Partnership guiding principles to support students educational and practice experiences. At a large Midwest College of Nursing (CON), we identified a need to improve communication between our primary academic partner and the CON regarding DNP project identification and implementation. Clinical staff of the healthcare system was stressed by the volume and poor communication of student projects. There was also a need to clarify clinician roles in facilitating DNP projects. Leaders in the CON sought to enhance our collaborative partnership for project sustainability due to increased DNP student enrollment.

Objective: DNP projects will align with the strategic goals and initiatives of the healthcare system. These projects will add value to the medical center and be a positive learning experience for students. Also to ensure projects add value, impact and create a positive learning environment for staff and students. As well as, enhance communication between CON and healthcare system leadership.

Methods: Senior CON and senior nursing administration and leadership developed the DNP Project Oversight Committee (DNPOC) to address these concerns. The primary goals of the DNPOC are to ensure that DNP projects align with the strategic goals and initiatives of the organization and projects add value to the medical center. Standing monthly meetings with CON and health system key stakeholders allowed identification of opportunities for improvement. Leaders used a systematic approach to develop a process for identifying, approving and sustaining DNP projects at the healthcare organization.

Results: Formal processes were developed to identify potential DNP projects and vet them against the organizational strategic plan using a DNP project identification form. Senior leadership evaluates each proposed project to ensure baseline data and appropriate resources are available. A defined workflow was developed to improve communication between CON and health system. Additionally, clinician responsibilities related to project oversight were clarified. All workflow and forms, as well as lessoned learned will be shared.

Conclusion/Significance: As DNP programs continue to increase enrollment and struggle with DNP project identification for students, academic nursing leaders need to strategically partner with health systems to formalize DNP project processes.
YOUTH MENTAL HEALTH FIRST AID TRAINING: VALUE TO MEDICAL STUDENTS VS. COMMUNITY MEMBERS

Presenting Author: Laura Hurley, BA
Authors: Laura Hurley (Rush Medical College), Raj Shah, MD (Rush University Medical Center), Kevin Chang, MD (UIC)

Introduction: The influence of mental health stigma is prevalent among community members and health care providers interacting with youth. Youth Mental Health First Aid (MHFA), launched in 2010, is one intervention designed to empower community participants in supporting young persons with mental health needs. Compared to peers of similar backgrounds, medical students experience significant mental health illness and rates of suicide. As such, medical students are likely to encounter situations requiring mental health support amongst patients and classmates. Yet, there is little literature detailing whether medical students value a mental health certification training originally designed for lay audiences.

Objective: To explore the overall quantitative and qualitative rating of MHFA training experience of medical students compared to community members.

Methods: An 8-hour, certified trainer led, Youth Mental Health First Aid course was provided for 20 self-selected medical students and 9 community members on two separate days at Rush Medical College. Participants completed post-training surveys to provide course feedback. Mean rating of the experience from a 5-point Likert scale was quantitatively compared using a t-test. Qualitative comments of medical students were thematically analyzed.

Results: Of the 29 attendees, 31% have lived experience with mental health illnesses. Collectively, both groups positively rated confidence in providing mental health first aid for youth (mean overall score = 4.6 (SD=0.50) for medical students vs. 4.78 (SD=0.44) for community members, t-test=0.96., p=0.17). Qualitative feedback from medical students called for improved mental health training within standard medical school curriculum.

Conclusion/Significance: In this preliminary proof-of-concept analysis, Youth Mental Health First Aid training was valued equally by medical students as by community members. If validated in larger studies, Youth Mental Health First Aid should be considered for inclusion in medical school training, similar to how basic cardiopulmonary resuscitation training is already included.
Abstract #: 104
Session Type: Poster
Category: Education

PEDIATRICS IN THE PRECLINICAL YEARS: A PARTNERSHIP WITH LAURANCE ARMOUR DAY SCHOOL

Presenting Author: Jessica Johnson, BS
Authors: Jessica Johnson, M4 (Rush); Jacob Hershey, M3 (Rush); Dr. Elizabeth Van Opstal, MD (Rush); Dr. Joanna Kuppy, MD (Rush); Dr. Marylouise Wilkerson, MD (Rush)

Introduction: In the preclinical years, the majority of curriculum is focused on adults. There is very little focus on pediatric patients - a patient population that may not be in every student's future, but one that is important to understand regardless of future careers. Because of this, many medical students are not exposed to pediatrics until the first day of their third year clerkship. Pediatrics is not simply medicine for little adults - the students have a steep learning curve on the first day of their clerkship. They have to learn what a healthy child at various ages looks like, in addition to the physiology and pathophysiology of children that differ so greatly from what they learned during their preclinical years.

Objective: The goal of this pilot project was to provide medical students with some exposure to the healthy child while in the second year of medical school.

Methods: We partnered with Laurance Armour Day School (LADS), Rush's affiliate child care center, and took students in small groups to learn how to interact with healthy children. We demonstrated developmental milestones communication skills, and simple, non-invasive physical exam maneuvers on children between infancy and five years of age. We had tried this on a smaller scale with 2nd year student volunteers in 2017, and after very positive feedback, we were able to integrate this experience directly into the curriculum for 2018.

Results: We had students fill out a survey before and after their experience, rating their comfort in assessing development and performing various aspects of the pediatric physical exam. Most 2nd year students felt they could better perform each physical exam maneuver taught more effectively and could more confidently assess development of children. Overall, they enjoyed the experience, but wished more time had been spent on actually performing physical exam.

Conclusion/Significance: By providing students with exposure to healthy children in their preclinical years, they will be better prepared to care for sick children during their clinical pediatrics rotation. As this program has been included in the updated curriculum, we will be able to continue this program and improve it for many medical students to come.
Abstract #: 105

Session Type: Poster
Category: Education

GUT GAMES: AN INTEGRATED BOARD GAME FOR THE APPLICATION OF BASIC AND CLINICAL SCIENCES IN THE CLASSROOM

Presenting Author: Aaron Katrikh, MS, BS
Authors: Aaron Z. Katrikh, MS (RMC); Christopher Ferrigno, PhD, MPT (RMC); and Maureen H. Richards, PhD (RMC)

Introduction: Many institutions including Rush University's College of Medicine are moving away from the traditional lecture-based approach. Instead, students are taught through other models including case-based collaborative learning and team-based learning, where students apply and integrate their newly acquired basic and clinical science through small group activities. Substantial challenges for educators using these approaches include: delivering new and engaging activities, effective integration of content from basic and clinical disciplines, efficient use of class time, and scaling the activity to the level of the learner. Here we designed an exciting and innovative game activity to integrate basic-science topics with clinical disciplines and to mitigate student disengagement.

Objective: To deliver a challenging and engaging classroom activity that could be adapted for different basic and clinical science disciplines.

Methods: First year medical students in a single pass, integrated curriculum participated in a board game consisting of >30 challenges related to gastrointestinal content developed by experts from five disciplines. Using a game board and points system, student teams completed challenges by applying high yield content while accumulating points as they progressed through the gastrointestinal tract. Students then completed a survey evaluating the success of the session.

Results: There was a 100% response rate from the students that participated in this activity. Overall, 84.3% of respondents endorsed that the learning objectives for this module were met (27.6% strongly agree) and 81.5% endorsed that the overall quality of this session was excellent (33.3% strongly agree). On average, the overall quality rating of the session was 4.66(+/- 0.8) out of a 6 point Likert scale, a score that was higher than all 11 sessions in this course, and well above the mean satisfaction rating of 3.77 +/- 0.7 for all 11 sessions in this course.

Conclusion/Significance: This activity provides an engaging structure for the application or review of basic science and clinical disciplines that can be scaled to the ability of the learner and adapted to accommodate different disciplines. This game-format activity, which can be easily developed by content experts and deployed with minimal faculty training, contributes to the collection of game-based in-class activities for a variety of health science curricula.
GUIDED DISCUSSION OF ART TO IMPROVE EMPATHY IN MEDICAL RESIDENTS

Presenting Author: Anila Khan, MD
Authors: Anila Khan (Rush); Richard Abrams (Rush)

Introduction: Physician empathy has been shown to reach its lowest levels during residency training. Allowing residents to engage in a guided discussion of art may improve their perspective taking ability and improve empathy.

Objective: Guide medical residents through a discussion of artwork and assess if their sense of empathy is affected.

Methods: 13 medical residents were taken to an art museum across three separate sessions to discuss three paintings. Participants were asked to describe their perception of each painting, then given the artist's description of the work. Before and 3 weeks after the session, participants completed the Interpersonal Reactivity Index, a 28-point questionnaire on a scale of 0-4 for each item, to assess empathy across four sub-topics (perspective taking, fantasy, empathic concern, and personal distress). A paired t-test was used to determine statistical significance between pre- and post-survey scores. Qualitative responses were also collected.

Results: 2 of the 13 participants did not complete the post-survey and their pre-survey scores were omitted. There was no statistically significant difference in average total survey score pre and post (68.7 pre vs 69.7 post, p=0.57). There was a statistically significant difference in average total scores on the fantasy taking scale (18.4 pre vs 20.1 post, p=0.02). There was no statistically significant difference in average total scores on the remaining sub-scales (perspective taking 18.45 pre vs 19.27 post, p=0.27, empathic concern 21.3 pre vs 20.3 post, p=0.21, personal distress 10.63 pre vs 10.09 post, p=0.58). Highlights of qualitative responses collected from participants included a desire to have more sessions and the impression that their ability to appreciate other's perspectives was heightened.

Conclusion/Significance: There was no overall difference in empathy measurement pre and post a guided art discussion. Qualitative responses from participants reflect the sessions as positive experiences that may have had an impact in the days immediately following the experience. These findings are limited by small sample size and lack of repeated sessions. Incorporating guided discussions of art into the residency curriculum may be beneficial. Multiple sessions may be necessary to see an impact.
Abstract #: 107

Session Type: Poster
Category: Education

FREQUENCY OF EDUCATION PROVIDED TO PATIENTS WHO RECEIVE FEEDING TUBES

Presenting Author: Mariah Long, BS
Authors: Mariah Long, BS (Rush); Sharon Foley, PhD, RD, LDN (Rush); Marisa Mozer, MS, RD, LDN, CSO, CNSC (Rush)

Introduction: Nutrition Support via enteral nutrition is needed to ensure adequate hydration and nutrition when patients are unable to meet nutritional needs orally. Complications can occur when education on proper tube feeding care is not provided by health care practitioners. This lack of education may compromise a patient's nutritional status and increase their risk for dehydration and re-admission to the hospital.

Objective: Thus, the purpose of this study was to investigate the prevalence in which tube feeding education was provided to patients shortly after receiving a feeding tube as an outpatient procedure at Rush University Medical (RUMC) and to investigate the associated outcomes of inadequate education.

Methods: A list of patients with the CPT codes for outpatient gastrostomy tube placement between January 2015 to August 2018 was requested from Information Services at RUMC. Demographics, pre-operative, education, and complication related variables were collected through the electronic medical record (EMR). A total of 42 medical records were reviewed.

Results: The majority of education, 83.3% (n = 35), was provided by dietitians, followed by 16.6% (n=7) from nursing and none from the Intervention Radiology department. It was found that 81% (n=34) of documented education detailed the tube feeding prescription and flush amount and 42.9% (n=18) included site care. However, only 4.8% (n=2) of documented education pertained to avoidance of complications or discussed medication administration. Additionally, 47.6% (n=20) of patients were readmitted to the hospital and 57% (n=24) presented to the emergency department.

Conclusion/Significance: Results indicate that inadequate education is being provided to patients who receive new feeding tubes as outpatients. For this reason, a team approach is needed to improve the process and identify the specific roles of each practitioner in the care of new tube feeding patients. Ideally, the second phase of this project would comprise of developing and implementing a standardized protocol regarding how education should be provided, and subsequently, to collect post-measures. Overall, the goal is to reduce complications, improve patient satisfaction, and ensure that excellence is being provided by all practitioners at RUMC.
Introduction: Malignant Hyperthermia (MH) is a rare medical emergency that may occur after receiving anesthetics. The Malignant Hyperthermia Association of the United States advises all medical facilities to be prepared for prompt diagnosis and immediate treatment response, in order to prevent mortality and reduce morbidity. Rush University Medical Center nursing care teams that work in areas prone to high risk /low volume MH events have not received consistent annual training regarding MH.

Objective: To implement a sustainable, multidisciplinary, evidence based practice annual training program that increases staff knowledge, in order to appropriately respond to MH event. Using a phased approach, this study will demonstrate which learning method is most effective in meeting this objective.

Methods: Baseline knowledge of MH was obtained with a pre-survey developed by the investigator. Education in-services (Phase 1: FY 17) and online learning module (Phase 2: FY18) included the same content (MH overview, resources, and policy and procedure review) and were provided to nursing staff. A post-survey was given to staff immediately after all training. Pre and post surveys contained five questions and the same content.

Results: Phase 1 (n=136) prior to the education implementation, 20% of the staff met the survey passing score. Immediately post-education-100% received passing score. Long-term retention of knowledge decreased at 4 months with 48% receiving a passing score. Phase 2 (n=437) pre-education 34.8% of participants achieved a passing score and 81.4% of participants achieved a passing score post online education.

Conclusion/Significance: Live in-service (Phase 1) provided immediate, short-term improvement to MH crisis knowledge but long term retention of this knowledge was unsatisfactory. Online education delivery method (Phase 2) was less effective at improving MH crisis knowledge. Due to the ineffectiveness of online training, long term follow-up surveys were not performed. Further study is needed to determine the best approach to MH education. Phase 3 FY19 of this project will include: mandatory annual, hands-on drill training with pre and post educational assessments. All members of the multidisciplinary team will partake in this training.
SAFE SLEEP PROGRAM FOR NEONATAL INTENSIVE CARE UNIT NURSING STAFF: A PILOT PROGRAM

Presenting Author: Shannon O'Brien, MSN, BS, RN, CNL
Authors: Shannon O'Brien (Rush University) and Alma Blancarte (Rush University)

Introduction: In 2016, the Centers for Disease Control and Prevention reported approximately 3,600 sudden unexpected infant deaths (SUID). In March 2018, an infant died from SUID days after discharge from the Neonatal Intensive Care Unit (NICU) at a large Midwest Medical Center, prompting evaluation of safe sleep practices (SSP). One study found that only 25% of NICU infants were observed in safe sleep environments, largely due to objects found in crib. Nurses, as primary bedside caregivers, play a vital role in improving SUID outcomes by role modeling SSP during hospitalization. Literature demonstrates education and safe-sleep cards increase SSP compliance in hospitalized infants.

Objective: The purpose of this project is to increase nurses' safe sleep knowledge and SSP compliance on the NICU.

Methods: Evidence-Based Practice Theory was used as the overarching framework for a safe sleep program, following American Academy of Pediatrics guidelines. The program included in-service education, an online educational module, and safe-sleep cards. NICU nurses, working all shifts, were offered education. Keller’s Attention Relevance Satisfaction and Confidence (ARSC) Model of Motivational Design guided the development of education. Infants included in crib audits were greater than 32 weeks and 1500 grams and were in an open crib. Challenges included educating a large number of nurses and modifying original safe-sleep card due to barriers addressed as an interdisciplinary team.

Results: Nurses' safe sleep knowledge was assessed using a questionnaire adopted from Eunice Kennedy Shriver National Institute of Child Health and Human Development. Crib audits were performed to assess SSP compliance pre- and post- education and safe-sleep card implementation. Post- in-service education questionnaire scores (N=23) increased by 14% when compared to pre-questionnaire scores (N=48). Pre-intervention crib audits (N=50) revealed 24% SSP compliance, and post-intervention data will be collected in December 2018.

Conclusion/Significance: A safe sleep program for NICU nurses improved nurses' safe sleep knowledge and may increase SSP compliance of hospitalized infants. Parents are likely to model a sleeping environment observed in the hospital. Therefore SSP in the hospital may increase parental compliance at home. Interprofessional collaboration and unit leadership buy-in were crucial to the success of the program.
Abstract #: 110

Session Type: Poster
Category: Education

ONE HOSPITAL'S EXPERIENCE WITH IMPLEMENTING ON-DEMAND ANNUAL COMPETENCIES FOR NURSES

Presenting Author: Kathy Ostrander, MSN
Authors: Kathy Ostrander (Rush Copley Medical Center) Elisabeth Garrison (Rush Copley Medical Center)

Introduction: Competence in nursing practice can be determined by self-assessment, peer review, knowledge tests, and performance observations. In the hospital setting, this determination is traditionally completed during an annual competency day. By implementing on-demand competencies in one organization, the assessment of nurse competence is completed in real-time, resulting in increased nurse satisfaction and positive financial impact for the organization.

Objective: The objective was to improve the effectiveness of competency verification and empower the nurses to take responsibility for their own competency.

Methods: Competency topics were selected based on nursing needs assessment, manager feedback, problematic skills derived from quality data, high-risk low-volume skills, and annual requirements. The verification method options varied depending on the competency topic, including observation of daily work, discussion, mock event (simulation), posttest, case study, return demonstration, and quality improvement (QI) monitor (documentation audit). The RN's had five months to complete their required competencies.

Results: The total potential savings on one unite were calculated to be $3,372. This results in a positive ROI of 249% and a savings of $2,406 per year for the organization. There were similar ROI results for the other two units. The overall annual savings for the organization for all three units was calculated to be nearly $7,500. Expansion of the pilot to Women's Health resulted in a positive ROI of 288% and a savings of almost $15,000 annually for the organization. 72% of nurses preferred ongoing competency sign-off on the unit and only 13% preferred scheduled competency.

Conclusion/Significance: The on-demand competency process improved the effectiveness of competency verification and 96% of nurses agreed that the new competency process allows the nurse to be accountable for completing their annual competencies. The survey response illustrates that the nurses support the change to on-demand competencies. It is anticipated that the nurses will feel more ownership and empowerment as on-demand competencies continue.
Abstract #: 111

Session Type: Poster
Category: Education

OPIOID MISUSE IN PATIENTS WHO UNDERGO EMERGENCY GENERAL SURGERY: PATIENT EDUCATION PRIOR TO PRESCRIPTION

Presenting Author: Michael Jake Petersen, BS
Authors: M. Jake Petersen (RMC); Kathryne Adams (RMC); Nicole Siparsky (RUMC)

Introduction: Storage and disposal (S&D) of unused opioid therapy (UOT) remains poorly understood in the postoperative patient population. Noncompliance with guidelines for UOT S&D may contribute to opioid misuse.

Objective: Patient education may mitigate opioid misuse behavior.

Methods: With institutional review board approval, a prospective cohort study recruited 24 emergency surgery patients over four months. Patients were excluded if they reported taking an opioid on admission. Subjects were surveyed before and after receiving standardized opioid education in the form of an educational video. A follow up survey assessed S&D of prescribed opioids one month after discharge.

Results: Before education, 38% (n=9) identified proper UOT disposal and 63% (n=15) identified safe handling of opioids. After education, 75% (n=18) identified proper disposal and safe handling of opioids. Eighteen patients received opioid prescriptions; three were lost to follow up. Follow up (n=15) revealed 67% safely stored opioids; 67% retained UOT. Few subjects (30%; n=3) reported proper disposal of UOT. The average number of prescribed pills was 19.8 and 73% used other pain medications. The average morphine milligram equivalents prescribed was 26.43.

Conclusion/Significance: Surgical patients remain unaware of safe S&D practices. An educational video increased awareness of, but not compliance with, safe S&D of UOT. Nearly one third of patients did not use their opioid prescription, suggesting that both poor patient awareness and opioid over-prescription contribute to opioid misuse. The use of non-opioid analgesics was widely employed and remains an effective method for decreasing opioid use in surgery patients.
Abstract #: 112

Session Type: Poster
Category: Education

ADDRESSING AGEISM AND BUILDING EMPATHY: A VIRTUAL REALITY TRAINING MODULE FOR INTERPROFESSIONAL STUDENTS

Presenting Author: Emily Phelps, MS
Authors: Emily Broman Phelps, MS (Rush); Carrie Shaw, MS (Embodied Labs); Erin Washington, MM (Embodied Labs); Isabel Kats (Rush); Neelum T. Aggarwal, MD (Rush); Daniel C. Potts, MD, FAAN (Cognitive Dynamics)

Introduction: With a growing, diversifying geriatric population comes the necessity to equip future medical providers and millennial caregivers with the awareness to address their unique care concerns. However, emphases on building empathy, clinical judgement, and communications skills in medical education often fail to incorporate a focus on geriatric patients.

Objective: This project applies virtual reality (VR) innovation to an interdisciplinary curricular module depicting common health issues experienced by older adults. We hypothesize that participants will 1) recognize sensory, physical, and relational implications facing older adults with dementia and age-related chronic conditions, 2) exhibit higher empathy levels and awareness of responsive care techniques, and 3) show less bias regarding age compared to before the simulation.

Methods: Data from surveys and experiences of a VR simulation, 'Beatriz', developed through Embodied Labs is leveraged to implement a VR-inspired healthcare educational program. Participants are recruited across Rush clinical sites and academic programs. Paper-based pre-surveys incorporate four existing measures of empathy, implicit bias, ageism, and knowledge of sex difference in medicine. Participants are then guided through consecutive VR modules. At a later date, participants will complete post-surveys and engage in focus group debriefs. Statistical methods will be descriptive on pre- and post-assessments, with content analysis on open-ended focus group answers.

Results: Preliminary focus group motifs include functional understanding of memory loss, experiential confusion and frustration, and contrasting patient inner dialogue with family dynamics. Unexpected gains include stated curiosity concerning gender roles of caregiving. Students embodying Beatriz described: greater awareness of symptomatic variability of dementia, further empathy for older adults with dementia, and deepened appreciation for clinical and familial accommodations in dementia care.

Conclusion/Significance: Emerging data reflect student endorsement of the VR experience as an enlightening supplement to academic content on aging. Limitations include post-survey lag and participant schedule conflicts to present to focus groups, such that post-data is alternatively collected on an individual basis. Ultimately, this project uniquely teaches students about the aging experience from the first-person patient perspective with immersive technology. Future implications include the integration of these modules into medical student education and public health programs that address caregiver burden in millennials.
THE IMPLEMENTATION OF AN INTEGRATIVE JOURNAL CLUB TO IMPROVE RESIDENT CONFIDENCE OF APPRAISING MEDICAL JOURNAL ARTICLES

Presenting Author: Carlo Prades, MD
Authors: Mary Biglin, MD (RU) Conor Walsh, MD (RU) Usama Ahmad, MD (RU) Caspian Folmsbee, MD (RU) Manya Gupta, MD (RU)

Introduction: Journal clubs initially served as a method of distribution of evolving medical developments of the time period. Residency programs have since employed the use of journal clubs to help trainees develop critical appraisal skills, understand research design, and incorporate biostatistics in clinical practice. The Rush Internal Medicine Residency program has initiated an Integrative Journal Club to help physicians-in-training develop these aforementioned skills.

Objective: The goal of this quality improvement research project is to increase individual resident-perceived confidence and comfort level with appraising research studies in the medical literature and to promote further integration of evidence-based medicine (EBM) in daily clinical duties

Methods: This research project was accepted as non-human subject research via expedited review by the Rush Institutional Review Board. The authors of this project will present monthly presentations analyzing 1-2 journal articles in a small group format implementing key principles of EBM to appraise scientific studies. Before each session, participants will complete a 14-point questionnaire to assess individual, resident-perceived confidence in critical appraisal. After each session, participants will complete the same 14-point survey to assess any potential growth in each individual’s critical appraisal comfort level. This study will be conducted over 5-6 monthly sessions.

Results: This current study is currently underway in the collection of data. We anticipate the use of simple t-test to determine if there is a statistical significance with the implementation of an integrative journal club and its impact on resident-perceived confidence in appraising the medical literature. We predict that there will be a statistically significant difference in the conglomered scores between pre-session scores and post-session scores. We also anticipate that there will be a statistically significant difference of resident-perceived confidence scores from the start of the study as compared to the end of the study.

Conclusion/Significance: There has been a greater emphasis of the use of EBM in daily clinical practice. Residents in the Internal Medicine Program have recognized the importance of incorporating relevant scientific studies in making certain clinical decisions in taking care of patients. This research project attempts to analyze if a journal club can improve resident confidence in appraising medical literature.
MINDFULNESS WORKSHOPS EFFECTS ON NURSES' BURNOUT AND STRESS

Presenting Author: Julia Sarazine, DNP
Authors: Julia Sarazine (RUMC)  Mary Heitschmidt (RUMC)  Hugh Vondracek (RUMC)  Samantha Sarris (formerly RUMC)  Natalia Marcinkowski (RUMC)

Introduction: Burnout decreases work performance and quality of care; resulting in more medical errors, lower patient satisfaction and higher rates of turnover. A systematic review showed mindfulness-based interventions for healthcare professionals reduced stress and burnout and increase self-compassion and general health. However, the authors determined that more high quality research is needed. Our hypothesis is a four-hour workshop will decrease burnout and stress and increase mindfulness skills.

Objective: This study is to determine if a four-hour mindfulness workshop is effective in reducing burnout and perceived levels of stress and increasing mindfulness. The intervention was assessed through three questionnaires completed prior to the workshop and one-month and six months after.

Methods: Nurses at a major urban medical center were recruited through email to attend a four-hour mindfulness workshop. Participants completed Maslach Burnout Inventory (MBI) Perceived Stress Scale (PSS) and Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) prior to the start of the workshop and one and six months after. The participants were assigned an ID number their responses were then entered into a REDCap electronic database and analysis was completed in SPSS. The study design allowed for comparisons pre-intervention and post-intervention.

Results: Of the 52 nurses who completed the baseline questionnaires; 94 percent were female with an average age of 38. 31 completed the questionnaires at one-month and 20 at six months. At one month, nurses reported statistically significant (SS) decreased perceptions of stress (-2.31, p=0.01) and emotional exhaustion (-4.78, p=0.03). Mindfulness skills, personal accomplishment, and depersonalization improved but were not SS. At six months, data showed SS increased perceptions of mindfulness (2.50, p=0.04) and personal accomplishment (5.14, p=0.03) and decreased emotional exhaustion (-6.21, p=0.05). Perceptions of stress and depersonalization improved but were not statistically significant.

Conclusion/Significance: Limitations are small sample size and participants lost to follow up. All of the changes were improvements, even if they were not statistically significant. There is potential for clinical significance as the nurses reported decreases in burnout and perceived stress and increases in mindfulness.
AN ULTRASOUND TRAINING COURSE FOR INTERNAL MEDICINE RESIDENTS

Presenting Author: Jordan Scharping, MD
Authors: Jordan Scharping, MD (RUMC, Internal Medicine PGY-2), Melissa Kander, MD (RUMC, Internal Medicine PGY-2), Amie J Gamino, MD (RUMC, pulmonary and Critical Care Attending Physician), Abhaya Trivedi, MD (RUMC, Pulmonary and Critical Care Attending Physician)

Introduction: Point of care ultrasound (POCUS) is becoming ever more prevalent and useful as a diagnostic tool in Internal Medicine. It is also an aspect of residency training that Rush house staff feel would be beneficial for their careers. Currently at Rush, POCUS is rarely taught to Medicine residents, and when it is, the teaching tends to be brief and unstructured.

Objective: We have developed a formal training curriculum and aim to assess its impact on resident knowledge of pertinent information in POCUS, confidence in their abilities to use ultrasound to improve patient care, and ability to diagnose disease using ultrasound at the bedside.

Methods: The course is currently underway and consists of five 2-hour teaching sessions, each with respect to ultrasound of a different body system. Each session includes a brief lecture series with videos followed by interactive, hands-on training at the bedsides of various consented patients in the MICU. It is being taught by critical care attending physicians. A total of 10 Medicine residents (PGY1-3) are enrolled to participate. The impact of the curriculum will be assessed via surveys and multiple-choice tests with video identification of common pathologies before and after teaching sessions as well as before and after the entire course. Furthermore, trainees' ability to diagnose various diseases with ultrasound will be formally tested at the bedside of various patients during a sixth session of the course.

Results: After completion of the first of five official teachings sessions, resident scores on post-session tests have consistently shown improvement when compared to pre-test scores (average pre-test score 6.8/10, average post-test score 9.5/10). Per responses to post-session surveys, resident confidence in using POCUS also increased significantly. Furthermore, as a result of the course thus far, residents have consistently stated that they would be more likely to use POCUS to perform clinically relevant tasks.

Conclusion/Significance: Preliminary data in this study suggests that formal POCUS training for Rush Internal Medicine residents will improve their confidence and ability to use bedside ultrasound to perform clinically relevant tasks and therefore improve patient care.
DEVELOPMENT OF A NOVEL EMERGENCY MEDICINE PHYSICIAN TRAINING TO IMPROVE CARE FOR SURVIVORS OF SEXUAL ASSAULT: A PRELIMINARY SURVEY

Presenting Author: Kaitlynn Tracy, BS
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  Affiliation/Institution: Melissa Prusky (M1, RMC), Chloe J. E. Solomon (M2, RMC), Kaitlynn P. Tracy (M2, RMC), Jaclyn Rodriguez (Office of the Illinois Attorney General), Maria Balata (Resilience), Madeline Mangiaracina (Resilience), Sloane York (Department of Obstetrics and Gynecology, RMC), Vanessa Tirone (Road Home Program), Dino P. Rumoro (Department of Emergency Medicine, RMC)

Introduction: In the United States, one in three women and one in six men experience sexual violence in their lifetime. One in seven survivors are younger than six years old. While emergency medicine (EM) nurses and social workers undergo continuing education in caring for survivors of sexual assault, physicians typically do not. Training for EM physicians is imperative to achieve physician competence and confidence of care for survivors.

Objective: Our objective in this work is to understand from the perspective of EM physicians what topics should be included in a training to improve competency and sensitivity of care for survivors of sexual assault. This will provide insight into points-of-care that are lacking for sexual assault survivors when presenting to the emergency room.

Methods: An anonymous checkbox-style survey was administered to 40 RUMC EM physicians, asking what topics they would like to learn more about in a training. Four categories, including communication, roles and responsibilities, medical care, and legal considerations, were included in the survey.

Results: Twenty-seven EM attendings completed the survey. Of these respondents, 96% requested education on communication, 70% on roles and responsibilities of various healthcare providers and law enforcement, 93% on follow-up medical needs, and 96% on legal considerations specifically for survivors under 18-years old.

Conclusion/Significance: Sexual assault is a significant public health problem that requires EM physicians receive specialized training in areas including trauma-informed care. Our research shows that RUMC EM physicians want to receive comprehensive training to improve skills and knowledge working with this patient population. Survey results were considered alongside expertise provided by Resilience, Sexual Assault Nurse Examiners, and others to develop a four-hour CME-accredited multidisciplinary training for RUMC EM physicians to improve quality of care and health outcomes. The first iteration of the training was successfully administered in December 2018.
FEEDBACK ON GENERAL MEDICINE ROTATIONS: RECONCILING TWO PERSPECTIVES

Presenting Author: Conor Walsh, MD
Authors: Conor Walsh (RUMC); Rupal Shastri (RUMC); Manya Gupta (RUMC)

Introduction: Feedback is a critical component to the development of new physicians. Without feedback, mistakes go uncorrected and good performance is not reinforced.

Objective: Our objective was to understand differences in perceived frequency and quality of feedback between hospitalists and residents with the ultimate goal of improving the system and culture of effective feedback.

Methods: We surveyed residents who had completed at least 1 month of general medicine wards and hospitalists on teaching services on various aspects of feedback during Fall 2018.

Results: 47/114 residents and 26/50 hospitalists responded to our survey. There was broad agreement of what constituted effective feedback with >55% of both groups agreeing that it should be specific, timely, and include both positive and negative feedback. Only 10.6% of residents thought that avoiding criticism was an important component of feedback. 84.6% of hospitalists reported giving end of rotation feedback 75-100% of the time whereas 44.7% of residents reported receiving it that often. Regarding feedback in general 57.7% of hospitalists reported giving feedback either daily or every few days compared to 8.5% of residents reporting receiving feedback that often. Overall, 44.7% of residents reported being told 'keep up the good work' or to 'continue reading' without additional specific feedback. Regarding challenges to giving feedback, 76.8% of hospitalists reported time constraints, 42.3% reported difficulty with negative feedback, and 38.5% reported lack of enough direct observation of residents.

Conclusion/Significance: Both residents and hospitalists agree that feedback is important and that a more robust culture of feedback is desired. Our project shows that there are large discrepancies between the perceived frequency of giving/receiving feedback between hospitalists and residents. Of particular interest, residents want more specific and negative feedback even as hospitalists acknowledged their own discomfort with giving constructive criticism. Other challenges cited by hospitalists include time constraints and not enough direct observation of residents. Improving the culture of feedback at any institution will require a deliberate and collaborative effort between residents and hospitalists. By reconciling both perspectives, this project serves as a starting point for our institution towards achieving that goal.
THE IMPACT OF THE INTESTINAL MICROBIOME ON THE AGING OF THE BRAIN

Presenting Author: Dulce Frausto, BS
Authors: Dulce Frausto (Rush University Medical Center, Division of Digestive Diseases and Nutrition, Section of Gastroenterology), Aeja Jackson (Rush University Medical Center, Division of Digestive Diseases and Nutrition, Section of Gastroenterology), Christopher Forsyth (Rush University Medical Center, Division of Digestive Diseases and Nutrition, Section of Gastroenterology), and Robin Zuwala (Rush University Medical Center, Division of Digestive Diseases and Nutrition, Section of Gastroenterology)

Introduction: The worldwide increase in old age population has contributed to the detrimental development of age-related diseases which includes neurodegenerative disorders, such as Alzheimer's disease (AD). Aging is the main risk factor for AD and cellular senescence, a state of irreversible cell-cycle arrest induced when cells encounter chronic stress, is a key driver of organismal aging. Although, number of senescent cells naturally increase with age, a clearer understanding of other factors that can prematurely promote the development of senescence is needed. Studies have shown that an association between lifestyle factors, specifically diet, to cellular senescence are evident. However, the mechanism by which they are tied together is still unclear. Interestingly, it is known that diet intake rapidly and robustly alters the intestinal microbiota community structure and function. Thus, we propose that unfavorable lifestyle factors, such as poor diet, are a risk factor that promote cellular senescence via a mechanism involving the alteration of the gastrointestinal microbiota.

Objective: To determine the gastrointestinal microbiota as a regulator of cellular senescence. In addition, to identify the mechanism by which poor lifestyle promotes cellular senescence in microglia

Methods: In this study, a microglial model will be exposed to various gut derived products and then analyzed using senescence-associated β-galactosidase (SA-βGal) assay and immunoblotting analysis of p16INK4A.

Results: The results of this study are expected to show that gut derived products associated with pro-inflammatory bacteria will demonstrate an increase of SA-βGal and p16INK4A in the microglial model.

Conclusion/Significance: Identification of the intestinal microbiota as a factor that promotes cellular senescence will lay the groundwork for the development of therapeutic approaches that target the microbiota (i.e., consumption of prebiotics or probiotics) to enhance treatment of age-associated disease, such as AD. The proposed research is significant because it will, for the first time, provide a mechanistic understanding of how the intestinal profile contributes to cellular senescence and how this process is altered by a physical activity and dietary intervention aimed at altering the intestinal microbiota.
Abstract #: 119

Session Type: Abstract/Podium Award (Deans’ Award)
Category: GI/Inflammation

MICROBIOME AND LEAKY GUT IN PARKINSON'S DISEASE

Presenting Author: Aeja Jackson, BS
Authors: Aeja Jackson*, Maliha Shaikh, MS, Nailliw Preite, MS, Sherry Wilber, Dulce Frausto*, Christopher Forsyth, PhD, Ali Keshavarzian, MD. Rush University Medical Center  *Rush University Graduate College

Introduction: Parkinson's Disease (PD) is the second most common neurodegenerative disease associated with aging in which patients suffer from neuroinflammation and substantia nigra dopaminergic (DA) cell loss. An estimated 80% of PD patients also exhibit non-motor symptoms such as gastrointestinal (GI) dysfunction, olfactory dysfunction, depression, and sleep disorders which precede motor symptoms by years. PD patients also display a dysregulated microbiome and an increase in intestinal and BBB permeability. From this standpoint, it is unclear why PD patients experience GI dysfunction years before the onset of motor symptoms and if the release of intestinal microbial products and endotoxins, such as lipopolysaccharide (LPS) and lipoteichoic acid (LTA) contributes to neuroinflammation.

Objective: To investigate whether gut-derived microbiome products activate brain microglia via Tlr receptors, the Nlpr3 inflammasome, and Notch1 signaling and determine if these mechanisms promote DA cell death and PD neuroinflammation and disease progression.

Methods: Treat primary mouse microglia and the SIM-A9 murine microglia cell line with increasing doses of LPS and LTA alone and in combination with either Notch1 inhibitor or Nlrp3 inhibitor. Outcome measures include western blot analysis, immunostaining, and PCR analysis. Use of Thy 1- ASO genetic mouse model and DSS treatment to promote gut leakiness without overt colitis. Outcome measures include intestinal permeability and behavioral testing, 16S microbiome analysis, RNA sequencing, western blot analysis, and immunostaining.

Results: LPS induces a dose-dependent increase in Nlrp3, Notch1 and MHC-II in SIM-A9 cells. Also, there was a LPS-induced increase in pro-IL-1β and Nlrp3 activation that were inhibited by pretreatment with the Notch1 inhibitor, DAPT.

Conclusion/Significance: LPS-induced microglia activation occurred concurrently with increased Nlrp3 inflammasome, Notch1, and pro-IL-1ß expression and activation. The decrease in pro-IL-1ß expression when Notch1 is inhibited supports that Notch1 has a positive role in promoting IL-1ß expression during the ‘first signal’ of Nlrp3 inflammasome activation. Data from these studies will result in a new understanding of potential mechanisms of microglial activation (neuroinflammation) in PD through gut derived microbial products resulting from increased intestinal permeability and could provide new intestinal-based targets for therapy and possibly prevention of PD.
EXOPHYTIC CONDYLOMA: AS BENIGN AS WE THINK?

Presenting Author: Sarah Jochum, MD
Authors: Sarah Jochum (RUMC), Wendy Tian (RUMC), Theodore Saclarides (RUMC), Joanne Favuzza (RUMC), Anuradha Bhama (RUMC), Jen Poirier (RUMC), Shriram Jakate (RUMC), Dana Hayden (RUMC)

Introduction: Some literature suggests exophytic anal condylomas are lower risk than flat anal lesions, though this relationship has never been formally studied. This assumption may lead us to observe or incompletely excise these lesions, which could leave dysplasia behind or undiagnosed.

Objective: This study evaluates lesion type (flat versus exophytic) and its association to dysplasia.

Methods: With IRB approval, we conducted a retrospective review of patients who underwent an operation for anal lesions. Two groups were defined based on lesion type. All analyses were conducted in R 3.3.2.

Results: 69 patients had a total of 423 lesions biopsied or excised. Mean age of the population was 48.2; 62.3% were male and 46.4% of patients were black, 37.7% were white and 14.5% were Hispanic. Risk factors most frequently reported included HIV positivity in 47.8% of patients and men who have sex with men (MSM) in 39.1%. 55.3% of lesions were exophytic and 41.6% were flat. Exophytic lesions were about 2.5 times more likely to have higher grades of dysplasia when compared to flat lesions (OR = 2.63, 95% CI: 1.09 - 6.32). Flat lesions were more likely to have no or low grade dysplasia when compared to exophytic lesions (p = 0.03). Lesion type was not associated with HPV-related changes, location, MSM, or HIV status. No significant relationship was found between grade of dysplasia and HIV status or MSM.

Conclusion/Significance: This study is the first to examine gross appearance of anal lesions and the association with severity of dysplasia. Surprisingly, exophytic lesions were more than twice as likely to have higher grade dysplasia. Risk factors such as HIV positivity and MSM were not associated with the type of lesion or the degree of dysplasia; thus, the only variable that predicted severity of dysplasia was gross appearance of the lesion. These findings suggest that we should no longer underestimate the risk of dysplasia in these exophytic condylomas and plan our treatment strategies accordingly.
GENOMIC METHYLATION AND EPIGENETIC MODULATOR MUTATIONS IN TUBULAR ADENOMAS

Presenting Author: Stephanie Sutherland, BS
Authors: Lela Buckingham (Rush University Medical Center)

Introduction: Colorectal cancer is the second most leading cause of cancer death in the United States. The need for laboratory-based assays to identify early events of genetic, epigenetic and post transcriptional events that yield neoplastic growths, aiding in the prevention of malignant lesions. Epigenetic factors, such as methylation of long interspersed nucleotide element-1 (LINE-1), is a biomarker for the assessment in the likelihood of intestinal polyps progressing to cancer. Hypomethylation is an early event of precancerous adenomas (high-risk polyp) but is lesser known for low-risk polyps.

Objective: Methylation assessment and targeted gene panel sequencing was performed to identify early-staged events that contribute to tumorigenesis. This study aimed to identify methylation differences based on risk. Hypomethylation and gene mutations were anticipated to be more prevalent in the HR and 2HR groups.

Methods: Samples were obtained from a primary colonoscopy and classified into risk-based groups depending on the outcome of a second surveillance colonoscopy. If zero new growths were identified during follow-up colonoscopy classification was 'low-risk' (LR) (n=35), however if new growths were identified classification was 'high-risk' (HR) (n=30). Half of the secondary lesions from the HR group (2HR) were obtained for paired-sample analysis (n=15). DNA was isolated from formalin-fixed paraffin embedded tissue. Samples were tested for Isocitrate dehydrogenase (IDH) mutation through pyrosequencing. LINE-1 methylation was assessed at three specific sites, and samples were bisulfite converted before pyrosequencing. Samples with adequate tissue were sequenced for 15 common colon gene mutations using Next Generation Sequencing (NGS).

Results: This study demonstrated the LR group was statistically hypomethylated compared to the HR group (p<0.001). LINE-1 (site 3) showed significantly lower methylation in the 2HR group compared to HR (p=0.022). Paired-sample analysis revealed a significant hypomethylation of the LINE-1 average between the HR to 2HR (p=0.045). NGS did not reveal significant gene mutation prevalence between the groups.

Conclusion/Significance: A relationship for risk and methylation was unable to be identified. However, the paired-samples results were consistent with previous observations of hypomethylation from normal tissue to malignant. Methylation assessment does not contribute towards predicting the likelihood of malignancy in low-risk polyps.
Abstract #: 122

Session Type: Poster
Category: Health Behavior

THE IMPACT OF BULLYING AND INCIVILITY ON NEW GRADUATE NURSES: HOW PRECEPTORS CAN BREAK THE CYCLE

Presenting Author: Vera Clinton, DNP, APN
Authors: Vera Clinton (RUMC)  Susan Corbridge (UIC)  Shirley Ambutas (RUMC)

Introduction: The American Nurses Association (2015a) Code of ethics for Nurses states all registered nurses and employees should strive to create a culture of respect free of incivility and bullying. Any nurse can be a victim of bullying however the new graduate nurse is at higher risk because of their lack of confidence (Stowkoski, 2010). Bullying not only affects the victim's emotional and physical well-being but is costly to employers due to high nurse turnover. Bullying and incivility are especially common toward new graduate nurses and cause stress, anxiety, depression, decreased job satisfaction, increased absenteeism, and can threaten patient safety.

Objective: The overall purpose of this quality improvement project was to increase nurse's knowledge of the impact of bullying and incivility on new graduate nurses and explore strategies to decrease or stop this behavior in the workplace.

Methods: Using strategies from a Civility Tool-kit, an hour-long educational program was implemented over the course of four weeks to preceptors and staff nurses on three acute care and one observation medicine units. A pre-and post-survey was given to the preceptors to assess their response to the intervention.

Results: Post intervention, preceptors were more comfortable discussing bullying and incivility with peers and leadership and they felt more prepared to intervene.

Conclusion/Significance: Preceptors should be given evidence-based strategies to decrease bullying and incivility in the workplace. Educating preceptors using the Civility Toolkit can increase their knowledge and awareness of bullying and incivility. This knowledge could empower preceptors to become champions for civility in the workplace.
THE EFFECTS OF DAILY STRESSORS IN INDIVIDUALS AT CLINICAL HIGH RISK FOR PSYCHOSIS

Presenting Author: Briana Galindo, BA
Authors: Briana. N. Galindo (RUMC); Kristen. M. Haut (RUMC); Sarah Pridgen (RUMC); Abhishek Saxena(RUMC); Austin Lee (RUMC); Christine. I. Hooker(RUMC)

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 (CHR).

Methods: 51 CHR individuals were identified using the Structured Interview of Psychosis-Risk Syndromes (SIPS). Participants then completed a daily diary where they reported emotional states, stressful events or interpersonal conflicts and how stressful each event was for them. Correlation analysis was used to assess the relationship between stressful events and symptom ratings. There was a significant association between stressful events per-day and total symptom rating (r = .45, p < .001). A two-sample t-test was conducted to compare the average daily mood with and without stressful events. There was not a significant difference in daily average mood when experiencing stress (M= 2.60, SD= 0.61) and not experiencing stress (M= 2.60, SD= 0.56); t(64)= 0.69, p= 0.49.

Results: These results suggest that CHR individuals experiencing more symptomatology also report more stressful events. However, it doesn't seem to affect their mood when they experience a stressful event.

Conclusion/Significance: These findings suggest the need for better understanding of the relationship between stressful events and CHR individuals.
Abstract #: 124

Session Type: Poster
Category: Health Behavior

CHANGES IN EMOTION PROCESSING NETWORK FOLLOWING SOCIAL COGNITIVE TRAINING IN INDIVIDUALS WITH SCHIZOPHRENIA

Presenting Author: Kristen Haut, PhD
Authors: Kristen Haut (Rush), Briana Galindo (Rush), Austin Lee (Rush), Sarah Pridgen (Rush), Savannah Lokey (UIC), Mor Nahum (Hebrew University of Jerusalem), Christine Hooker (Rush)

Introduction: Deficits in social cognition are prominent features of schizophrenia that play a large role in functional impairments and disability and are associated with altered activity in functional networks that support abilities such as emotion recognition. Targeted cognitive training has been proposed as a potential intervention to address cognitive and behavioral deficits and has been shown to improve cognitive functioning in individuals with schizophrenia.

Objective: This study tests whether targeted cognitive training designed to specifically focused on social cognition would alter the activation in functional networks engaged in facial emotion processing, especially those involving the amygdala and superior temporal sulcus.

Methods: 36 individuals with schizophrenia or schizoaffective disorder were included in the study. Subjects underwent a clinical evaluation and a functional MRI session prior to and subsequent to completing 40 hours (over ~8 weeks) of either targeted social cognitive training using SocialVille (brainhq.com) or a computer game control condition. Resting state fMRI was acquired as well as fMRI during performance of an emotion recognition task and changes in emotion processing network activation was evaluated. Changes in emotional face processing network were evaluated using seed-based connectivity analyses and psychophysiological interaction.

Results: Training was associated with altered activity within the emotion processing network, including the amygdala and superior temporal sulcus. In addition, altered connectivity including increased connectivity between the amygdala and regions including the medial prefrontal cortex was found using psychophysiological interaction analyses.

Conclusion/Significance: These results suggest that targeted social cognitive training may be effective in altering functional network connectivity in networks associated with psychosis and may be a useful tool for intervention in individuals with psychotic disorders.
INVESTIGATING SOCIAL SERVICES AVAILABLE FOR LGBTQ YOUTH EXPERIENCING HOMELESSNESS IN CHICAGO

Presenting Author: Julie Kurek, Medical Student
Authors: Julie Kurek (Rush Medical College)

Introduction: About 40% of the youth experiencing homelessness in Chicago identify as LGBTQ and most are without a home due to lack of acceptance for how they identify. LGBTQ youth experiencing homelessness have a variety of needs besides finding shelter such as finding medical care, legal services, and GED programs.

Objective: The objective of this research project was to identify the variety of social services available for the LGBTQ youth experiencing homelessness on the West Side of Chicago. The social services found were organized into an excel spread sheet and also made into flyers so that this information could be distributed at a future West Side transitional housing program called Project Fierce. Project Fierce will be a transitional housing program for LGBTQ youth experiencing homelessness in the Lawndale neighborhood. This summer project is connected to a larger Rush Medical Student capstone project that will take place over the next four years. A group of medical students (Eddie Dovigi, Kelli Hatter, Julie Kurek, and Briyana Domjahn) are working on a capstone project with an overall goal of creating a health clinic at Project Fierce that provides welcoming, nonjudgmental, and competent healthcare for the LGBTQ clients.

Methods: The methods used to find the social services in Chicago was research on online resources, such as Purple Binder, NowPow, Queery, and Lurie Children’s Hospital’s List. The specific kinds of social services researched were shelters, food, mental health services, legal services, education, job training, transportation, clothing, sexual assault resources, exercise resources, sexual health resources, and faith-based/ LGBTQ friendly services.

Results: Approximately over 800 social services for LGBTQ youth in Chicago were found and organized into an excel document. For each category, the top ten resources closest in distance to Project Fierce were listed on individual flyers.

Conclusion/Significance: NowPow (an online website embedded into EMRs that connects patients to social services) has been given the excel document with the over 800 resources. They are currently working on a way to incorporate it into their online website so that it will be available to all patients and providers at Rush.
Abstract #: 126

Session Type: Poster
Category: Health Behavior

IMPACT OF LOW TECHNOLOGY AUGMENTATIVE AND ALTERNATIVE COMMUNICATION IN CONJUNCTION WITH ENHANCED MILIEU TEACHING ON SOCIAL COMMUNICATION IN YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDER

Presenting Author: Jenna Lesser, BS
Authors: Jenna Lesser

Introduction: Many children with autism spectrum disorder (ASD) develop minimal spoken language. Augmentative and alternative communication (AAC) systems are often a means of functional communication for this population. Past research has demonstrated that AAC systems can increase requesting and protesting among minimally verbal children with ASD. However, well-rounded communication goes beyond requesting and protesting to include social communication. There is a lack of research addressing use of AAC with children with ASD to address social communication deficits or communicative purposes beyond requesting and protesting. Additionally, most previous research on AAC involves expensive, difficult to access technology. Enhanced milieu teaching (EMT) is an evidence-based intervention targeting overall communication frequency and social communication specifically. Preliminary evidence indicates that EMT can be combined with AAC to target these outcomes in minimally verbal children with ASD. However, the only existing evidence involves high-technology AAC systems.

Objective: This study examines the impact of low-technology picture-based AAC on minimally verbal children with ASD when introduced via EMT.

Methods: Study approved by Rush IRB. An ABAB single-subject design assessed the impact of introducing a low-technology, picture-based communication board using EMT on social communication. Between phase differences were analyzed using visual analysis and Tau-U probability. The subject was a minimally verbal 3;4 boy with ASD.

Results: Visual analyses indicate the intervention was effective for increasing communication. Baseline and withdrawal ('A') phases showed 5-14 communicative acts per session (mean=8). Treatment ('B') phases showed clear increases of communication with 13-35 acts per session (mean=23.25). Percent of acts using AAC was on average 7% during 'A' phases and 57.4% during 'B' phases. The intervention didn't clearly impact social communication.

Conclusion/Significance: Low-technology picture-based communication boards implemented using EMT helped increase frequency of communication in one young, minimally verbal child with ASD. Early social communication skills were not clearly impacted by the intervention. Ability to see change in this area may have been limited by the short duration of intervention. This study extends previous research indicating that AAC can increase frequency of communication to low-technology, accessible devices. Further research with longer intervention time or more participants may provide a better opportunity to see effects on social communication.
Differences in Care Seeking Amongst Individuals with Childhood Trauma

Presenting Author: Linzy Pinkerton, BS
Authors: Linzy Pinkerton B.S. (Rush University Medical Center), Mark H. Pollack, M.D. (Rush University Medical Center), and Alyson K. Zalta, Ph.D. (University of California Irvine and Rush University Medical Center)

Introduction: Approximately 1 in 5 adults in the U.S. have a mental illness in a given year. However, utilization of services remains low with 41% of those with a mental health condition actually seeking care. Survivors of childhood trauma are at increased risk of suffering from subsequent mental health conditions.

Objective: While previous research has looked at care seeking behavior among all types of trauma survivors, the current study focuses on care seeking behavior among childhood trauma survivors.

Methods: Self-report data was collected from survivors of childhood interpersonal trauma (N=94) who attended an eligibility session for a research study evaluating a resiliency intervention. Participants completed self-report measures assessing demographic variables, trauma history, and history of care seeking. A trained diagnostic interviewer assessed lifetime psychiatric disorders using the Structured Clinical Interview for DSM-IV (SCID-5).

Results: A series of t-tests were run to compare participants who reported utilizing mental health services in the past (N=67) with those who had never sought care (N=27). Participants who were Caucasian (v. all other races; t(92)=4.03,p<.001) or who met criteria for a lifetime diagnosis of depression (t(69)=2.23,p=.033), obsessive-compulsive disorder (t(67)=2.34,p=.0324), or anxiety disorder (t(67)=3.08,p=.004) were more likely to seek care over their lifetime. A logistic regression examining these variables as simultaneous predictors showed that Caucasian participants were 21.88 times more likely to seek care than participants of other races. Severity of childhood trauma and lifetime trauma load were not associated with care seeking.

Conclusion/Significance: Our findings suggest that among individuals with childhood interpersonal trauma, racial and ethnic minorities are less likely to seek mental healthcare. This likely contributes to mental health disparities among minority groups. It is notable that a number of individuals in our study had never sought mental healthcare in their lifetime, but were interested in participating in a research trial delivering a resiliency intervention. Although it is possible that these individuals were motivated by extrinsic factors (e.g., study payment), anecdotal evidence suggests that a 'resiliency' intervention was less stigmatizing and more appealing to some participants. Thus, future research may explore how resiliency interventions may help to overcome barriers to traditional care approaches.
Abstract #: 128

Session Type: Poster
Category: Health Behavior

DISORGANIZATION SYMPTOMS AS A PREDICTOR OF SOCIAL FUNCTIONING AND FUNCTIONAL CAPACITY

Presenting Author: Sarah Pridgen, MA
Authors: Sarah A. Pridgen (RUMC); Ojus Khanolkar (UIC); Briana Galindo (RUMC); Parnika Telagi (UIC); Kristen M. Haut (RUMC); Christine I. Hooker (RUMC)

Introduction: Individuals with schizophrenia show impairments on a wide variety of social cognition and functional capacity measures; however, there is little research on the relationship between specific symptoms and poor task performance.

Objective: The objective of this study is to evaluate if disorganization symptoms commonly seen with schizophrenia affect performance on functional capacity and social cognition measures.

Methods: 58 individuals with schizophrenia completed social cognitive and functional capacity measures including the empathic accuracy task, a measure of how well individuals can infer the emotions of others, and the Virtual Reality Functional Capacity Assessment Tool (VRFCAT) which simulates activities of daily living. Subjects also were rated on the Positive and Negative Symptom Scale (PANSS), which assesses the severity of a number of symptoms of schizophrenia. Regression analyses were used to examine if psychotic symptoms or disorganization symptoms were a better predictor of outcome on social cognitive and functional capacity measures.

Results: Disorganization symptoms were found to be significantly associated with performance on the empathic accuracy task (F= 6.10, p=.017) and total time required to complete the VRFCAT (F= 5.41, p=.024). Symptoms of disorganization predict performance on these measures over and above demographic characteristics (age and IQ) and positive symptoms associated with schizophrenia. Positive symptoms showed no correlation with performance.

Conclusion/Significance: These results suggest disorganization symptoms are more strongly related to poor social functioning and impaired functional capacity than psychotic symptoms.
EFFICACY ANALYSIS OF STUDENT-MANAGED CBT FOR SMOKING CESSATION WITH INPATIENTS

Presenting Author: Gabriella Rustia, BA
Authors: Gabriella Rustia, BA (Rush University); Arthur Hoffman, MD (Rush University Medical Center); Zoe L Gordon, MD (Greater Lawrence Family Health Center)

Introduction: This study reports on the impact of a medical student-managed smoking cessation program for hospitalized patients. The intervention consists of a 30-minute cognitive-behavioral counseling session offered to patients by trained medical students. Patients were followed after discharge with up to 4 phone calls.

Objective: This intervention has previously been shown to be effective when provided by full-time nursing staff. Our hypothesis was that trained medical students would be at least as successful in (a) risk reduction, as measured by total number of cigarettes smoked, and (b) total cessation rate.

Methods: A single group study retrospectively analyzed the effectiveness of this evidence-based tobacco cessation intervention when delivered by medical students. All enrolled patients between June 2015 and December 2017 were included. The primary outcome was smoking cessation rates at follow-up intervals up to 90-days post-discharge. Secondary outcome was program retention through outpatient follow-up and total cigarettes smoked at follow-up. IRB approval was received for this chart review.

Results: Fifteen volunteer medical students enrolled 119 inpatients at a university hospital who were smoking prior to hospitalization and endorsed willingness to stay off cigarettes. Self-reported cessation rates of available patients at follow-up were 48% (n=23) up to 7-days and 38% (n=5) at 90-days post-discharge. Intention-to-treat cessation rate was 26% at 2-days and 4% at 90-days. Daily amount smoked decreased for all patients with follow-up information. Low confidence to avoid smoking when bored or depressed was negatively associated with cessation. Fifty-four percent of patients received some phone follow-up, but only 5% received all scheduled calls. Lower overall confidence, smoking more per day, and hospitalization for non-cardiovascular or non-pulmonary reasons were associated with being lost to follow-up.

Conclusion/Significance: This inexpensive student-run intervention was effective at helping patients sustain cessation for at least three weeks after discharge. Further studies are required to determine long term efficacy and proactively address the low follow-up rates.
COMBATING ADVERSE CHILDHOOD EXPERIENCES: THE PROCESS OF BECOMING A TRAUMA-INFORMED INSTITUTION

Presenting Author: Courtney Severin, BS, MS
Authors: Courtney Severin (Rush University Medical College)

Introduction: In the late 1990’s, a monumental study was published that was able to demonstrate a correlation between trauma in one's childhood and adverse health outcomes in adulthood. These traumatic events are known as Adverse Childhood Experiences (ACEs). There are several policy recommendations to mitigate the impact of ACEs on our communities. This includes creating health care systems that are trauma-informed so they may be able to prevent, recognize, and properly care for patients and staff that are dealing with the after-effects of trauma or ACEs. In 2017, a working group of Chicago hospitals (the Hospital Collaborative) was formed to take on the process to become trauma-informed institutions. This is a relatively new process with little information known on how to implement this change across a healthcare system.

Objective: The underlying goal for this project was to take an in-depth look at the process Chicago hospitals are taking to become trauma-informed. Summarizing their work thus far can help improve the efficiency and effectiveness of the process as well as encourage more hospitals to become trauma-informed.

Methods: Six institutions of the Hospital Collaborative were interviewed on their process, thus far, to become trauma-informed. Approximately 32 interview questions were created in accordance with the 10 implementation domains of the Substance Abuse and Mental Health Services Administration (SAMHSA) model. The findings were summarized to highlight the unique experiences, processes, and perspectives as well as common motifs across the institutions.

Results: While many of the experiences were unique to an organization, commonalities were seen in progress, training implementation, and challenge of obtaining commitment from leadership. Positivity and energy for this work was present at all institutions. While each hospital was new to officially take on this change, each found that there already existed trauma-informed practices throughout their institution.

Conclusion/Significance: Implementing an institution wide change is a difficult feat and varies substantially across institutions. Through collaboration, these hospitals decide together on next steps but then alter the task to fit within the unique structure of their institution. By utilizing what has been shared and promoting the work of trauma-informed care, we are moving Chicago closer to becoming a trauma-informed city.
Abstract #: 131

Session Type: Poster
Category: Health Behavior

GRADUALLY SHIFTING SLEEP AND CIRCADIAN RHYTHMS OF TEENS WITH WEEKEND MORNING BRIGHT LIGHT AND EARLY SCHOOL-NIGHT BEDTIMES

Presenting Author: Amelia Smith, BS
Authors: Amelia E. Smith (RUMC); Sabrina L. Velez (RUMC); Charmaine I. Eastman (RUMC); and Stephanie J. Crowley (RUMC)

Introduction: A large majority of adolescents go to bed too late to get sufficient (>8h) school-night sleep; this is partly driven by delayed (late) circadian clocks.

Objective: In this ongoing study, we are testing whether one weekend of morning bright light and a gradual advance of school-night bedtimes can advance the circadian system and increase sleep duration in high school students.

Methods: So far, 32 adolescents (14.6-17.9 years; 16 females) with self-reported short school-night sleep (≤ 7h) and late bedtimes (school-night average ≥ 23:00; non-school average ≥ midnight) completed a 31-day IRB approved (ORA# 16092605) protocol during the school year. After a 2-week baseline of usual sleep at home, participants live in the laboratory for a weekend, during which the dim light melatonin onset (DLMO), a measure of circadian phase is measured. For the next two weeks, the intervention group (n=15) is instructed to advance school-night bedtime from their own baseline: 1h earlier during the first week and 2h earlier in the second week. Wake times remain unchanged. During the intervening weekend, intervention participants receive bright light in the lab on both weekend mornings (~6000 lux; 2.5 h intermittent light) and 8.5-h sleep opportunities each night. A control group (n=17) is given no instruction about bedtimes and does not attend the bright light weekend. DLMO is measured during the final (third) weekend in all participants. Actigraphic sleep is collected throughout.

Results: Intervention DLMOs are advancing more than controls (50.4±49.8 mins vs. -7.2±49.2 mins; t(30)=3.3, p=.003). By the final weekend, about half (n=8) of the intervention group have DLMOs > 9.5h before their school-day wake time (early enough to facilitate sufficient sleep). The intervention group is increasing total sleep time by 68 mins by falling asleep 89 mins earlier than baseline. The control group shows no changes in sleep duration nor fall asleep time.

Conclusion/Significance: These data suggest that one weekend of morning bright light plus earlier school-night bedtimes can advance circadian phase and increase sleep time. Variability in responses, however, suggests that some adolescents need to phase advance more to be aligned with early school start times.
SELF PERCEPTION OF EMPATHY AND EMPATHIC ACCURACY EXAMINATION ACROSS PHASES OF PSYCHOSIS

Presenting Author: Parnika Telagi, Undergraduate Student
Authors: Parnika Telagi(1,2), Kristen M. Haut(2), Erin Guty(3), David Dodell-Feder(4), Abhishek Saxena(4), Sarah Pridgen(2), Briana Galindo(2), Christine I. Hooker(2). (1)University of Illinois at Chicago; (2)Department of Psychiatry, Rush University Medical Center; (3)Department of Psychology, Pennsylvania State University; (4)Department of Psychology, University of Rochester.

Introduction: Empathy, the ability to understand and share the subjective emotional states of others, is crucial for social functioning and relationships between individuals. Current research suggests that empathy is impaired in individuals with schizophrenia. This study aims to compare the empathic accuracy of individuals at clinical high risk for psychosis and individuals with schizophrenia to controls, in addition to analyzing the relationship between one's self perception of empathy and their empathic accuracy.

Objective: The objective of this study is to understand empathic ability of individuals across phases of psychosis. In addition, this study aims to understand the relationships between empathic accuracy and social functioning as well as empathic accuracy and other self-reported measures. Finally, this study will assess the relationship between audio tone recognition and facial emotion recognition to one's empathic accuracy.

Methods: This study included 45 healthy individuals, 53 individuals determined to be at a clinical high-risk for psychosis (CHR), and 72 individuals with a diagnosis of a schizophrenia-spectrum disorder. Subjects completed an empathic accuracy task where they were asked to make inferences about the naturally occurring emotions of individuals as they recalled autobiographical events. Subjects continuously rated what they thought the emotions of the individuals recalling the events were and were then scored for accuracy using the target's self-reported feelings.

Results: ANOVA showed significant group difference (F=21.56, p<.001) in overall empathic accuracy performance between the three groups. The average correlation for the schizophrenia group was 0.61 whereas the CHR and control groups both showed a correlation of 0.85 and 0.87 respectively. In addition, each participant was given a Social Functioning Score from a clinician based on a series of related questions. The relationship between the Social Functioning Score and the empathic accuracy indicated that there is a trend to significance for the CHR group, but no significant correlation for the SCZ group.

Conclusion/Significance: Individuals with schizophrenia have significant impairment on empathic accuracy. CHR individuals did not show any impairment compared to the healthy control sample, which suggests that impairments on empathic accuracy may become apparent after the onset of the disorder.
CHILD ABUSE VICTIMIZATION AMONG TRANSGENDER AND GENDER NON-CONFORMING PEOPLE: A SYSTEMATIC REVIEW

Presenting Author: Valerie Tobin, MS, APN, PMHCNS-BC
Authors: Valerie Tobin (Rush) Kathleen Delaney (Rush)

Introduction: Child abuse is associated with poor long-term health outcomes. Transgender and gender non-conforming (TGNC) people are at higher risk for child abuse and higher levels of suicidal ideation, suicide attempts, depression, and poor physical health than cisgender people (those whose gender identity and sex assigned at birth match). Nurses need to understand risk factors and their outcomes to care for this growing population.

Objective: The purpose of this review is to organize and describe the available data on the risks of exposure and effects of childhood abuse on TGNC people. No review of this subject has been identified in the literature. The findings have implications for research, prevention and treatment activities for TGNC people and their families.

Methods: A systematic review was undertaken of quantitative studies, from 1989 - 2018, published on the topic of child abuse in transgender and gender non-conforming people. The following databases were searched: Scopus, PubMed, and PsychInfo. Articles were text mined to identify sources that did not appear in the searches. Inclusion criteria were 1) participants included either transgender adults or those with gender non-conforming behaviors in childhood and 2) who reported experiencing child abuse.

Results: All studies were cross sectional, exploratory/descriptive. Of the original 186 articles identified, 14 were included in the final review. Articles varied in populations and methodology. Research on transgender adults assumed childhood gender non-conformity. Those who are transgender and those who displayed gender non-conforming traits in childhood were at risk for child abuse and sequelae. Those who were abused in childhood were at higher risk for negative health outcomes.

Conclusion/Significance: The methods in these studies varied widely. The differed in how they identified their populations and measures of abuse. Some of the differences in approach impact the conclusions one can draw from the literature. Nurses should be vigilant to the possibility of childhood abuse in these populations and offer affirming prevention, screening, and interventions. Investigations are needed into prevention of child abuse based on gender identity and gender expression and to treatment of negative outcomes of child abuse among TGNC.
Abstract #: 134

Session Type: Poster
Category: Health Behavior

EARLIER AND LONGER SLEEP IMPROVES EXECUTIVE FUNCTIONS IN ADOLESCENTS

Presenting Author: Sabrina Velez, BA
Authors: Sabrina Velez (RUMC); Duke Han (USC/RUMC); Charmane Eastman (RUMC); and Stephanie Crowley (RUMC)

Introduction: Many adolescents fall asleep too late to obtain sufficient sleep on school nights. Bright morning light can shift circadian rhythms earlier, facilitating earlier sleep onset and longer sleep.

Objective: We are testing whether shifting circadian rhythms and bedtimes earlier, thereby extending sleep, improves executive functions in late and short-sleeping adolescents attending high school.

Methods: So far, 32 healthy adolescents (14.6-17.9 years; 16 female) completed an IRB-approved (ORA#16092605) four-week study, in which they were randomly assigned to a control (n=17) or intervention (n=15) group. Following two weeks of usual home sleep, participants lived in the Biological Rhythms Research Laboratory for a weekend. On Friday night, a 9-h sleep opportunity ended at average school-day wake. On Saturday (at 09:00, 10:00, or 12:30) participants completed five measures from the Delis-Kaplan Executive Function System (D-KEFS), a paper-and-pencil neuropsychological battery that assesses components of executive function. During the subsequent two weeks, intervention participants were assigned earlier school-night bedtimes; 1-h and 2-h advance during weeks three and four, respectively. During the intervening weekend, intervention participants received 2.5h intermittent bright light from light boxes (~6000 lux) on both mornings in the laboratory to advance circadian rhythms. The control group was not given instruction about bedtimes and did not receive morning bright light. The D-KEFS was repeated during the Saturday of a final lab weekend at the same time as before. Time-by-group interactions from repeated measures ANOVAs are reported.

Results: Color Word inhibition performance improved in the intervention group, but not in the control group, F(1, 30)=5.05, p=.03. Design Fluency scores increased in both groups, but more in the intervention group, F(1, 31)=4.68, p=.04. Circadian phase advanced 50 mins, sleep onset advanced 89 mins, and total sleep time increased 68 mins in the intervention group, but remained unchanged in the control group (see companion abstract by Crowley et al.).

Conclusion/Significance: Two weeks of advancing circadian rhythms and bedtimes (making them earlier) and increasing sleep duration in adolescents produced better executive functioning performance in the domains of inhibition and visual creativity. These data have implications for academic performance and healthy decision making in adolescents. Support: R01HL105395 (S.J.C.)
EVALUATING AND UNDERSTANDING RUSH MEDICAL STUDENTS' COMPARATIVE BURNOUT RATES

Presenting Author: John Walton, BS, MSL
Authors: Dr. Daniel P Dunham (Rush), Dr. James Wyatt (Rush), Tyson Pankey (Rush)

Introduction: Burnout is characterized by emotional exhaustion, depersonalization, and deficits in feelings of personal accomplishment. Medical school is known to be extremely demanding and studies show that between 45-71% of medical students in the US exhibit at least one sign of burnout. This study explores burnout among students at Rush Medical College.

Objective: Quantify the amount of students experiencing burnout symptoms at Rush Medical College and explore possible variables that may contribute to the burnout.

Methods: Burnout was measured using a modified Healthcare worker Maslach Burnout Inventory (MBI) 22-item questionnaire. The questionnaire measures three burnout characteristics; emotional exhaustion, depersonalization, and personal accomplishment. These questions use a Likert scale to assess characteristics. Scores are then tallied and a numeric value is determine for the three characteristics. Demographic information like sex, race, year in school, commute time, and years from the end of college to medical school were recorded. There is also an analysis of contributing factors including hobbies, research, curriculum, rotations, volunteering, and commute time.

Results: The questionnaire was distributed to 543 students and completed by 240. Among students who completed the survey, 33% had signs of Emotional Exhaustion, 21% had signs of Depersonalization, and 52% had signs of Personal accomplishment. Overall approximately 40% of students experienced at least one burnout symptom and 14% experienced multiple symptoms of burnout.

Conclusion/Significance: In the study, many Rush medical students indicated signs of burnout. The rates of burnout are consistent with the findings of other studies. The burnout rates among Rush medical students are comparable to other medical students. Further burnout assessments in this longitudinal study, will help illuminate other contributors to student burnout and hopefully reveal methodologies to reduce burnout.
INDIVIDUAL DIFFERENCES IN FACIAL EMOTION RECOGNITION IN PSYCHOSIS RISK

Presenting Author: Leslie Zuniga, BA
Authors: Leslie Zuniga (UIC); Kristen Haut (Rush); Briana Galindo (Rush); Parnika Telagi (UIC); Christine Hooker (Rush)

Introduction: Individuals with schizophrenia demonstrate impaired emotion recognition that is associated with poorer social functioning. However, the relationship of emotion recognition to functioning in individuals prior to the onset of a psychotic illness is unclear. Currently, there is limited research focusing on emotion recognition in individuals who are at high clinical risk for psychosis (CHR). It is unclear if performance differs based on the type of emotion presented and the impact of clinical and demographic factors is unknown.

Objective: This study examines the effect of individual differences on the performance of a facial-emotion processing task in CHR individuals. We hypothesize that CHR subjects will demonstrate reduced accuracy recognizing negative facial emotions compared to positive. In addition, we hypothesize that individual differences on gender, age, IQ and symptoms may be related to differential performance on the task.

Methods: 59 individuals (33 males, 26 females) who meet CHR criteria performed a facial emotion recognition task using morphed faces that combine an emotional expression with a neutral face to varying degrees. T-tests, correlation and regression analyses were used to assess the effects of individual differences on task performance. Subjects were also rated on a number of CHR symptoms following a clinical interview.

Results: Repeated measures ANOVA shows significant differences in accuracy depending on the emotion expressed ($F=29.48$, $p<.001$) and CHR individuals are significantly more accurate on positive emotions compared to negative emotions ($t=-9.91$, $p<.001$). While there were no overall effects of gender, age, education, or IQ, females with higher IQ tend to show greater total accuracy ($r=.38$, $p=.06$) whereas males did not ($r=.11$, ns). There were no significant correlations between symptoms and task performance.

Conclusion/Significance: These results suggest that while CHR individuals show differing performance based on the type of emotion, performance differences cannot be attributed to basic demographic differences or symptom levels. These findings suggest that research on emotion processing CHR individuals may need to account for differential effects of emotion type as well as of IQ by gender. Further research is necessary to better understand the individual differences that impact emotion recognition performance in individuals at risk for psychosis.
Abstract #: 137

Session Type: Poster
Category: Health Science

INSERTIONS AND DELETIONS (INDELS) IN THE NON-TRANSLATED HUMAN GENOME UPSTREAM OF ZHX2 ALTER ZHX2 MRNA EXPRESSION IN MCD AND FSGS

Presenting Author: RANJAN DAS, PhD
Authors: Ranjan Das PhD¹, Maria Del Nogal-Avila PhD¹, Joubert B. Kharlyngdoh PhD¹, Hector Donoro-Blazquez BE¹, Zoe Post MD¹, Eduardo Molina-Jijon PhD¹, Lionel C. Clement PhD¹, Camille E. Mace PhD¹, Carmen Avila-Casado MD, PhD², Sumant S. Chugh MD¹ ¹Department of Internal Medicine, Rush University Medical Center, Chicago, IL, USA. ²University Health Network, University of Toronto, Toronto, ON, Canada.

Introduction: ZHX proteins, especially ZHX2, play a critical role as transcriptional regulators of human and experimental podocyte disease. Multiple groups conducting whole exome sequencing were unable to find significant mutations in these genes in human glomerular disease. We sequenced the genome upstream of ZHX2 and the intronic sequence looking for insertions and deletions that may induce DNA conformational changes, resulting in altered ZHX2 expression.

Objective: To identify chromosomal changes upstream of ZHX2 gene in patients with glomerular diseases and the significance of these genomic insertions and deletions on transcriptional regulation of ZHX2.

Methods: The 1.3 million bp region between the beginning of the immediate upstream gene HAS2 and the end of ZHX2 was sequenced in 28 patients with nephrotic syndrome (8 MCD, 2 FSGS tip lesion, 8 FSGS with mutations in slit diaphragm genes, 4 recurrent FSGS, 2 recurrent non-HIV collapsing glomerulopathy, and 4 Hodgkin disease with nephrotic syndrome) and 27 healthy controls using Agilent Custom capture and high throughput Illumina sequencing to obtain about 8 million sequences per sample. The Qiagen Biomedical Genomics Workbench software was used to identify InDels > 3 bp and > 20 sequences present exclusively in the patient population. One of the InDels identified was replicated in cultured podocytes using CRISPR Cas9 technology to study changes in ZHX2 expression.

Results: We identified 5 InDels (size range 6 to 67) shared by than one patient and 40 others (size range 4 to 133) present in a single patient. These InDels were absent in controls and the 1000 genomes project. Patients with MCD and FSGS tip lesion had a high percentage of deletions (approximately 80%), whereas those with other forms of FSGS had mostly insertions (approximately 66%). Significance of these indels was verified by inserting one of these indels upstream of ZHX2 in single cell derived immortalized human podocytes by CRISPR-Cas9 approach. Podocytes carrying this InDel developed reduced ZHX2 expression.

Conclusion/Significance: Insertions and deletions upstream of the ZHX2 gene are commonly present in patients with MCD and FSGS and alter ZHX2 mRNA expression.
THE IMPACT OF RACE AND INSURANCE STATUS ON BASELINE HISTOPATHOLOGY PROFILE IN PATIENTS WITH CHRONIC RHINOSINUSITIS

Abstract 

Session Type: Poster
Category: Health Science

THE IMPACT OF RACE AND INSURANCE STATUS ON BASELINE HISTOPATHOLOGY PROFILE IN PATIENTS WITH CHRONIC RHINOSINUSITIS

Presenting Author: Hannah Kuhar, BA
Authors: Hannah N. Kuhar (RMC), Ashwin Ganti, BA (RMC), Michael Eggerstedt, MD (RUMC), Mahboobeh Mahdavinia, MD, PhD (RUMC), Paolo Gattuso, MD (RUMC), Ritu Ghai, MD (RUMC), Pete S. Batra, MD, FACS (RUMC), Bobby A. Tajudeen, MD (RUMC)

Introduction: Chronic rhinosinusitis (CRS) is an inflammatory disease process characterized by different phenotypes and histopathology profiles. Race and access to care have been implicated in CRS disease severity. Structural histopathology reporting may aid in delineating the inflammatory burden responsible for this effect.

Objective: The current study represents the first use of a structured histopathology report in order to better examine the association of histopathological findings with clinical features of CRS by race and insurance status. Through this work, we seek to add to the growing body of literature on the distinct pathologic mechanisms of CRS as it pertains to different patient groups and possible options for management. We hypothesize that race and insurance status may influence CRS disease, possibly manifesting in unique histopathological findings among patients with CRS.

Methods: A structured histopathology report of 14 variables was utilized to assess sinus tissue removed during functional endoscopic sinus surgery (FESS). Histopathology variables and SNOT-22 scores were compared by race (Black, White, Latino and Asian) and insurance status (Medicare, Medicaid, and private insurance).

Results: 201 CRS patients (124 White, 38 Black, 28 Latino, and 9 Asian) undergoing FESS were included. Black patients demonstrated increased SNOT-22 (50.74 ± 20.32 vs. 41.47 ± 22.75, p<0.022) and eosinophils per high-power field (>5/HPF) (60.5% vs. 44.8%, p<0.05). White patients demonstrated decreased eosinophil aggregates (22.6% vs. 35.1%, p<0.039) and eosinophils/HPF (<5/HPF) (42.7% vs. 55.8%, p<0.048). Medicaid patients had increased SNOT-22 (55.50 ± 24.46 vs. 41.39 ± 21.74, p<0.003), polypoid disease (61.5% vs. 42.3%, p<0.05), sub-epithelial edema (80.8% vs. 53.1%, p<0.006), hyperplastic/papillary changes (23.1% vs. 8.0%, p<0.028), fibrosis (61.5% vs. 38.5%, p<0.036), eosinophil aggregates (46.2% vs. 24.6%, p<0.022), and eosinophils/HPF (>5/HPF) (65.4% vs. 45.1%, p<0.043). When controlling for insurance status, Black race was no longer associated with increased SNOT-22 (p<0.104) or eosinophils/HPF (>5/HPF) (p<0.183).

Conclusion/Significance: Black and Medicaid patients demonstrated more severe disease by histopathology and SNOT-22. These findings were no longer significant among Black patients after adjusting for insurance status, suggesting that the prevailing factor influencing worse disease may be access to care.
Abstract #: 139

Session Type: Poster
Category: Health Science

RUSH UNIVERSITY MEDICAL CENTER BLOOD BANK RELOCATION AFFECTING TRANSIT TIMES FOR BLOOD UNITS: A TIME COURSE STUDY

Presenting Author: Angelica Nolan, BS
Authors: Angelica Nolan (RU) and Miriam Miller (RUMC)

Introduction: During the spring of 2018, the Rush blood bank moved from the Jelke building to the fifth floor of the tower to be closer to the operating rooms. Transit times averaged 5 minutes from Jelke, which contributed to significant blood wastage. To confirm the move from Jelke to the tower, we sought out to investigate the new transit time after the blood bank moved to the tower, as well as how long the blood products waited in the pneumatic tube stations.

Objective: We hypothesized that relocating to the tower would decrease transit times for the blood products, thus reducing blood wastage. Additionally, we hypothesized that blood products would spend minimal time in the pneumatic tube system.

Methods: The scope of this study was limited to red blood cells. The time course study was done using the Swisslog pneumatic tube station. The timing began the moment the blood unit left the blood bank. After arrival, the timing ended, and an elapsed time was calculated. Another time was noted while observing the floors. Engineering logs were also obtained to support our findings. Blood waste data was retrieved from the quality assurance database. Descriptive statistics were done using SPSS to show the new mean transit times.

Results: Mean transit times reduced from 5 minutes to 2 minutes, (S.D. 1.5 minutes) and a sample size of 239. The mean transit time to the cancer center was 4.2 minutes (S.D. 1.5 minutes) and a sample size of 57. The number of wasted units from the operating room (OR) over the course of three quarters were 72, 30, and 65 respectively. Non-OR floor waste results were 35, 58, and 42 respectively. Cancer center results were 0, 2, and 2 respectively.

Conclusion/Significance: We hypothesized correctly that transit times would decrease after the move; however, blood waste fluctuated. After relocating to the tower, there was a 40% decrease in transit times. Blood units were retrieved immediately; however, the operating rooms demonstrated the most variability. Wasted units varied among all floors, while the cancer center contributed minimal blood wastage.
Abstract #: 140

Session Type: Poster
Category: Health Science

CBC UTILIZATION IN THE CARDIAC INTENSIVE CARE UNIT (CICU)

Presenting Author: Laura Ramirez, BS in Kinesiology
Authors: Laura Ramirez (Rush University), Dr. Maribeth Flaws (Rush University), Dr. Nadine Lerret (Rush University), Yolanda Garcia (Rush University)

Introduction: It is reported that medical laboratory testing contributes to about 60-70% of medical decisions. Appropriate utilization of laboratory testing is important for patient safety, diagnosis, and resulting costs. At Rush University Medical Center (RUMC) there are no guidelines implemented to monitor laboratory utilization. Given that the complete blood count (CBC) is a frequently ordered laboratory test at RUMC, it is important to determine if this test is being properly ordered.

Objective: The first objective is to determine inappropriate utilization and a cost spending analysis of CBC orders in the CICU from April to June 2018. The second objective is to determine how CBC ordering practices in the CICU from April to June 2018 differ from those in the general medicine unit (GMU) from April to June 2017.

Methods: Data was collected retrospectively via EPIC based on specific inclusion criteria for our patient population and statistical analysis was employed using SPSS.

Results: For objective I, a Chi-Square Goodness of Fit test revealed a non-statistically significant difference of CBC orders between April to June 2018 ($X^2 (2df) = 4.645, p = .098$). This resulted in a cost spending analysis of $969.18 in CBC orders. In objective II, a Chi-Square Test of Homogeneity revealed a statistically significant difference in CBC ordering frequencies between the CICU and GMU ($X^2 (2df) = 6.307, p = .043$). However, the magnitude of this difference is small (Cramer’s $V = .055$).

Conclusion/Significance: Preliminary results suggest that the observed frequencies of CBC orders are not that far from what is expected, which would imply that RUMC has efficient lab utilization practices. Despite what the results show, the indications by which the CBC orders were placed for a specific patient are not known. Thus, determining which of those CBC orders where truly necessary for given patient would require further analysis. The Choosing Wisely campaign recommends against repetitive CBC testing when a patient is in stable condition as this could lead to adverse effects. That is why it is important for the development of guidelines that could aid in the prevention of unnecessary laboratory testing.
Abstract #: 141
Session Type: Poster
Category: Health Science

MIR-149 ONCOGENE EXPRESSION IN PLASMA FROM PATIENTS UNDERGOING CT SCREENING FOR LUNG CANCER

Presenting Author: Angelo Rivera, BS
Authors: Angelo Rivera; Lela Buckingham (Rush University); Nadine Lerret (Rush University); Alexandra Vardouniotis (Rush University)

Introduction: Lung cancer is based on the detection of pulmonary nodules by using cross-sectional imaging. Currently tissue biopsies are used to investigate if a nodule is cancerous or benign, which require surgery to acquire a small tumor tissue sample. Liquid biopsies are used alternatively when possible as non-invasive simple blood tests. Liquid biopsies utilize cell free DNA, cell free RNA or circulating tumor cells for testing. Circulating free miRNA may be released in the blood from cell turnover; this is dependent on factors such as location, size, metastasis, vascularity, and tumor state. These microRNAs (miRNAs) are short nucleotide ribonucleic acids with epigenetic functions by interfering with mRNA translation. miRNAs have been observed and isolated from inside membrane vesicles, body fluids or bound to proteins or lipoproteins. miRNAs have been used in multiple studies to investigate the prognosis of diseases, drug sensitivity, drug resistance, and cancer susceptibility.

Objective: The microRNA, miR-149 is an epigenetic regulator of cancer-associated genes including FOXM1, SOX2 and AKT1. A total of 152 previously collected plasma samples collected at the time of CT scanning for lung cancer were used for this study to find expression of miR-149.

Methods: RNA isolation was performed using the miRCURY TM RNA Isolation Kit- Biofluids (Exiqon). miR-149 was measured by standard and qPCR.

Results: miR149 expression was significantly higher in cases of malignant lesions than in benign cases and those with no lesions (Mann-Whitney p=0.012). In qualitative studies, miR149 expression trended toward cases with malignant lesions (Kruskal-Wallis p=0.124).

Conclusion/Significance: The presence of miR-149 in plasma from lung cancer compared to benign cases strengthens the relationship between miR-149 and lung cancer. Using liquid biopsies for lung cancer miR-149 can be quantified to enhance interpretation of CT scans or other biomarkers and possibly replace tissue biopsies. Lung cancer detection would improve during the earlier cancer stages. Future studies would include separating out lung cancer types as either NSCLC or SCLC; pre and post intervention, to determine if these factors influence miR-149 expression.
VALIDATION OF HEPARIN-INDUCED THROMBOCYTOPENIA (HIT) ASSAY ON AN AUTOMATED PLATFORM

Presenting Author: Tirtha Shah, BS
Authors: Tirtha Shah (Rush University), Ricardo Sumugod (Northwestern Memorial Hospital), Nadine Lerret (Rush University), LaDonna Moreland (Rush University), and Maribeth Flaws (Rush University)

Introduction: Heparin Induced Thrombocytopenia (HIT) is a drug induced disorder where antibodies are produced against the heparin-platelet factor 4 (PF4/hep) complex which activates platelets resulting in thrombosis. Among the hospitalized patients, about 1-5% of people develop Heparin Induced Thrombocytopenia (HIT). HIT is clinically diagnosed using two different classes of assays: enzyme immunoassays (EIAs) and functional assays. The EIAs detect antibodies against the PF4/hep complex whereas the functional assays measure platelet activation in the presence of these antibodies. Even though these classes of assays can successfully rule out HIT, both the EIAs and functional assays have a longer test run-time. In order to solve this problem, clinical labs have started to use automated methods to diagnose HIT.

Objective: The aim of this study is to validate Hemosil HIT Ab (PF4-H) method on an automated platform. The hypothesis of the study was to prove that automated Hemosil HIT Ab (PF4-H) method has high sensitivity and shorter turn-around time as compared to the manual ELISA method.

Methods: This study analyzed 61 patient specimens that were received at the Northwestern Memorial Hospital's clinical lab between July, 2018 - August, 2018. Both the Hemosil HIT Ab (PF4-H) method and the manual ELISA method were compared based on their sensitivities, specificities, and test turn-around time. The Hemosil HIT Ab (PF4-H) method was performed using ACL Top Family automated analyzer. ELISA method was used as the test of record.

Results: As compared to ELISA method, the data showed that the Hemosil HIT Ab (PF4-H) method had a higher specificity (80%) and a lower sensitivity (51%). The positive and negative predictive values of the automated method were calculated to be 88% and 35% respectively. Of the 61 patients tested, only 58% of the patients had concordant results. Hemosil HIT Ab (PF4-H) method had a shorter run time as compared to the ELISA method.

Conclusion/Significance: It was concluded from this study that the Hemosil HIT Ab (PF4-H) method would not be able to replace the ELISA method due to its low sensitivity and specificity.
CONSTITUTIVE EXPRESSION OF INTERFERON-GAMMA AND INTERLEUKIN-22 BY INTRAEPITHELIAL GROUP 1 INNATE LYMPHOID CELLS IN SIV-INFECTED AND UNINFECTED COLONS

Presenting Author: Natasha Ferguson, MS
Authors: Natasha Ferguson (Rush-presenting/first author); Andrew Cogswell (Rush); Edward Barker (Rush)

Introduction: Despite effective antiretroviral treatment, which suppresses virus production, many people infected by the virus still have an increased morbidity and mortality relative to uninfected individuals. Many of these non-AIDS related deaths correlates with increased systemic inflammation and the presence of microbial products in circulation. One of the hallmarks of HIV infection is massive loss of CD4+ T-cells in the gut within weeks of transmission. Exposure of GI tract epithelial cells to IFN-gamma leads to decrease in tight junctions between the cells.

Objective: It has been posited that HIV-infection of CD4+ Th17 cells may account for disruption of the epithelial layer and increased microbial translocation from the lumen into the lamina propria of the GI tract due to loss of IL-22. We wanted to determine if (1) intraepithelial (IE) innate lymphoid cells (ILCs) produce IL-22 during SIV infection and (2) if intraepithelial (IE) ILCs produce IFN-gamma during SIV infection and decrease tight junction protein expression. We hypothesize that IE ILCs would secrete decreased IL-22 in infected rhesus macaques (RM) during SIV infection.

Methods: We initially compared the capacity of colonic IE ILCs from SIV-infected and uninfected rhesus macaques (RM) to secrete IL-22 and IFN-gamma. We isolated IELs from RM colon and stained them using surface antibodies to identify ILCs and intracellular antibodies to identify IFN-gamma and IL-22 using flow cytometry.

Results: We found both IFN-gamma and IL-22 to be secreted by group 1 ILCs from SIV-infected RM. Surprisingly we also found the same frequency of group 1 ILCs from uninfected RM secreting both IFN-gamma and IL-22.

Conclusion/Significance: Currently, we are determining whether IFN-gamma produced by ILCs from uninfected RMs and infected RM may differ in their ability to trigger leaky gut in RM.
Introduction: When adequately treated, Human Immunodeficiency Virus (HIV) is a manageable chronic disease. Combined antiretroviral therapy (cART) is able to decrease the virus to undetectable levels in the plasma and improve CD 4+ cell counts, thus significantly reducing the risk of HIV death secondary to immunosuppression. Still, medication compliant HIV+ individuals have a life expectancy of 10 years shorter than their HIV- counterparts and are at a higher risk of dying from illnesses associated with aging including cancer, cardiovascular disease, hepatic issues, and neurocognitive disorders. The heightened risk of these observed illnesses is believed to be a consequence of persistent inflammation and immune activation in HIV+ patients. Recent studies suggest that the source of this inflammation is increased intestinal permeability leading to translocation of microbial products into the systemic circulation, particularly when coupled with intestinal dysbiosis. The phenomenon of increased intestinal permeability has yet to be completely elucidated, but preliminary work has shown circadian processes that integrate external environmental stimuli, such as light:dark cycles and food intake, to play a role in its pathogenesis.

Objective: We believe exposing HIV+ individuals to light treatment therapy will normalize their circadian rhythm, thus reducing intestinal mucosa permeability and systemic circulatory inflammation.

Methods: 10 subjects were consented and enrolled in the IRB approved study; 8 completed the study. Each was instructed to perform bright light treatment every morning for five weeks, wear an actiwatch to measure total sleep time, complete sleep diaries and medication/caffeine/alcohol logs, and attend six on-site study visits - two of which included a blood draw to measure soluble immune markers.

Results: Analysis of the plasma data using the Wilcoxon signed-rank test demonstrated a statically significant (p=0.05) increase in soluble inflammatory markers IL-6 and sCD14 post light treatment.

Conclusion/Significance: These results support the idea that circadian rhythm can influence intestinal permeability and inflammation in the circulatory system, but not in a negative correlation paradigm as hypothesis. Subject data revealed that circadian rhythms were more consistent post treatment, likely due to having to wake up and complete morning therapy, but overall duration of sleep was decreased which may be a confounding factor that caused inflammatory markers to increase.
Abstract #: 145
Session Type: Poster
Category: Infectious Disease/Immunology

WISCOTT-ALDRICH SYNDROME: A NOVEL GENETIC VARIANT

Presenting Author: Dannielle Grayer, MD
Authors: Dannielle Grayer MD MPH (RUMC) and Lisa Giordano MD (RUMC)

Introduction: Wiskott-Aldrich Syndrome (WAS) is an X-linked primary immune deficiency disorder, caused by a mutation in the WAS gene on the X chromosome at Xp11.22 - p11.23. Abnormalities in the function and/or expression of the WAS protein lead to the phenotypic variability of WAS. The estimated incidence is one to four cases per 1,000,000 live male births. Clinical features include a classic triad of severe immunodeficiency, micro-thrombocytopenia, and eczema. Supportive care with management of infections and avoidance of live viral vaccines is important, and hematopoietic stem cell transplantation (HSCT) may be curative.

Objective: To present a patient with clinical features of WAS and a novel mutation in the gene responsible for the WAS.

Methods: A full term, non-dysmorphic, male neonate presented with petechiae and ecchymoses. The physical exam was otherwise normal. There was no family history of hematologic disease. The initial platelet count on the first day of life was 20K/ul and rose to 205K/ul after random donor platelet transfusion. Thrombocytopenia persisted, despite intermittent improvements after random donor platelet transfusions and IVIG. Although neonatal allo-immune thrombocytopenia (NAIT) was initially considered the most likely etiology, maternal alloantibody testing was negative. The peripheral blood smear demonstrated micro-thrombocytes. The patient developed intermittent bloody stools. At four months of age he developed pseudomonas otitis externa complicated by pre-auricular cellulitis and a candida rash. He is currently being evaluated for HSCT.

Results: Genetic testing revealed a hemizygous variant WAS c.151G>T (p.Val51Phe) in exon 2 of WAS gene at Chr X: g.48542690G>T. This mutation has not been previously described. The absolute lymphocyte count was normal, but CD4 and CD8 cells were decreased. IgG and IgM were in the normal range, but IgA was elevated. A decreased expression of WAS protein was found on lymphocytes. Lymphocyte proliferative response to mitogens was normal.

Conclusion/Significance: A novel WAS gene variant is described in an infant with a phenotypic presentation of classic WAS. The differential diagnosis of neonatal thrombocytopenia is extensive, but WAS should be considered in males. Ours is the first description of a specific variant in the WAS gene leading to the clinical phenotype of WAS.
Abstract #: 146

Session Type: Poster
Category: Infectious Disease/Immunology

THE SOCIAL FACTORS INFLUENCING ANTIMICROBIAL USAGE IN THE MICU

Presenting Author: Mikhail Heber, BS
Authors: Mikhail Heber (RMC), Katharina Rynkiewich (WUSTL), Dr. Sarah Won M.D (RUMC), Dr. David Schwarz (CCHHS)

Introduction: Antimicrobial resistance (AMR) is an increasingly significant threat that has the potential to significantly impact everyday life. Current, while limited, qualitative studies on AMR have examined the social factors that have contributed to AMR spread and show that social determinants could vary by specialty. There is a need for more qualitative research in focused, specialty-oriented settings to better understand the underlying components of antimicrobial prescribing behaviors.

Objective: The goal for this project falls under the overarching goals for the CDC Chicago Prevention and Intervention Epicenter (CPIE) project: 'An Ethnographic Approach to Interrogating Antimicrobial Stewardship: Practices and Challenges in Hospital Infection Management' with specific focus on understanding: 1. How do medical ICU (MICU) clinicians utilize antimicrobial therapies? 2. What factors influence antimicrobial decisions in the MICU?

Methods: Participant observation was used to as a way to observe everyday local contexts of antimicrobial use in the MICU during daily rounds. As part of participant observation, semi-structured contextual interviews were conducted with eight MICU pulmonary and intensive care physicians (attendings and fellows). Notes from the participant observation and interviews were typed and coded using an open coding method facilitated by a qualitative analysis software (MAXQDA).

Results: While results of this study are ongoing and iterative, preliminary results and analysis have yielded 3 potential social factors influencing antibiotic usage in the MICU: 1. Clinician professional and social roles within the MICU 2. Hierarchies of social engagement between fellows, attendings, and other MICU clinicians 3. Multi-disciplinary hierarchies in relation to consultations from different specialties

Conclusion/Significance: These social processes can be analyzed using the theoretical framework of Bourdieusian habitus, which is an embodied production and reproduction of processes of social interaction within various spaces of power. In the MICU, each actor had embodied the social influences around them such that their actions were part of the habitus of the MICU. Clinicians thus act in alignment with their specialty-similar peers, therefore constituting a MICU-specific culture of practice.
Abstract #: 147

Session Type: Poster
Category: Infectious Disease/Immunology

EXPRESSION OF ZIKA VIRUS NONSTRUCTURAL PROTEINS NS3 AND NS5 IN HUMAN FETAL ASTROCYTES RESULT IN REDUCED CELL VIABILITY

Presenting Author: Oscar Jimenez, BA, MS
Authors: Oscar A. Jimenez (Rush University); Srinivas D. Narasipura(Rush University); and Lena Al-Harthi (Rush University)

Introduction: Viral proteins mediate the consequences of viral infection. Upon cell entry, cleavage of ZIKV polyprotein generates three structural proteins: capsid (C), envelope (E), and premembrane (prM); which form the virion. The remaining proteins are nonstructural, comprising of NS1, NS2A, NS2B, NS3, NS4A NS4B, and NS5; many of which act as transcriptional machinery within the host endoplasmic reticulum. The proteins NS3 and NS5 are enzymes with structural motifs that mediate viral replication, protease activity, and innate immune inhibition. We initiated an investigation to assess the effect of individual ZIKV proteins on human fetal astrocytes (HFAs).

Objective: To determine the impact of individual ZIKV proteins on the viability of HFAs.

Methods: All 10 proteins from ZIKV strain PRVABC59, which was isolated in Puerto Rico in 2015, 2 of which were cloned using Gibson Assembly method in a PLV plasmid. Plasmids were then individually packaged into a lentivirus vector. A concentrated titer of lentivirus was used to transduce 2x10^5 HFAs seeded on a 24-well plate. After transduction, cells were incubated for 7 days then analyzed for cell viability using a commercial kit that utilizes a colorimetric compound, tetrazolium, that is only bioreduced in viable cells (MTS assay).

Results: We found transduction and expression of ZIKV proteins NS3 and NS5 in HFAs cause 80-90% reduction of viable cells after 7 days of treatment.

Conclusion/Significance: Our data suggest that ZIKV NS3 and NS5 alone can cause significant cell death when expressed in human fetal astrocytes. Further studies will determine the mechanism mediating cell death.
Abstract #: 148
Session Type: Poster
Category: Infectious Disease/Immunology

TYPE OF FOOD ALLERGEN IS ASSOCIATED WITH ATOPIC DERMATITIS SEVERITY

Presenting Author: Sukruthi Jois, MD
Authors: Sukruthi Jois(1), Aame Betty Andy-Nweye(1), Kylie Jungles(2), Mary C. Tobin(1), Mahboobeh Mahdavinia(1). (1)Allergy/Immunology Section, Department of Immunology and Microbiology, Rush University Medical Center (2)Medical School; Rush University Medical Center

Introduction: Atopic Dermatitis (AD) in early childhood is associated with food allergy (FA), and exposure to food allergens can result in uncontrolled AD in children with comorbid severe AD and food sensitization. In this study, we aimed to determine whether type of food allergen is associated with the severity of Atopic Dermatitis in a cohort of children with food allergy.

Objective: The purpose of this study is to determine whether in children with FA and AD, the type of food allergen plays a role in severity of AD.

Methods: Children diagnosed with FA (diagnosed by positive skin test and/or in vitro specific-IgE) and AD between December 2015-September 2017 were enrolled in this prospective cohort study. AD severity scores based on SCORAD were calculated on the day of recruitment. ANOVA was used to test the association of SCORAD with food allergens.

Results: Total of 98 children with mean±SD age of 4.2±3.3 were enrolled. 70% of the children were African-Americans, 12%Caucasians and 10.6%Hispanics. Allergy to milk and soy were significantly associated with higher SCORAD (mean±SD of 37.6 ±11.5 vs. 18.5±10.2 for children with and without milk allergy respectively p=0.01 and 37.6±11.5 vs.11.5±10.2 for children with and without soy allergy; p=0.01). Furthermore, children with egg allergy had a trend towards higher SCORAD (mean±SD of 28.4±5.5vs18.6 ± 10.5;p=0.1). There was no association between allergy to wheat, peanut, tree-nuts, fish, shellfish, corn or chick-peas with SCORAD.

Conclusion/Significance: Our analysis showed a significant association between AD severity and allergy to milk and soy in children with known food allergy to these foods. Milk and soy are common hidden ingredients in food products and although these children were instructed to avoid these foods, they might be accidentally exposed to traces of these foods resulting in uncontrolled AD.
THE IMPACT OF OBESITY AND HIV ON MARKERS OF INNATE IMMUNITY

Presenting Author: Thomas King, BS
Authors: Thomas C King (Rush University), Alan Landay, PhD (Rush University) Brett Williams, MD (Rush University) Jacy Wasoski (Rush University)

Introduction: The advent of anti-retroviral therapy has allowed patients with Human Immunodeficiency virus infection to live much longer lives. This has consequently lead to a greater incidence of obesity related comorbidities such as hypertension, diabetes, and cardiovascular disease, due to the induction of a state of chronic and constant low grade inflammation.

Objective: This study explores the expression of markers of activation and exhaustion of the innate immune system in HIV+ individuals with obese BMI's (over 30) and 'healthy' BMI's (under 30). We are looking at markers in iNKT cells, MAIT cells, and NK cells, all of which have implications in HIV and obesity. iNKT cells, an important first responder in the innate immune system, have been found to be decreased in obese patients. MAIT cells, which are responsible for neutralizing bacterial infected epithelium, have been found to be decreased in progressive HIV infection. NK cell function is known to be decreased in obesity. We hypothesized that the percentages of NK, MAIT, and iNK-T cells will be decreased in the overweight versus the lean HIV+ patients and these cell populations will be dysregulated, with increased markers of activation and exhaustion. This puts obese HIV-positive patients at a higher risk for comorbidities due to the additional stress that obesity puts on their immune system through enhanced chronic low-grade inflammation.

Methods: The markers were measured using flow cytometry, performed on isolate peripheral blood mononuclear cells. Our goal was to recruit 10 obese and 10 healthy weight patients, but we were only able to recruit 10 non-obese patients and 5 obese patients.

Results: There was no statistically significant difference in the expression patterns of the markers of activation and exhaustion, but a significant difference was found in the total CD4 counts of the two patient populations (p<.05), with obese patients having lower overall values.

Conclusion/Significance: This study is important due to the rising age of HIV infected individuals, so we can better understand how the disease impacts their immune system in the long term.
THE ROLE OF STORE-OPERATED CRAC CHANNELS IN INFLAMMATORY CYTOKINE PRODUCTION IN THE GENETICALLY INHERITED DERMATOSIS DARIER'S DISEASE

Presenting Author: Chelsea Maguire, BS
Authors: Chelsea Maguire (Northwestern University & Rush University), Murali Prakriya, PhD (Northwestern University)

Introduction: Darier's Disease is an inflammatory genetic skin disease characterized by abnormal adhesion between keratinocytes, caused by mutations in the sarco/endoplasmic reticulum Ca2+ -ATPase (SERCA) pump. SERCA pumps play a critical role in intracellular calcium homeostasis, and therefore cellular signaling, as calcium ions are known to directly mediate the expression of several transcription factors and gene products, such as cytokines. In refractory forms of Darier's, chronic inflammation can lead to the development of frequent painful plaques which are prone to secondary infection and severe scarring. Previous studies have shown that inflammatory cytokine production is a calcium-dependent process in epithelial cells. Therefore, we investigated if store-operated calcium release-activated calcium (CRAC) channels could be used as a potential target to inhibit the inflammatory symptoms seen in these patients.

Objective: We sought out to test differences in store-operated calcium entry (SOCE) between Darier and normal keratinocytes and whether blocking CRAC channels could inhibit SOCE and cytokine production in these cells.

Methods: We cultured Darier keratinocytes and treated them with a CRAC channel blocker. Results were compared to normal keratinocytes. SOCE was measured using FURA-2 fluorescent imaging while cytokines IL-8, CXCL1, and CXCL5 were quantified using ELISA after inducing calcium-dependent gene expression.

Results: We provide evidence for elevated resting calcium levels and greater SOCE in Darier's disease keratinocytes compared to normal cells. IL-8 and CXCL1 production was also significantly reduced in both cell types after treatment with a CRAC channel blocker.

Conclusion/Significance: This study provides promising insight into a new potential treatment for patients with refractory Darier's Disease.
Abstract #: 151

Session Type: Abstract/Podium Award (Rush-IMSD)
Category: Infectious Disease/Immunology

HYPERGLYCEMIA AND ITS EFFECTS ON THE SURVIVAL OF CD4+ T CELLS

Presenting Author: Evelyn Roback-Navarro, BS
Authors: Evelyn Roback-Navarro (RU), Nadine Lerret Ph.D (RU), Lela Buckingham Ph.D (RU), LaDonna Moreland (RU)

Introduction: Diabetes is the 7th leading cause of death in the United States. While there is no current cure, recent studies have found links between diabetes, obesity, and inflammation. Immune cells are known contributors of inflammation, but it is unclear which immune cell and mechanism are responsible for the progression of diabetes. This study focuses on the effects that hyperglycemic conditions have on CD4+ T cell survival and mode of death.

Objective: We hypothesized that CD4+ T cells primed in hyperglycemic conditions did not undergo apoptosis, but rather necrosis when compared to CD4+ T cells cultured in normal glycemic conditions. We proposed that the necrotic marker high-mobility group box 1 (HMGB1) would be upregulated on CD4+ T cells cultured with dendritic cells primed in hyperglycemic conditions. Furthermore, we hypothesized that some CD4+ T cells exposed to hyperglycemic conditions were undergoing apoptosis via the CD27/CD70 pathway.

Methods: Peripheral blood-derived human T cells and dendritic cells were co-cultured in different concentrations of glucose and then analyzed using flow cytometry for HMGB1, a necrotic protein, CD70, an apoptotic ligand and CD27, a co-stimulatory immune checkpoint molecule.

Results: Dendritic cells primed in hyperglycemic showed an increase in CD70, an apoptotic ligand, as the concentration of glucose increased (p=0.0207). This is significant when paired with the observation that CD27, the receptor for CD70, is down-regulated on T cells in the same cultures. Necrosis was also analyzed via HMGB1. Data showed that when dendritic cells expressed more HMGB1 as glucose increased, the CD4+ T cells would express less. Though not significant, Caspase 3 had a decreasing trend as glucose concentrations increased.

Conclusion/Significance: Hyperglycemia drives the upregulation of the apoptotic ligand on dendritic cells however the results show that the corresponding receptor for CD27/CD70 apoptosis is downregulated by hyperglycemia, suggesting cell death is not via apoptosis. Additionally, data showed T cells express less HMGB1 under hyperglycemic conditions, suggesting necrosis is not the mode of death. While further studies need to be done, future screening and treatment options may still benefit by targeting the T cell population to further prevent the progression to diabetes in predisposed patients.
Abstract #: 152

Session Type: Poster
Category: Infectious Disease/Immunology

β-CATENIN NEGATIVELY REGULATES IL-6 AND IL-8 EXPRESSION AT TRANSCRIPTIONAL LEVEL AND INDUCES REACTIVITY IN HUMAN ASTROCYTES

Presenting Author: KaReisha Robinson, MS
Authors: KaReisha Robinson*, Srinivas D. Narasipura and Lena Al-Harthi Department of Microbial Pathogens and Immunity, Rush University Medical College, Chicago, IL. USA.

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 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 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 was used to examine with β-catenin, TCF1, TCF3, TCF4, and LEF1 were directly interacting with the IL-6 and IL-8 promoters. Student T-test was 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.
Abstract #: 153
Session Type: Poster
Category: Infectious Disease/Immunology

PHYSICIAN PERCEPTION OF ANTIBIOTIC STEWARDSHIP IN THE MEDICAL ICU

Presenting Author: Kavya Timmireddy, BA
Authors: Katharina Rynkiewich (Washington University of St. Louis), David Schwartz, MD (John H. Stroger Hospital of Cook County), Sarah Won, MD (Rush University Medical Center)

Introduction: While the twentieth century discovery of antibiotics revolutionized health care, the emergence of antibiotic resistant organisms is fast threatening to undo the advances of the past seventy years. In response, the medical community, at large, has made efforts, of which antibiotic stewardship programs (ASP) take the lead, to reduce the spread of antibiotic resistance infections (ARIs). However, despite the recent requirement that U.S. hospitals have an ASP, there is little research into how physician perceptions, attitudes, and beliefs impact how they navigate and apply ASP. This is of particular importance, as research has shown that environment and human factors can greatly impact the success or failure of hospital policies and programs.

Objective: To address this deficit, this project examined the interaction between medical intensive care unit (MICU) doctors and the institution-respective ASPs at two large urban hospitals.

Methods: Two sets of emails (primary and a follow up) were sent to 30 physicians across the two hospitals. Semi-structured interviews were conducted with five attendings and six fellows who acquiesced as well as the physician-director and infectious disease pharmacologist attached to the institution's ASP. Interviews were transcribed and analyzed for common themes. In addition, ASP related text documents published by the respective institutions were analyzed based on their relationships to clinicians and vice versa, paying specific attention to accessibility, mode of consumption, participation in creation, form, and content.

Results: While analysis is still ongoing and iterative, preliminary observations support a disconnect in physician perspective between the notions of stewardship and antibiotic prescribing. Physicians viewed antibiotic prescribing as an autonomous process, while stewardship program guidelines were viewed as something impressed on them by the institution even though the physical outputs (actions) of both concepts were the same. In response to the perceived loss of autonomy, physicians, although they almost unanimously espoused reduction of ARIs, rarely gave credence to ASP guidelines (or even looked them up).

Conclusion/Significance: Due to the small sample size, it is difficult to draw generalizations from this research applicable to other ICU or hospital spaces. However, the observations made in this study highlight important sociocultural considerations involved in the implementation of ASPs.
Abstract #: 154

Session Type: Poster
Category: Infectious Disease/Immunology

OPTIMIZATION OF A HIGHLY SPECIFIC IN SITU HYBRIDIZATION IMAGING TECHNIQUE TO QUANTIFY HIV RESERVOIRS

Presenting Author: Amber Virdi, MS
Authors: Amber Virdi (Rush University), Hannah Barbian (Rush University), Lena Al-Harthi (Rush University)

Introduction: Combination antiretroviral therapy (cART) has successfully transformed HIV infection from a deadly to a chronic disease, where patients maintain undetectable HIV viral load in plasma. Interruption of cART, however, leads to a fast resurgence of HIV in plasma, indicating that replication-competent HIV reservoirs and sanctuary sites persist in spite of cART. Significant data from our lab point to a unique CD8 T cell type known as CD4dimCD8bright T (DPT) cells, as well as the brain, as reservoirs for HIV. Yet, limited information exists regarding in vivo quantitation of contribution of both DPT cells and the brain to the overall HIV reservoir.

Objective: In an attempt to better quantify these HIV reservoirs, we initiated experiments to adapt RNA/DNAscope technology for use in DPT cells and brain.

Methods: RNA/DNAscope is a novel, highly sensitive in situ hybridization technique that allows for the simultaneous visualization of target RNA and DNA within a variety of sample types. It is highly specific, utilizing a probe set of 20 unique 'double Z probes' that each target 1kb regions within the sample. Z probes were created to specifically bind the target HIV RNA or DNA, as well as a pre-amplifier used for fluorescent labeling. In order for the hybridization technique to be successful, two independent Z probes must bind adjacent to support a pre-amplifier. An amplification complex is built, and then fluorescently labelled probes are added to the complex. The result of this methodology is punctate immunofluorescent spots indicating the presence of an RNA or DNA target. Initially we infected isolated peripheral CD4 T cells, one of HIV's primary targets, in vitro and used RNA/DNAscope to visualize and quantitate HIV RNA/DNA.

Results: Of these infected CD4 T cells, ~9.9% show viral RNA, ~8.8% show viral DNA, and ~1.2% show both viral RNA and DNA.

Conclusion/Significance: Ongoing optimization of the assay includes efforts to reduce background and unspecific staining in dual RNA/DNAscope, refine quantification methodology, and expand analysis specifically towards DPT cells and brain sections from HIV infected individuals.
Abstract #: 155

Session Type: Abstract/Podium Award (Rush-IMSD)
Category: Infectious Disease/Immunology

DELAYED NEUTROPHIL RESPONSE DAMPENS INFECTION CONTROL IN DIABETIC WOUND

Presenting Author: Janet Zayas, MS
Authors: Janet Zayas (Rush University Medical Center, Department of Microbial Pathogens and Immunity and Department of Internal Medicine, Hematology/Oncology) Ruchi Roy (Department of Medicine, Hematology/Oncology), Joseph Goldufsky (Department of Medicine, Hematology/Oncology), Stephen Wood (Rush University Medical Center, Department of Microbial Pathogens and Immunity), and Sasha Shafikhani (Department of Medicine, Hematology/Oncology).

Introduction: Diabetic foot ulcers (DFUs) are one of the leading causes of hospitalization and represent a major morbidity associated to diabetes in patients living in developed countries. Around 26 million patients with diabetes in the US alone develop foot ulcers at some point in their lives, costing approximately 25 billion dollars annually in care and accounting for about 67% of all lower extremity amputations in the US. Bacterial infection has long been recognized as a major impediment to wound healing in diabetic ulcers. However, the underlying reasons for the inability of people with diabetic wounds to fight off bacterial infection remain poorly understood.

Objective: Determine the signaling mechanism(s) underlying impaired neutrophil chemotactic response to chemokines in diabetic wound; and assess the underlying reason(s) for insufficient chemokine expression and microbial killing in the diabetic wound early after injury. In addition, determine the potential of pro-inflammatory chemokines to restore antimicrobial defenses and stimulate healing in diabetic wounds early after injury.

Methods: In these studies, an animal model for type II diabetes (C57BLKs-leprdb/db/db and C57BL/6 mice), purified murine and human neutrophils, histological analyses (H&E staining and immunohistochemistry), RT-PCR, Elisa, and chemotactic assay were used.

Results: We found that chemokine insufficiency in diabetic wound early after injury is due to reduced pattern recognition receptor (PRR) signaling due to impaired microbial killing; and, impaired chemotactic response in diabetic neutrophils is due to defects in FPR primary receptor signaling upon exposure to elevated glucose levels in diabetic serum. We further found that engaging CCR1 secondary receptor on neutrophils significantly improves antimicrobial defenses and stimulates healing in diabetic wounds.

Conclusion/Significance: Conclusion: Neutrophil chemotactic impairments and chemokine insufficiency early after injury, lead to delayed neutrophil response contributing to delayed inflammatory response and reduced antimicrobial peptide expression. These events leave diabetic wound vulnerable to infection with pathogenic bacteria, worsening wound damage and driving diabetic wound toward persistent non-resolving inflammatory state. Significance: These studies advance our understanding of impaired infection control in diabetic wounds and lay the groundwork for the development of novel pro-inflammatory chemokine-based therapeutic approaches to enhance antimicrobial defenses and to help stimulate healing in diabetic wounds.
IS PLAYING A WOODWIND OR BRASS INSTRUMENT ASSOCIATED WITH DEVELOPMENT OF VELOPHARYNGEAL INSUFFICIENCY IN PATIENTS WITH CLEFT PALATE?

Presenting Author: Jennifer Akin, BA
Authors: Jennifer Akin, Karen Tessler PhD, Alvaro Figueroa DDS, MS, Jill Jeffe MD, Nicole Heller DNP, Christina Tragos, MD

Introduction: Velopharyngeal Insufficiency (VPI) occurs in 5-36% of patients following primary cleft palate repair and is defined as the inability to fully seal the velopharyngeal sphincter. Since most sounds in the English language require complete closure of the velopharyngeal sphincter, surgical treatment is often required for full rehabilitation. Stress Velopharyngeal Insufficiency (SVPI) occurs when high intraoral pressure prevents the soft palate from sealing and is reported in 7-34% of collegiate brass and woodwind musicians. While normal speech seldom causes intraoral pressures to exceed 5-6 mmHg, playing a woodwind or brass instrument can cause pressures to surpass 130 mmHg. This study investigated the impact of woodwind and brass instrument use on VPI in patients with a history of cleft palate.

Objective: The purpose of this study is to identify if playing woodwind and brass instruments is a compounding risk factor on the development of VPI in children with a history cleft palate.

Methods: Patients aged 8-24 years with a history of a cleft palate reconstruction and woodwind or brass instrument use were recruited from a craniofacial center. Participating patients and families were administered a questionnaire pertaining to their musical instrument usage and speech competence. A subsequent retrospective chart review utilizing the electronic medical records system was then performed.

Results: Participants ranged in age from 10-17 years with an average age of approximately 14 years. On average the patients had played for 2 years and practiced less than 2 hours/day and 5 hours/week. Approximately 75% of participants had a history of speech pathologies requiring speech therapy with the average time spent in therapy being slightly less than 4 years. None of the participants noticed voice changes such as hypernasality or nasal air escape after playing their instrument.

Conclusion/Significance: Low time commitment (<2 hours/day) woodwind or brass instrument playing does not appear to put patients with a history of a repaired cleft palate at greater risk of developing VPI. Therefore, school-aged participation in these instruments should not be restricted unless the patient becomes symptomatic.
SCLEROSTIN ANTIBODY RESCUES HYOPHOSPHATEMIA AND INCREASES BONE MASS IN THE HYP MOUSE MODEL

Presenting Author: Kelsey Carpenter, MS
Authors: Kelsey A. Carpenter (Rush), Ryan D. Ross (Rush)

Introduction: X-linked hypophosphatemia (XLH), the most common form of vitamin-D resistant rickets, is characterized by elevated fibroblast growth factor 23 (FGF23) levels which impairs phosphate reabsorption and inhibits skeletal mineralization. XLH is commonly diagnosed in children who exhibit shortened stature, leg bowing, and decreased bone mass. Current treatments have a number of side effects. FGF23 antibody, a novel treatment, effectively rescues hypophosphatemia, but treated mice continue to have increased FGF23 and mineralization problems. Sclerostin, a protein produced primarily in osteocytes, suppresses bone formation by antagonizing Wnt-signaling. Sclerostin is reported to be elevated in Hyp mice, the XLH murine homolog, and in the circulation of XLH patients, yet it’s role in the pathophysiology of XLH has not yet been investigated.

Objective: We hypothesize that sclerostin is a key regulator of phosphate metabolism and skeletal mineralization and that suppression of sclerostin via sclerostin antibody (Scl-Ab) can improve both metabolic and skeletal pathologies of XLH.

Methods: Sixty Hyp mice and wild type littermates were injected subcutaneously twice weekly with either 25 mg/kg Scl-Ab or vehicle (saline) treatment. Treatment was initiated at 4-weeks of age and continued until sacrifice at 8 weeks of age. Circulating phosphate and fibroblast growth factor 23 (FGF23) levels were analyzed using ELISAs. Bone mass of femurs were analyzed using micro-computed tomography. Data was compared separately for males and females using a two-way ANOVA with genotype and treatment as the independent factors. Post-hoc analysis was performed using an independent student's T-test.

Results: Scl-Ab treatment significantly increased serum phosphate levels and significantly suppressed circulating levels of intact FGF23 in treated wild-type and Hyp mice. Bone mass increased in the cortical and trabecular bone upon Scl-Ab treatment in both sexes.

Conclusion/Significance: Short-term treatment of growing Hyp mice with Scl-Ab leads to significant improvement in circulating phosphate, circulating FGF23 levels, and bone mass levels. The current study demonstrates that use of a monoclonal antibody to sclerostin improves the primary clinical pathologies of XLH, improving phosphate levels and bone mass, upon short-term treatment. These results point to a novel treatment strategy for XLH and points to a role for sclerostin in the regulation of FGF23.
COMPARISON OF ROUTINE CARE VERSUS TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS) FOR TREATMENT OF BACK PAIN IN THE EMERGENCY DEPARTMENT

Presenting Author: Jean-Philippe Daniel, BS
Authors: Jean-Philippe Daniel (Rush); Nicholas Chien (Rush); Kevin Dyer (Rush); Shital Shah (Rush); Thomas Seagraves (Rush); and Yanina Purim-Shem-Tov (Rush).

Introduction: Low back pain is a common presenting complaint in Emergency Medicine. Standard care includes NSAIDs, opioids, and/or muscle relaxants, which may have harmful effects on patients and have the potential to develop dependency and addiction. Transcutaneous electrical nerve stimulation (TENS) is a promising therapy that uses skin surface electrodes to stimulate peripheral nerves, resulting in decreased pain perception and analgesia. Variable efficacy has been shown depending on the study, therefore, further research is needed to understand this technology's viability as a major tool for pain relief.

Objective: To evaluate the role of an over-the-counter TENS unit in managing low back pain in the ED, and to compare the average patient length of stay in the ED compared to conventional treatment.

Methods: The study used a convenience sample of 70 patients presenting with a chief complaint of lower back pain. The study protocol and consent form were approved by the Rush IRB. Pain scores on a 0-10 scale were obtained before and after treatment with the TENS unit for 30 minutes. The control group included 70 historical cases with reported pain scales before and after conventional treatment. T-test analysis was used to evaluate for any statistical difference in pain reduction between the two groups, with 70 subjects per group in order to achieve appropriate power.

Results: Based on preliminary data (Sample size = 37), the average pain reduction score for the TENS group was 2.55 (the percentage reduction was 0.31), and the average pain reduction score for the historical group was 2.64 (percentage reduction was 0.31). After removing two outliers (patients who got admitted), the length of stay was 16.3 minutes longer for the TENS group as compared to the historical group.

Conclusion/Significance: According to preliminary data, there is no statistical difference between the TENS and historical groups for pain score reduction and length of stay. These results would suggest that TENS is a viable treatment option for lower back pain in the ED compared to conventional therapy. Given that TENS units are available over-the-counter, patient education can potentially contribute to reducing ED visits for lower back pain.
PHOSPHATE RESTRICTION IMPAIRS OSTEOBLAST FUNCTION IN GROWING MICE BY DECREASED mTOR SIGNALING

Presenting Author: Frank Ko, PhD
Authors: Frank Ko (Rush); Marie Demay (Harvard)

Introduction: Hypophosphatemia, which is characterized by low serum phosphate, is commonly a complication of drug therapy, medical illness, or burn injury. Chronic hypophosphatemia leads to rickets, which is a consequence of impaired phosphate mediated hypertrophic chondrocyte apoptosis, and osteomalacia due to impaired mineralization. However, mechanisms of how phosphate deficiency affects skeleton are still unknown.

Objective: Thus, we investigated the mechanisms of bone loss in mice given phosphate restricted diet.

Methods: Growing mice were given dietary phosphate restriction and mTOR and canonical Wnt signaling were interrogated by immunohistochemistry and Western blotting. We also cultured MC3T3-E1 cells in phosphate-free media and assess protein expression by Western blot.

Results: To interrogate impairment of osteoblast differentiation, Wnt signaling was interrogated and found no difference in b-catenin expression in osteoblasts and osteocytes from phosphate restriction. mTOR signaling, which is a nutrient and growth factor sensing pathway that promotes mRNA translation and protein synthesis, was interrogated to determine its role during matrix synthesis. Following phosphate restriction from 28 days to 31 days of age, pS6, a downstream target of mTOR signaling, was decreased in both trabecular and cortical osteoblasts. Primary osteoblasts isolated from phosphate restricted mice also exhibited decreased pS6. To determine how phosphate restriction impairs mTOR signaling, upstream activators pAKT and pAMPK of mTOR signaling were interrogated. While pAKT expression was not altered, pAMPK, which inhibits mTOR signaling by activating TSC1/2 complex, was increased in primary osteoblasts isolated from phosphate restricted mice. Osteoprogenitor and osteoblast cells (MC3T3-E1) cultured in media absence of phosphate also demonstrated decreased pS6 due to increased pAMPK. Decreased concentration of ATP in osteoprogenitors and osteoblasts further supports activated AMPK in response to phosphate deficiency.

Conclusion/Significance: These studies suggest that acute dietary phosphate restriction of growing mice impairs mTOR signaling via nutrient sensing (pAMPK), not growth factor sensing (pAKT), pathway.
Abstract #: 160
Session Type: Poster
Category: Musculoskeletal

DOES THE AMOUNT OF SAGITTAL PLANE CORRECTION IN A POSTERIOR SPINAL FUSION FOR ADULT SPINAL DEFORMITY HAVE AN IMPACT ON THE DEVELOPMENT OF PROXIMAL JUNCTIONAL KYPHOSIS?

Presenting Author: Dong Gue Oh, BS
Authors: Dong Gue Oh, BS; Jonathan Markowitz, BS; Bryce A Basques, MD; Philip K. Louie, MD; Jannat M Khan, BS; Michael T Nolte, MD; Kamran Movassaghi, MD; Howard S An, MD; Christopher J. Dewald, MD

Introduction: Correction of sagittal imbalance has become crucial in the surgical correction of adult spinal deformity (ASD). Literature shows that overall impact of ASD has been largely predicted by the sagittal plane. However, proximal junctional kyphosis (PJK) following instrumentation with long posterior spinal fusion remains a common complication in this patient population

Objective: The purpose of this study was to evaluate the role of sagittal plane correction on the development of PJK following posterior spinal fusion for adult spinal deformity.

Methods: The retrospective cohort analysis evaluated consecutive patients who underwent a posterior spinal fusion for ASD. Radiographic assessments included: sagittal vertical axis (SVA), pelvic incidence (PI), lumbar lordosis (LL), thoracic kyphosis (TK), T1 pelvic angle (TPA), and kyphosis at one- and two-levels above the upper instrumented vertebra (UIV+1, UIV+2). Patients were determined to have PJK if kyphosis was greater than 15° or 10° at UIV+1 and UIV+2, respectively.

Results: 142 patients fulfilled inclusion criteria. The mean age at the time of surgery was 58.8 +/- 11.6 years. Overall, the mean number of total fusion levels was 9.8 +/- 5.2. There were no significant differences in the demographic variables between the groups. Increased rates of PJK were associated with pre-operative to postoperative TK (OR 1.11 per degree; P<0.001) and final postoperative thoracic kyphosis (OR 1.05 per degree; P=0.030).

Conclusion/Significance: Our results can help guide surgeons in preoperative planning for patients undergoing an instrumented posterior spinal fusion for deformity correction. Overcorrection of a patient's thoracic kyphosis is associated with the development of PJK at a minimum of 2 years following surgery. While a less aggressive correction may decrease the risk for the development of PJK, this concern needs to be balanced against wishes of patients
Abstract #: 161

Session Type: Poster
Category: Musculoskeletal

NON-INVASIVE, CONTINUOUS MONITORING OF MUSCLE TISSUE OXYGEN SATURATION (STO2M) BY NEAR INFRARED SPECTROSCOPY (NIRS) IS MORE SENSITIVE TO INCREASES IN CARDIAC OUTPUT THAN STO2R (RENAL) IN ELBW INFANTS GIVEN BLOOD TRANSFUSIONS (BTX)

Presenting Author: Nicole Pohlman, BS
Authors: Pohlman, Nicole (Rush Medical College); Kimura, Robert (Rush University Medical Center)

Introduction: Studies indicate that decreases in STO2R can be used as an early indicator of decreasing cardiac output prior to shock. Further studies show that changes in the [SPO2-STO2] gradient are inversely proportional to changes in tissue perfusion. Since 40% of renal blood flow supports GFR, the delivery of oxygen to the kidney far exceeds its oxygen demand. In contrast, the delivery of oxygen to muscle is tightly connected to oxygen demand. We hypothesize that changes in cardiac output will have a greater effect on [SPO2-STO2] in muscle compared to kidney. Since BTx increases cardiac output, we speculate that [SPO2-STO2M] will decrease more than the [SPO2-STO2R] follow BTx.

Objective: To determine the effect of BTx on SPO2, STO2R, and STO2M in ELBWs.

Methods: Three ELBWs were enrolled in the study 5-20 days after birth. NIRS probes were placed on the thigh (STO2M) and the flank (STO2R) along with a pulse oximeter (SPO2). According to a BTx protocol, the patients were NPO three hours prior, during and after BTx. Measurements were recorded every two seconds during these nine hours. [SPO2-STO2] were calculated for every time point and then averaged pre-(one hour), during (three hours) and post-BTx(one hour).

Results: The [SPO2-STO2M] for patient 1 (PT1) and PT2 decreased following BTx by 50% and 35%, respectively, while the [SPO2-STO2M] for PT3 remained constant. The [SPO2-STO2R] for PT1 decreased by 40% following the BTx, while the [SPO2-STO2R] for PT2 and PT3 remained constant.

Conclusion/Significance: These data indicate that the effect of BTx on tissue perfusion were variable in these ELBWs. In PT3, the [SPO2-STO2] did not change for either muscle or kidney indicating that tissue perfusion was not affected by the BTx. The decrease in [SPO2-STO2] for both muscle and kidney in PT 1 indicated an increase tissue perfusion in both organs. In contrast, BTx caused a decrease in [SPO2-STO2M] in PT2 and no change in [SPO2-STO2R]. These findings suggest that changes in [SPO2-STO2M] may be a more sensitive biomarker of decrease in cardiac output compared to [SPO2-STO2R]. Further studies comparing changes cardiac output and changes in [SPO2-STO2] in muscle and kidney are needed to support this conclusion.
Abstract #: 162

Session Type: Poster
Category: Musculoskeletal

THE EFFECTS OF COGNITIVE INTERFERENCE ON GAIT AND TURNING IN HUNTINGTON'S DISEASE

Presenting Author: Nicollette Purcell, MS
Authors: Nicollette L. Purcell, MS (Rush University), Jennifer G. Goldman, MD, MS (Shirley Ryan Ability lab), Bryan Bernard, PhD (Rush University), Joan A. O'Keefe, PT, PhD (Rush University)

Introduction: The progression of HD leads to a loss of automaticity, such that previously automatic tasks, such as ambulation, require more attentional resources. Dual-task (DT) paradigms stress the locomotor system exacerbating deficits not seen under single-task (ST). However, the extent to which dual-tasking affects specific gait domains in HD has not been thoroughly researched.

Objective: The aims of this study were to determine 1) how dual-tasking during ambulation impacts spatiotemporal aspects of gait and turning and 2) whether inertial sensor-generated gait measures are sensitive to motor symptoms in HD.

Methods: Seventeen HD participants (55 + 9.7 years) and 17 age-matched controls (56.5 + 9.3 years) underwent an IRB-approved gait testing protocol via, two-minute walk test with APDM™ Opal inertial sensors. Gait was assessed under a ST, self-selected pace and during a verbal fluency DT. The Unified Huntington's disease Rating Scale-total motor scores (UHDRS-TMS) was administered and a self-reported, 12 month retrospective fall history was recorded.

Results: Under ST, HD participants demonstrated significantly slower gait speed (p=0.034) and shorter stride length (p=0.026), and greater lateral step (p<0.0001) and stride length (p=0.0004) variability compared to controls. Under DT, HD individuals exhibited the same deficits as in the ST trials: slower gait speed (p=0.004), shorter stride length (p=0.005), increased lateral step (p<0.0001) and stride length (p<0.0001) variability, compared to controls. Significant dual-task cost [DTC = (DT-ST/ST)*100)] was observed during turns with HD participants taking more time (p=0.013) and steps to complete a turn (p=0.028) while dual-tasking compared to controls. Higher UHDRS-TMS correlated with greater stride length variability under both ST and DT conditions (p=0.008). Unexpectedly, the number of participant’s falls in the past year did not correlate with any gait parameters under the ST or DT conditions.

Conclusion/Significance: HD participants demonstrated significantly greater DTC for turning. Turning is a less automatic motion than straight walking, requiring dynamic coordination of body segments and anticipatory control mechanisms. The complexity of turning makes it more susceptible to the negative effects of cognitive interference in HD. Furthermore, wearable inertial sensors show promise as a practical means to objectively assess gait deficits providing clinically meaningful motor outcomes in clinical trials.
Abstract #: 163
Session Type: Poster
Category: Musculoskeletal

METAL RELEASE RESPONSE SURFACE FOR A BIO-TRIBOMETER TO STUDY CELL REACTION TO WEAR AND CORROSION DEBRIS

Presenting Author: Simona Radice, PhD
Authors: Simona Radice (RUMC); Michel P. Laurent (RUMC); Robin Pourzal (RUMC); Nadim J. Hallab (RUMC); Markus A. Wimmer (RUMC)

Introduction: For an improved understanding of the mechanisms behind wear and corrosion of implants in Total Hip Arthroplasty (THA), new laboratory tests aiming to better simulate the clinical situation are needed. In this context, we present the results from tests run on a tribocorrosion-bioreactor, where wear and corrosion debris are generated in the same chamber used for cell cultures tests.

Objective: The aim of this work was the generation of wear and corrosion debris, which have clinically relevant chemical and morphological properties, and which are capable of triggering cell immune response within the test duration time.

Methods: A ball-on-flat tribometer was designed to operate inside a CO2 incubator. The chamber containing the tribological system was integrated with a three-electrode electrochemical setup. The tests were performed with an Al2O3-ball in reciprocating rotational motion against a CoCrMo-metallic sample, for 12 hours and under constant load. Cell culture medium (RPMI-1640) with 10 vol% fetal bovine serum was used as lubricant. Response surfaces were generated, which showed the influence of three tested parameters (motion amplitude, load and voltage) on the mass loss and wear scar volume of the metallic discs. Lubricant samples were analyzed for metal ion content by mass spectroscopy. Wear particles and corrosion products were analyzed by scanning electron microscope with energy dispersive spectroscopy.

Results: The voltage was found to be the parameter with greatest impact on the mass loss, whereas both the motion amplitude and the load were the main parameters influencing the wear scar volume. The concentration range of Cobalt in the lubricants over all tests ranged from 1.5 to 62 ppm. This range corresponded well with the calculated concentration of metal release from the mass loss results (2.3 - 63 ppm). Wear particles were in the micron to submicron size range. Morphological and chemical analyses of wear and corrosion debris is work in progress.

Conclusion/Significance: The range of Cobalt released into the medium was high enough to trigger cell response according to literature. The analysis of the generated wear and corrosion debris is focused on the possible formation of chromium- and cobalt- phosphates, which have been found in retrieved implants and tissues from THA patients.
Introduction: Currently space-flown research experiments are an expensive endeavor costing on the order of thousands of dollars per kilogram just to get to low earth orbit. Hindlimb-suspended mice provide a cheap and low risk alternative to experiments done aboard the ISS but bone composition and mineralization characterization of this model has not yet been performed.

Objective: This study seeks to determine the composition and mineralization of hindlimb-suspended (HLS) mice using Fourier Transform Infrared Microscopy (FTIRM) techniques and backscatter scanning electron microscope (bSEM) techniques.

Methods: Cortical bone from the midshaft tibia was collected from mice suspended for 14-days (HLS) (n=10) and compared to non-suspended controls (CON) (n=8). Mineral-to-matrix and collagen cross-link ratios, crystallinity, and the carbonate substitution data were collected according to validated techniques. To measure global mineralization, specimens were imaged using an accelerating voltage of 25 kV at a magnification of 150x, with a resulting pixel size of 1.95 by 1.95 μm (Zeiss SIGMATM VP). A bone mineral density distribution was derived to assess the mean mineralization (Z) and the full width at half maximum, or the mineralization heterogeneity (Z). Osteocytic osteolysis was assessed by measuring the average lacunar area and peri-lacunar mineralization was assessed by determining the mean mineralization and mineralization heterogeneity.

Results: Mineral-to-matrix ratio was significantly decreased in HLS as compared to CON animals while, collagen cross-link ratio, carbonate substitution, and crystallinity did not reach significance. Lacunar area was decreased in HLS compared to CON animals but cortical mean mineralization, cortical heterogeneity, and peri-lacunar mineralization demonstrated no significant differences.

Conclusion/Significance: Bone which formed during HLS had a significantly reduced mineral-to-matrix ratio when compared to CON animals. Mineral is an important factor in bone mechanical properties and loss of mineral-to-matrix ratio can be an indicator of increased susceptibility of fracture and marker of osteoporosis. Unexpectedly, the average lacunar area decreased significantly in HLS animals. It is thought that net resorption in response to disuse would have increased the lacunar area due to removal of peri-lacunar matrix via osteocytic osteolysis. Reduction in lacunar area could indicate increasing osteocyte apoptosis or evidence of lacunar micropetrosis.
PATIENTS WITH OSTEOPOROSIS UNDERGOING DEFORMITY CORRECTION SPINAL FUSION FOR ADULT SPINAL DEFORMITY ARE AT GREATER RISK OF DEVELOPING PROXIMAL JUNCTIONAL KYPHOSIS

Presenting Author: Oscar Chen, BS
Authors: Oscar Chen BS(1); Michael T Nolte(1), Bryce A Basques, MD(1); Philip K. Louie, MD(1); Kamran Movassaghi, BS(1); Jonathan Markowitz, BS(1); Dennis McKinney, BS(1); Howard S An, MD(1); Christopher J. Dewald, MD(1). (1)RUMC, Department of Orthopaedic Surgery, Chicago, IL.

Introduction: As the prevalence of adult spinal deformity (ASD) increases, proximal junctional kyphosis (PJK) has become one of the greatest challenges of orthopaedic surgery for spinal deformities. PJK is defined as the segmental kyphosis that occurs at the adjacent segment just cephalad to a spinal fusion. As a consequence of PJK, almost 50% of patients require revision surgery within six months of initial surgery. Due to the difficulty in PJK diagnosis and treatment, focus has now shifted towards prevention. Many risk factors have been proposed to put patients at higher risk for PJK; one of them being osteoporosis. Osteoporosis is a disease caused by thinning of trabecular bone that results in bone weakness. Increase in the probability if compression fractures due osteoporosis and loosening of pedicle screws may lead to further development of PJK.

Objective: We hypothesize that osteoporotic patients who undergo deformity-correcting spine fusion for ASD are at greater risk for developing PJK.

Methods: We evaluated patients who underwent a spinal fusion for ASD. Patients were excluded from analysis if they were under 18 years of age at the time of surgery, had postoperative follow up less than 24 months or had surgery for thoracolumbar fracture or infection. Bone mineral density (BMD) score T<-2.5 was used as a cutoff to determine osteoporotic patients. Radiographic assessments included: sagittal vertical axis (SVA), pelvic incidence (PI), lumbar lordosis (LL), thoracic kyphosis (TK), T1 pelvic angle (TPA), and kyphosis at one- and two-levels above the upper instrumented vertebra (UIV+1, UIV+2). Patients were determined to have PJK if kyphosis was greater than 15 or 10 at UIV+1 and UIV+2, respectively. Multivariate logistic regression was used to test association between osteoporosis and development of PJK.

Results: 214 patients fulfilled inclusion criteria. Patients with osteoporosis were older and less often presented with spinal stenosis. Patients with osteoporosis presented with significantly greater instances of PJK using UIV+2 (80.0% vs 54.5%; p=0.028) measurements compared to those who did not have osteoporosis.

Conclusion/Significance: Patients with osteoporosis may be a risk for developing PJK following spinal fusion for ASD compared to those with a more robust bone mineral density.
SUCCESSFUL ONE STAGE REVISION OF A TOTAL FEMUR MODULAR ENDOPROSTHESIS PERIPROSTHETIC INFECTION IN A PROFOUNDLY IMMUNOCOMPROMISED PATIENT

Presenting Author: Alison Coogan, BS
Authors: Alison C. Coogan (Rush Medical College), Mick P. Kelly (Rush University Medical Center), Priya V. Patel (Rush University Medical Center), Anna Tamulonis (Purdue University), Paul Kent (Rush University Medical Center)

Introduction: Two-stage exchange including explantation of components and antibiotic spacer placement is considered the gold standard for prosthetic joint infection (PJI). However, preliminary data demonstrate that one-stage revision is an option. The Infectious Diseases Society for America only recommends consideration of a one-stage revision in select patients due to risk of continued infection.

Objective: Our patient had an infected total femur, which makes it difficult to create an articulating spacer including the hip and knee. Here we describe a successful one stage revision 7 months after initial surgery in a profoundly immunocompromised Ewing’s sarcoma patient.

Methods: We describe an example of one-stage revision for PJI in an immunocompromised patient. Furthermore, we report the results of our literature review using the keywords 'prosthetic joint infection' and 'one stage surgical revision'.

Results: Our search revealed 78 results, 22 of which focused on one stage surgical revision. While other studies included immunocompromised patients, none considered immune status specifically. Our patient is a 20-year-old female with localized Ewing sarcoma of the left distal femur who was status post complex en bloc resection of the entire femur followed by total femur arthroplasty with modular oncological endoprosthesis who is currently in remission and receiving adjuvant chemotherapy. She presented with acute onset of left hip pain with fever and pancytopenia. Hip aspiration revealed WBCs of 0.554 with 17.5% PMNs and cultures grew Enterobacter cloacae within 24 hours. The patient underwent irrigation and debridement without explantation of components and appropriate IV antibiotics. She had persistent fevers and elevated C-reactive protein values and sedimentation rates. The patient decided to undergo one-stage revision to avoid a hemipelvectomy, the only other option to eradicate infection. The fever curve and CRP significantly improved following the procedure and the patient continues to do well.

Conclusion/Significance: Clinical decision making in the immunocompromised patient is difficult as we cannot use validated lab markers from studies of immunocompetent patients. Currently there are no randomized controlled trials evaluating one-stage versus two-stage revisions and medical teams must consider patient factors, the infecting organism, and risks of each procedure. Immunocompromised status should not be a strict contraindication for one-stage revision of a PJI.
Abstract #: 167

Session Type: Poster
Category: Musculoskeletal-Orthopaedics

MICE MODEL OF COMPLEX REGIONAL PAIN SYNDROME

Presenting Author: Vaskar Das, PhD
Authors: Vaskar Das, Ph.D., Jeffrey S. Kroin, Ph.D., Matt Meagher, Ph.D., Asokumar Buvanendran, M.D. Departments of Anesthesiology and Orthopedics/Anatomy, Rush University Medical Center, Chigago, IL

Introduction: CRPS (complex regional pain syndrome) is very difficult to treat because it is a complex disease that can produce malfunction in neuronal, vascular, trophic and skeletal components in the body.

Objective: We introduce a mouse model of CRPS, which despite normal bone healing after distal tibia fracture, still produces pain.

Methods: Following IACUC approval, 20 young adult female C57BL/6 mice were randomly assigned to control (naïve) or fracture/pin/cast groups. The injury group underwent a closed distal tibia fracture in the right leg, with a 0.011” stainless steel pin percutaneously inserted into the tibia. The hindlimb was wrapped in casting tape for 3 weeks. After cast removal, the mice were tested for pain-related behavior: mechanical allodynia in the hindpaws, the complex behavior of burrowing, and spontaneous locomotor activity, over a 4-week post-injury period. Behavioral measures and edema (paw thickness) were compared between groups using mixed repeated measures models. At 4 weeks, Faxitron x-rays were performed in the lateral, posterior-anterior, and axial projections of both hindlegs to evaluate how well the fracture was being repaired. Comparison was with the fractured right side versus the untouched left side for each animal (paired t-test).

Results: The ipsilateral force withdrawal threshold in the fracture group was lower (increased pain) at 3 weeks (P=0.001) and 4 weeks (P=0.001), burrowing ability was poorer in the fracture group at 3 weeks (P=0.001) and 4 weeks (P=0.008), rearing ability was poorer in the fracture group at 3 weeks (P=0.001), ambulation was poorer in the fracture group at 3 weeks (P=0.007) and paw thickness was greater in the fracture group at the 3 week (P=0.001) and 4 week (P=0.001) time periods compared to the control group. X-rays demonstrated that in all 3 projections the tibia alignment in the fractured leg was not different from the contralateral uninjured leg.

Conclusion/Significance: There were no deformities in bone alignment in the fracture mice, yet CRPS signs still developed, which matches clinical CRPS with good orthopedic repair practice. Therefore this model is appropriate to use to study new CRPS treatments after bone fracture.
Abstract #: 168
Session Type: Poster
Category: Musculoskeletal-Orthopaedics

**CHANGES IN FRACTURE TOUGHNESS OF NAF, BISPHOSPHONATE, AND SCLEROSTIN ANTIBODY TREATMENTS MEDIATED BY CRYSTALLINITY AND MINERALIZATION**

**Presenting Author:** Reid Davison, BS, MSE
**Authors:** Reid Davison (Rush); Ryan Ross (Rush); Kyle Anderson (Rush)

**Introduction:** The quality of bone depends on many factors that contribute to bone strength including geometry, bone turnover, and the composition of the bone matrix. Here, the effects of treatments for osteoporosis (NaF, bisphosphonate, and Scl-Ab) on bone matrix composition fracture toughness were investigated. Previous studies have indicated the positive relationship between crystallinity and mineralization on various mechanical parameters, however, it is yet to be determined whether NaF, bisphosphonate, and Scl-Ab alter fracture toughness and whether these potential changes are associated with alterations to crystallinity and mineralization. If bisphosphonates were to show negative effects on bone toughness, this would help explain the increase in typical femur fracture rates reported in patients taking bisphosphonates.

**Objective:** Ultimately, it is important to determine which of these treatments could lead to decreased bone fracture toughness, since these treatments are typically used in patients with low bone mass, which are already at a high risk for fractures.

**Methods:** Rats were given one of the treatments during a period of rapid bone growth and sacrificed at 7 or 28 days. Femoral structure was evaluated using microCT. To separate the effects of the treatments on mineral composition from the effects on the femoral structure as a whole, we measured the material properties of bone only, by loading after inducing a controlled notch in the bone, mitigating the geometric properties. To account for notch depth variability, SEM imaging was used to identify each notch depth and factor it into the fracture toughness measurement.

**Results:** We showed that from 7 days to 28 days, the average cortical thickness and bone area increased for each treatment, and that the average cortical porosity decreased for each treatment group. 3 point bending data indicated that the toughness decreased from 7 to 28 day old rats for each treatment.

**Conclusion/Significance:** Although we identified significant correlations between the matrix composition and fracture toughness, which is consistent with previous findings, there were no specific differences between groups in fracture toughness, indicating that none of the treatments tested negatively affected the matrix composition and therefore the fracture toughness.
NOVEL BIO-TRIBOMETER TO CHALLENGE CELL CULTURE OR HUMAN TISSUE WITH IN SITU GENERATED METAL DEGRADATION PRODUCTS

Presenting Author: Kathrin Ebinger, MD
Authors: Kathrin Ebinger (RUMC), Simona Radice (RUMC), Susan Chubinskaya (RUMC), Nadim Hallab (RUMC), Markus Wimmer (RUMC)

Introduction: Total joint replacement is highly successful but CoCrMo-alloys can undergo tribocorrosion causing adverse local tissue reactions in periprosthetic tissue. This endangers the long-term survival. Likely, degradation products are initially highly bioreactive and become electrochemically stable over time. Bio-reactiveness is typically judged in monolayer cell culture, not reflecting the complex interaction of different cell types in their 3D environment.

Objective: The aim of this study was the development a bio-tribological testing system to produce and challenge (a) a macrophage cell line and (b) human synovium with freshly in situ produced and dynamically bioactive degradation products.

Methods: Wear production: ball-on-disc unit (Al2O3-on-CoCrMo), 37 N (>50 MPa) contact load, 20-40° amplitude, 2 Hz frequency combined with three-electrode configuration for potential control to force ion release. Metal release quantified by weight loss and by measurement of wear scar volume via white light interferometry. Cell culture: Human THP‐1 macrophages exposed to metal degradation products under different electrochemical potentials to force a metal dissolution. Cell viability quantified via luminescent cell viability assay. Human tissue (Gift of Hope, IL, IRB exempt): Synovial membranes assigned to internal control or test group and exposure of test group to degradation products. Tissue reaction evaluated by macroscopic appearance and cell viability using a fluorescent live/dead assay.

Results: Macrophages: dose dependent decrease of cell viability compared to the control group: 53%: -0.9 V current control, p=0.0009; 24 %: 0 V + wear, p<0.0001; 13%: positive control Nigericin, p<0.0001, <1%: + 0.9V high metal ion release, p<0.0001. Human synovium: macroscopic scale: gray-black tissue discoloration. Cell viability: 20%±4% reduction compared with control (>95 %) (p=0.03).

Conclusion/Significance: The present findings confirm that the newly invented bio-tribometer is producing a sufficient amount of biological active degradation products to challenge cells within a monolayer culture or their native 3D matrix. That could be utilized get a closer understanding of periprosthetic reactions to medical implants. Further investigations will focus on dose-response correlations and the measurement of cytotoxic and inflammatory effects of metal degradation products. Limitations include a limited number of experiments and the not yet analyzed size and shape of the released particles.
Abstract #: 170

Session Type: Poster
Category: Musculoskeletal-Orthopaedics

EFFECTS OF TAPER MISMATCH ANGLE AND HEAD TOPOGRAPHY ON MODULAR HIP TAPER CONTACT MECHANICS

Presenting Author: Jonathan Gustafson, PhD
Authors: Jonathan A. Gustafson, Robin Pourzal, Hannah J. Lundberg  Rush University Medical Center, Chicago, IL.

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. One attributed cause of onset of fretting-based corrosion is micromotion between the femoral head and stem taper due to improper seating and assembly. The role of the taper mismatch angle-relative fit- and machined micro-grooves of the stem and head taper interfaces on the contact mechanics remains unclear.

Objective: The objective of this study was to employ a novel, micro-grooved finite element (FE) model of the hip taper interface and assess the role of taper mismatch angle and head taper finish-smooth and rough-on the modular junction contact mechanics.

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: height=11µm, spacing=200µm; head taper: height=2µm, spacing=25µm). A 4kN load was used to simulate modular assembly during surgery. Mismatch between the stem and head taper were varied between 0 (no mismatch) and 12° (0.2°). Ten simulations (5 angles x 2 head taper surface types) were performed in Abaqus v2017/Standard. Outcome variables included contact area, pressure, plastic strain, and number of micro-grooves undergoing plasticity.

Results: Increasing taper mismatch led to significant decreases in contact area for both head taper surface types. Taper mismatch had minimal effects on contact pressure (~2.15 GPa) with the 'rough' head taper surface finish, unlike the idealized, 'smooth' head tapers (1.30 - 1.91 GPa). Significant plastic deformation of the micro-grooves was only found in models with the 'rough' head taper surface finish.

Conclusion/Significance: Angular mismatches between the stem and head taper can significantly influence the long-term stability of the implant. Modeling taper micro-grooves showed significant permanent deformation seen clinically on retrieved implants. These models may be used to predict implant performance. Identifying ideal head and stem taper topographies will aid in minimizing micromotion in modular junctions and reduce the risk of failure in THA.
Abstract #: 171

Session Type: Poster
Category: Musculoskeletal-Orthopaedics

SEVERE ADVERSE LOCAL TISSUE REACTIONS ASSOCIATED WITH GROSS TRUNNION FAILURE OF TMZF FEMORAL COMPONENTS

Presenting Author: Deborah Hall, BS
Authors: Deborah Hall (Rush), Songyun Liu (UIC), Jennifer L. Wright (Rush), Craig J. Della Valle (Rush), Robert M. Urban (Rush), Robin Pourzal (Rush)

Introduction: Little has been reported on the chemical composition of wear/corrosion debris and the resulting cellular reaction, identified as adverse local tissue reaction (ALTR) of joint tissues, associated with gross taper failure (GTF) of Stryker Accolade Ti-12Mo-6Zr-2Fe (TMZF) femoral components.

Objective: The purpose of this study was to analyze damage at both head and stem surfaces, the resulting implant debris, and tissue reaction associated with GTF of TMZF femoral components coupled with CoCrMo femoral heads.

Methods: Two Stryker Accolade TMZF femoral components were evaluated. Extensive metal debris and black staining of the surrounding tissues with significant damage of the femoral trunnions was observed at revision surgery. Characterization of the damage features on the tapers was conducted using SEM/EDS. Head taper surfaces were measured with optical CMM. Histologic sections were analyzed using EDS, FTIR-I and micro-Raman spectroscopy.

Results: Both trunnions were completely worn, resulting in at least 1,200 mm$^3$ volumetric material loss. Total material loss was actually greater as the femoral necks were also severely worn. Head taper material loss was 12.86 mm$^3$ and 11.24 mm$^3$ respectively. Material transfer of the TMZF-alloy covered the entire head taper surfaces, with fretting, fretting corrosion, and pitting observed locally. In the pseudocapsule, a mixed inflammatory pattern of lymphocytes and macrophages adjacent to extensive necrotic tissue was observed. Dense, black particles within the tissue were identified as Ti-oxide or TMZF-alloy wear particles. Micro-Raman identified the rutile phase of Ti-oxide. FTIR-I confirmed multiple translucent green particles as chromium phosphate.

Conclusion/Significance: The mixed inflammatory pattern was due to both corrosion at the head-neck junction and GTF. It appeared that corrosion of the head contributed initially to the overall damage and tissue reaction, but became secondary as abrasion of TMZF-alloy began to dominate the damage process. The presence of chromium phosphate led to the characteristic histopathological pattern of lymphocyte-dominated ALTR. The macrophage response appeared primarily related to the extensive TMZF wear debris. Understanding the relationship between damage mechanisms, wear/corrosion debris, and the resulting tissue response will prevent similar failure in future implant designs and assist the surgeon in decision-making for revision surgery of patients currently hosting TMZF implants.
SUBJECTS WITH MEDIAL KNEE OA REDUCE KNEE ADDUCTION MOMENT USING PLANTAR PRESSURE-BASED AUDITORY FEEDBACK

Presenting Author: Jade He, MS
Authors: Jade He (Rush), Christopher Ferrigno (Rush), Najia Shakoor (Rush), Markus A Wimmer (Rush)

Introduction: In an ongoing clinical trial, we are using a wireless shoe insole and a smartphone to generate pressure-based auditory feedback for subjects with medial knee osteoarthritis (OA) to learn a gait modification and lower the knee adduction moment (KAM).

Objective: The abstract reports the immediate kinetic response of subjects to the gait retraining strategy.

Methods: The study was IRB-approved and informed consents were obtained. Individuals with clinical and radiographic moderate knee OA were recruited. Subjects began the visit by getting accustomed with the insole contained in a standardized, flexible shoe. Their baseline plantar pressure was collected. Five trials of level walking at a comfortable pace was collected (Baseline). During gait retraining, subjects were instructed to subtly adjust their gait and maintain plantar pressures below thresholds, which were 85-95% of the average peak pressures measured by two lateral sensors earlier. The activations of the two sensors are concurrent with the time occurrence with the peaks of KAM in midstance (KAM1) and terminal stance (KAM2). Immediately after subjects became able to avoid eliciting the auditory cues while demonstrating a visually unnoticeable gait, their gait were acquired and trials that did not elicit auditory cues were accepted (Post-Feedback). Standard motion capture was used. Peak and waveform data were analyzed using paired t-tests and statistical mapping analysis, respectively.

Results: Sixteen subjects (13F/3M, 62±10 years, 29.6±6.0 kg/m2, 8 KL22, 8 KL-3) were analyzed. KAM1 reduced significantly by 8.28% (0.24 %BW*HT, p = 0.012) and other knee moments did not differ after gait retraining. Cadence reduced by 1.91 strides/min (p = 0.043) and step widened by 0.02 m (p = 0.047). Differences in spatiotemporal measures did not correlate with difference in KAM1 based on Pearson's correlation coefficients. Waveform analysis revealed significant differences in KAM at 9-21 %Stance, in the anteroposterior GRF at 5-17 %Stance and 42-50 %Stance, and in the vertical GRF at 7-13 %Stance and 34-40 %Stance.

Conclusion/Significance: Individuals with knee OA were able to reduce KAM1 during the initial introductory session of a gait retraining program. Plantar pressure-based auditory feedback is potential in redistributing compartmental loads in the knee joint and lower KAM in individuals with knee OA.
Abstract #: 173

Session Type: Poster
Category: Musculoskeletal-Orthopaedics

RAMAN IMAGING OF ARTICULAR CARTILAGE BIOCHEMICAL COMPOSITION

Presenting Author: Thomas Houser, BS
Authors: Spencer Fullman (Rush), Madison Davis (Rush), and Catherine Yuh (Rush)

Introduction: Osteoarthritis, a degenerative joint disease, affects nearly 30 million Americans. Advanced imaging techniques, such as Raman Spectroscopy, provide a unique approach to analyzing the biochemical structure of articular cartilage and molecular changes associated with osteoarthritis.

Objective: Develop a technique, using Raman spectroscopy, to effectively map the depth-dependent biochemical components (collagen, glycosaminoglycans, and water) of hydrated bovine articular cartilage.

Methods: The Raman scans were collected via a HORIBA Scientific Raman spectrometer, using the 532-nm laser. Acquisition parameters (laser power, acquisition time, number of acquisitions, objective, autofocus method, and spectral range) were manipulated to optimize spectrum quality for characterization of surface composition. Vertical maps contained 100 scan points, with variable longitudinal step size and depth optimization. Each scan captured a spectral range of 700 to 1850 cm\(^{-1}\). Laser autofocus was varied between video and spectral (range 1452-1456 cm\(^{-1}\)). Spectra were analyzed using Raman spectral collection software and compared with published articular cartilage data.

Results: Utilizing the 10x objective, 100% power, spectral autofocus (1452-1456 cm\(^{-1}\)), an acquisition time of 2 seconds with 3 acquisitions per scan a consistent, clean spectrum was produced with characteristic peaks at 1060 cm\(^{-1}\) for glycosaminoglycans, 1246 cm\(^{-1}\) for a unique type II collagen peak and 1663 cm\(^{-1}\) for water. Vertical map scans traversing the cross-sectional depth of the cartilage produced increasing signal strength for each characteristic peak with increasing cartilage depth.

Conclusion/Significance: While our current protocol produced findings in agreement with published literature, slight parameter changes altered spectral quality making it difficult to determine a true optimum. Utilization of a higher power water-immersion or long-working-distance objective is likely to produce more useful spectra. Tissue preparation techniques must be developed to ensure homogenous surface topography enabling consistent autofocus surface recognition. These advancements will allow for the implementation of three-dimensional scans, with which a more significant analysis of biochemical characteristics can be performed. This study has provided cursory data, validating Raman as a tool that can accurately characterize the biochemical composition of bovine articular cartilage. Further development of cartilage analysis techniques with Raman spectroscopy can pave the way for rapid analysis of the biochemical changes that occur within articular cartilage following mechanical stress.
Abstract #: 174

Session Type: Poster
Category: Musculoskeletal-Orthopaedics

A CADAVERIC STUDY OF ARTHROSCOPIC HIP CAM IMPINGEMENT TREATMENT: BIOMECHANICAL COMPARISON OF CONTACT PRESSURES BETWEEN PARTIAL VERSUS COMPLETE FEMORAL OSTEOPLASTY

Presenting Author: Laura Krivicich, BS
Authors: Laura M. Krivicich (Rush); Sunikom Suppauksorn (Rush); Jourdan M. Cancienne (Rush); Edward Beck (Rush); Elizabeth Shewman (Rush); Jorge Chahla (Rush); Shane J. Nho (Rush)

Introduction: The biomechanical consequences of incomplete deformity correction during hip arthroscopy have not been studied. To better understand the causality between incomplete deformity correction and failure to clinically improve following surgery, joint contact pressures should be studied in various states of CAM deformity.

Objective: To determine the differences in biomechanical properties between native CAM deformity, CAM deformity with incomplete resection, and CAM deformity with complete resection.

Methods: A cadaveric study was performed using 8 frozen hemi-pelvises with CAM-type deformity (alpha angle >55i,°) measured on CT scan and an intact labrum. Intraarticular pressure maps were produced for each specimen under the following conditions: 1) native CAM deformity, 2) CAM deformity with incomplete resection and 3) CAM deformity with complete resection. A 5.5-mm burr was used to resect the lateral portion of the CAM deformity to a depth of 3-4 mm. The specimen was placed in a custom designed jig in the MTS electromechanical test system to create pressure and area map measurements. In each condition, contact pressure, contact area, and peak force within a region-of-interest (ROI) were obtained. Repeated measurements were performed three times in each condition, and the average value of each parameter was used for statistical analysis. ANOVA was used to compare biomechanical parameters between three conditions.

Results: CAM deformity with complete resection demonstrated statistically significant lower contact pressure (15.94+2.15 mm2) compared with incomplete resection (15.92+2.24mm2) and native CAM deformity (15.84+2.18 mm2). Percentage reduction of contact pressure in the complete resection and incomplete resection groups compared to the native CAM deformity group were 18.49% and 1.58% respectively. There was no statistically significant difference in contact pressures between the incomplete resection and unoperated groups. Contact area and peak force showed no statistically significant differences across three conditions.

Conclusion/Significance: There are lower intraarticular hip contact pressures in complete resection of the cam lesions when compared to an incomplete resection and intact hip without resection. These observations underscore the importance of ensuring complete resection of femoral cam lesions in patients undergoing hip arthroscopy for FAIS. Biomechanical properties in native CAM deformity and incomplete resection are similar. Complete resection may reduce contact pressure in the femoroacetabular joint.
CELL IDENTIFICATION AND SUB-CELLULAR CHEMICAL CHARACTERIZATION USING HD FTIR-IMAGING: A MULTIVARIATE ANALYSIS

Presenting Author: Songyun Liu, MS
Authors: Songyun Liu (UIC, RUMC), Deborah J. Hall (RUMC), Stephanie M. McCarthy (RUMC), Si Chen (APS-ANL), Joshua J. Jacobs (RUMC), Robert M. Urban (RUMC), Robin Pourzal (RUMC)

Introduction: Wear and corrosion debris generated from total hip replacements (THR) can cause adverse local tissue reactions (ALTR) or osteolysis, often leading to premature implant failure. The tissue response can be best characterized by histopathological analysis, which accurately determines the presence of cell types, but is limited in the characterization of biochemical information (i.e. protein conformation alteration). Fourier transform infrared micro-spectroscopy imaging (FTIRI) enables rapid analysis of the chemical structure of biological tissue with a high spatial resolution, and minimal additional sample preparation. The data provides the most information through data classification carried out by multivariate methods.

Objective: It is the goal of this study to demonstrate the beneficial use of this multivariate approach in providing pathologist with biochemical information from cellular and sub-cellular organization within joint capsule and remote organ tissue retrieved from THR patients.

Methods: Joint capsule tissue from 2 retrieved THRs were studied. Case 1: a metal-on-polyethylene THR, and Case 2: a dual modular metal-on-metal THR. For the FTIRI analysis, tissue samples were formalin-fixed and paraffin-embedded and sectioned into 5μm thick samples and placed on separate BaF2 discs for deparaffinized. FTIRI data were collected with an Agilent Cary using high-mag transmission mode. Hyperspectral images were exported to CytoSpec V2.0.05 for further processing to reconstruct into pseudo-color maps based on cluster assignments.

Results: Case 1 exhibited a strong presence of lymphocytes and macrophages. The multivariate HCA was able to distinguish macrophages and lymphocytes based on the infrared response, even in areas where both occurred intermixed. Large CrPO4 particles due to taper corrosion embedded within fibrin exudate rich areas were also confirmed through clustering. In Case 2 exhibited a strong macrophage presence indicative of a foreign body reaction. Interestingly, up to three different macrophage types could be distinguished by HCA depending on the type of foreign body or mixtures of foreign bodies that were up taken by the cells.

Conclusion/Significance: The results demonstrate that multivariate FTIRI approach is a powerful tool to characterize the chemical structure and foreign body response of joint capsule tissue, which is a promising tool for spectral histopathology to aid in clinical diagnosis and quantification of histopathological patterns.
Abstract #: 176

Session Type: Poster
Category: Musculoskeletal-Orthopaedics

FEMORAL OFFSET AND TOPOGRAPHICAL GEOMETRY ARE MORE IMPORTANT DETERMINANTS OF TAPER DAMAGE IN TOTAL HIP MODULAR JUNCTIONS THAN FLEXURAL RIGIDITY

Presenting Author: Stephanie McCarthy, BS
Authors: Stephanie McCarthy (Rush); Sean M. Kearns (Tulane University); Deborah J. Hall (Rush); Laura Quigley (Rush); Brett R. Levine (Rush); Robin Pourzal (Rush); Hannah J. Lundberg (Rush).

Introduction: Modular head-neck junctions have been used with great success in total hip arthroplasty (THA), yet there are increasing reports of failure requiring revision surgery attributed to this junction. The major contributing factors that coincide with these failures are still debated.

Objective: The purpose of this study is to evaluate multiple patient specific and implant design factors for their association with damage on retrieved THA stem and head taper surfaces.

Methods: Under IRB approval, we examined 99 revision THAs with a modified Goldberg score. Implant parameters were measured using digital calipers, an optical coordinate measuring machine, and white light interferometry. Radiographic measurements and patient specific factors were obtained. A multiple regression model was developed to determine the effect of the radiograph measurements (femoral offset and inclination angle), patient BMI, time in situ, and implant design parameters (stem taper flexural rigidity, size, material, and surface topography (microgroove height and spacing), engagement length between both tapers, stem-head taper angular mismatch, head size, and head taper surface roughness (Ra)) on damage scores.

Results: The factors associated with stem taper damage were femoral offset (p=0.003), stem taper microgroove height (p=0.015), and head taper Ra (p=0.037). Femoral offset (p=0.015) and stem taper microgroove spacing (p=0.029) were associated with head taper damage scores. All additional factors were not significant, including flexural rigidity.

Conclusion/Significance: Femoral offset and surface topography were the only factors that significantly contributed to damage on both tapers. Unlike previous studies, flexural rigidity was not associated with damage on either taper. It appears the resistance to bending between the stem axis and center of the femoral head (femoral offset) is more important than the resistance to bending of the stem taper itself (flexural rigidity). In addition, several surface topography factors contributed to damage scores. This indicates that taper surface topography likely influences the initial stability of the junction, determining the onset of micromotion and thus the extent of fretting corrosion damage. By understanding the factors impacting fretting corrosion damage in modular taper junctions, implant design optimization can reduce these occurrences and therefore the risk of revision surgery.
TOTAL KNEE REPLACEMENT WEAR IS MOST SENSITIVE TO TRANSVERSE PLANE ALIGNMENT- A PARAMETRIC FINITE ELEMENT STUDY

Presenting Author: Steven Mell, BS, PhD
Authors: Steven P. Mell (Rush), Markus A. Wimmer (Rush), Joshua J. Jacobs (Rush), Hannah J. Lundberg (Rush)

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 in both the AP and superior/inferior directions, and location of the tibial IE axis in the medial/lateral (ML) direction. ISO 14243-3:2014 displacement 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 2.7 to 17.2 mm3/million cycles within the simulations performed. The linear regression model included all first order terms except for femoral component VV angle. All terms were significant (p<0.05) except for the location of the femoral CoR in the AP direction and the ML location of the tibial IE axis. The regression model was highly significant to p << 0.001. Model R-squared was 0.72, explaining most of the variance in the FEA predictions. The three most influential parameters were femoral component IE angle, tibial insert IE angle, and tibial slope.

Conclusion/Significance: In this study nine alignment parameters were investigated and eight were found to have significant influences on wear, with femoral and tibial component IE angles and tibial slope the most influential. The linear regression model generated was able to explain 72% of the variability in the output data. This study suggests that TKR wear is highly sensitive to transverse plane alignment and care should be taken to properly align components during surgery.
SURGICAL IMPACTION FORCE DURING TOTAL HIP ARTHROPLASTY: EFFECT OF MATERIAL AND EXPERIENCE LEVEL

Abstract #: 178
Session Type: Poster
Category: Musculoskeletal-Orthopaedics

Presenting Author: Kirsten Sipek, BS
Authors: Kirsten Sipek (UIC); Jonathan Gustafson (RUMC); Robin Pourzal (RUMC)

Introduction: Total hip arthroplasty (THA) is a commonly performed procedure to relieve arthritis or traumatic injury. However, implant failure can occur from loosening or crevice corrosion as a result of inadequate seating during implantation. It is unclear if the material choice—metal or ceramic—can affect the assembly force applied by the surgeon while considering their experience level.

Objective: The objective of this study was to evaluate the differences in surgical assembly force considering two materials—metal and ceramic heads—while ascertaining the effects of surgeon experience to implant assembly.

Methods: A total of 30 surgeons of varying levels (Attending, Fellow, Resident, Medical Student) were recruited and asked to perform a benchtop, modular taper assembly using an instrumented apparatus simulating a procedure in the operating room. The apparatus comprised of a 12/14 stem taper attached to a 3-dimensional (3D) force sensor (9347C, Kistler® USA, Amherst, NY). Surgeons were randomly assigned a metal or ceramic femoral head and instructed to assemble the taper using their preferred surgical technique. This procedure was repeated five times. Surgeons were brought back to test the opposite material after four weeks. Output 3D force data was analyzed for differences in peak vertical force applied, angle of deviation from the stem axis, and variability between trials.

Results: Preliminary results suggest no significant differences between the forces applied to the metal heads and the ceramic heads. Attending surgeons applied the greatest force (8.2 kN; Fellow=5.2 kN; Resident=6.7 kN; Students= 7.1 kN) regardless of material and exhibited the lowest variability among the different surgeon groups. Attending surgeons also applied their force with the smallest off-axis angle (4.2° vs Fellow=6.6° vs Resident=4.7° vs Students= 4.4°). Lastly, the impaction force plots suggest that the first impact strike is the most crucial for head stability.

Conclusion/Significance: Differences in impaction force when assembling metal and ceramic femoral heads were not apparent; however, significant variability of technique and force was observed across the different surgical experience levels as well as within surgeons of the same level. Understanding assembly mechanics and surgical habits for THR will provide insight to the best assembly procedures for these implants.
**Abstract #:** 179

**Session Type:** Poster  
**Category:** Musculoskeletal-Orthopaedics

**COMPARISON OF BONE TURNOVER BIOMARKERS IN SERUM AND URINE FROM TOTAL HIP REPLACEMENT PATIENTS MEASURED ON AN AUTOMATED ANALYTICAL PLATFORM**

**Presenting Author:** Brittany Wilson, BS, BA  
**Authors:** Brittany M. Wilson (RUMC), Ryan D. Ross (RUMC), Joshua J. Jacobs (RUMC), and D. Rick Sumner (RUMC)

**Introduction:** Validation of biomarkers for peri-implant osteolysis and aseptic loosening remains a challenge primarily due to the lack of prospective studies in the target population. A unique repository of fluids from total hip replacement (THR) patients has been maintained at Rush University Medical Center. Standard reagents validated for use in serum are available on an automated clinical platform, but the applicability of these reagents for use in urine is unknown.

**Objective:** To assess the utility of serum-validated immunoassay reagents for use in urine by comparing to matched serum samples from THR patients.

**Methods:** The study was approved by the IRB on human research and signed consent was obtained from each patient. Matched serum and urine samples were evaluated by an automated electrochemiluminescent immunoassay (Roche Diagnostics, cobas e411) for C-terminal telopeptide of type-I collagen isoform \( \beta \) (\( \beta \)-Crosslaps), osteocalcin N-terminal mid fragment (N-MID OC), N-terminal propeptide of type-I collagen (PINP), and interleukin-6 (IL-6). Correlations between serum and both raw and creatinine-corrected urinary measures were assessed. Spike and recovery experiments were utilized to assess urinary matrix effects.

**Results:** For \( \beta \)-Crosslaps, there were strong correlations between serum and raw (rs=0.711, \( p<0.0001 \)) and creatinine-corrected (rs=0.779, \( p<0.0001 \)) urinary measures. There were moderate correlations between serum N-MID OC and raw (rs=0.582, \( p<0.0001 \)) and creatinine-corrected (rs=0.482, \( p<0.0001 \)) urinary measures. PINP was not detected in urine, and no significant correlations were observed between serum IL-6 and raw (rs=0.262, \( p=0.069 \)) and creatinine-corrected (rs=0.122, \( p=0.403 \)) urinary concentrations. Spike and recovery experiments indicated minimal matrix effects of urine on the \( \beta \)-Crosslaps assay. Potential matrix effects were observed for the other analytes as N-MID OC and IL-6 tended to be slightly over-recovered while PINP was under-recovered.

**Conclusion/Significance:** Assays for \( \beta \)-Crosslaps and N-MID OC performed well in human urine using the serum-validated reagents on an automated platform. The serum PINP assay is not recommended for use in urine. IL-6 can be measured in urine using this technology, but stability and matrix effects should be considered. This study broadens the utility of using biomarkers to detect or monitor peri-implant osteolysis by validating the use of an automated platform to measure analyte levels in urine.
Abstract #: 180

Session Type: Poster
Category: Musculoskeletal-Orthopaedics

TRANSIENT STIFFENING DURING JOINT ARTICULATION IS A UNIQUE FEATURE OF THE SUPERFICIAL ZONE IN CARTILAGE

Presenting Author: Catherine Yuh, BS, MS
Authors: Catherine Yuh (Rush); Michel Laurent (Rush); Susan Chubinskaya (Rush); Markus A Wimmer (Rush)

Introduction: Removal of the superficial zone in articular cartilage has been shown to alter tissue properties and function. Cartilage surface mechanical responses to articular loading when the surface is removed remains unclear.

Objective: To elucidate how surface removal affects cartilage stiffness following articular loading, a bioreactor was employed to apply articular loading on surface-intact and surface-removed explants. Microindentation was utilized to assess stiffness changes due to articular loading.

Methods: Twenty-four 14x20x3-mm oval explants were procured from freeze-thawed 24-week-old bovine trochlear grooves, placed in 1× PBS at 4°C, and distributed into four groups/animal (n=6): 1) loaded + surface-intact; 2) loaded + surface-removed; 3) free-swelling-control + surface-intact; 4) free-swelling-control + surface-removed. Using a vibratome, ~500 μm of the surface was removed from surface-removed explants. Removal of the superficial zone was confirmed with Safranin O staining. Stress-relaxation indentation submerged in 1× PBS was performed with a 20-μm conospherical indenter and an 8-μm indent depth. Following initial stiffness characterization, 40-N confined compression, 0.5 Hz ±15° articulation, and 0.1 Hz ±7.5° migrating contact was applied to explants using a 32-mm alumina ball in a bioreactor for 1 hour. Following bioreactor testing, microindentation was repeated. For data analysis, the ratio of post:pre-bioreactor stiffness was calculated and analyzed using Shapiro-Wilks tests, analysis of variance blocked by animal, and pairwise comparisons.

Results: For surface-intact explants, compared to the free-swelling-controls, articular loading significantly increased surface stiffness (p=0.006). For surface-removed explants, no significant difference was detected between loaded and free-swelling-control explants (p=0.927). When comparing loaded groups, surface-intact explants had significantly increased in surface stiffness response compared to surface-removed explants (p=0.013).

Conclusion/Significance: Intact cartilage displays surface stiffening following tribological stress, which may indicate an important biomechanical feature that facilitates load transfer during articular loading. This study demonstrates that cartilage adaptive stiffening to load is a unique feature of the superficial zone. Surface removal reduces this adaptive response, suggesting that the superficial zone has unique structural features that allow changes of the stiffness properties of cartilage upon loading. This indicates that the superficial zone is crucial for cartilage load-bearing function. These findings provide further insight on baseline cartilage functional health from a mechanical perspective.
Abstract #: 181

Session Type: Poster
Category: Nephrology

SEPARATION AND IDENTIFICATION OF MONOSACCHARIDES IN A MIXTURE USING LC/MS/MS

Presenting Author: Pascal Bus, PhD
Authors: P. Bus PhD, S.S. Chugh, MD  Department of Internal Medicine, Rush University Medical Center

Introduction: Liquid chromatography in combination with mass spectrometry offers a great method to identify and quantify molecules with high specificity and sensitivity in pure or biological samples. The identification and quantification of monosaccharides is challenging due to their hydrophobicity. Therefore, monosaccharides are difficult to ionize as well as to desalt resulting in a loss of signal and ion suppression.

Objective: To modify monosaccharides involved in the sialic acid pathway in order to separate and identify these monosaccharides in a mixture using LC/MS/MS.

Methods: Studies were performed on an UltiMate 3000 analytical LC (Thermo Scientific) in combination with a Thermo Accucore Vanquish C18+, 21x100 mm, 2.7 um column, interfaced to a TSQ triple quadrupole with an ESI source (Thermo Scientific). The oven temperature was fixed at 55˚C. The mobile phase consisted of 0.1% formic acid in LCMS-grade water (A) and 0.1% formic acid in LCMS-grade acetonitrile (B) and run in multiple gradient slopes to optimize sample separation. Monosaccharides present in the sugar mixture samples included an internal standard and were modified to improve column retention time.

Results: Modifications of our sugar mixture had an efficiency of 99.75% and resulted in an enhanced column retention time, and to the separation of the internal standard and all monosaccharides present in our sample, including isomers. There was no significant interference with ionization of the monosaccharides by salts due to an adequate retention time of the monosaccharides. The use of different gradient slopes of increasing percentage of mobile phase B, improved the separation and identification of the monosaccharides even further.

Conclusion/Significance: Modification of the monosaccharides involved in the sialic acid pathway in combination with LC mobile phase gradients resulted in an optimal separation and identification of these monosaccharides.
WEEKLY SUBCUTANEOUS MUTATED HUMAN ANGIPOIETIN - LIKE 4 (8520) IMPROVES CKD IN DIABETIC RATS VIA AN ANTI-ENDOTHELIAL APOPTOSIS MECHANISM

**Presenting Author:** Maria Del Nogal Avila, PhD  
**Authors:** Maria Del Nogal Avila (RUMC), Ranjan Das (RUMC), Joubert Kharlyngdoh (RUMC), Hector Donoro (RUMC), Eduardo Molina Jijon (RUMC), Lionel Clement (RUMC), Camille Mace (RUMC), Carmen Avila Casado (UToronto), Sumant S. Chugh (RUMC).

**Introduction:** We previously showed that single intravenous dosing of recombinant mutated human Angptl4 (8520) reduces proteinuria for over 2 weeks in diabetic rats (Clement L, Mace C, et al Nature Medicine Jan 2014). We now tested whether subcutaneous doses in diabetic rats would reduce CKD.

**Objective:** Study the effect of subcutaneous administration of 8520 in diabetic rats.

**Methods:** We treated male ZSF1 rats (n = 5 rats / group) with 8520 or rat albumin once a week subcutaneously in declining doses, starting with 500 μg per dose on Week 0 (W0) to 125 μg on Week 9, to 100 μg on Week 15 and 50 μg on Week 16, after which the treatment was stopped and rats sacrificed on W20. Food and water intake, proteinuria, blood glucose, plasma human Angptl4 levels and serum parameters were measured periodically.

**Results:** Pharmacokinetic assessment of plasma human Angptl4 (8520) levels showed elevated levels between W1 and W15 at dose ranges between 500 μg and 100 μg subcutaneously per week. Plasma levels were statistically similar at doses between 500 μg and 125 μg. Plasma creatinine was significantly lower in the treatment group (P < 0.01 to P < 0.001) between doses 500 and 125 μg, and BUN between 500 and 100 μg (P < 0.05). 18-hour proteinuria was mostly similar between treatment and control groups, and as were the plasma glucose and triglyceride levels. Histological improvement revealed very significant improvement morphometric parameters in the treatment compared to control group. TUNEL staining for apoptosis revealed very significant reduction in interstitial capillary endothelial apoptosis in the treatment vs. the control group (P < 0.001).

**Conclusion/Significance:** Weekly subcutaneous doses of mutated human Angptl4 in ZSF1 rats improves GFR at doses between 500 and 125 μg. Despite sub-therapeutic doses and stopping treatment towards the end, morphology was significantly improved, suggesting a memory effect. The absence of effects on proteinuria and the highly significant difference in interstitial capillary endothelial apoptosis suggests that the beneficial effects of subcutaneous dosing are mediated by preserving interstitial capillaries and presumably promoting repair in the treatment group.
THE SIALYLATION-INDUCING COMPOUND GDT-01 IMPROVE DIABETIC NEPHROPATHY AND PRESERVE GFR IN ZSF1 RATS OVER 7 MONTHS PERIOD

Presenting Author: Joubert Kharlyngdoh, PhD
Authors: Joubert Kharlyndoh PhD (RUMC), Maria Del Nogal Avila PhD(RUMC), Pascal Bus PhD(RUMC), Ranjan Das PhD(RUMC), Eduardo Molina Jijon PhD(RUMC), Hector Donoro BE(RUMC), Lionel Clement PhD(RUMC), Camille Mace PhD(RUMC), Sumant S. Chugh MD(RUMC).

Introduction: Using of the previously published sialic acid precursor ManNAc (Clement LC et al. Nature Medicine Jan 2011) on rat diabetic nephropathy studies were observed to worsen hyperglycaemia in ZDF rats, indicating a long term harmful effect. A seven-month study on male ZSF1 rats was conducted to improve in vivo sialylation in the glomerulus using the compound GDT-01 with the goal of studying its effect on Chronic Kidney Diseases and hyperglycaemia in rat diabetic nephropathy

Objective: The main objective of the study was aimed at discovering novel therapeutics for diabetic nephropathy and chronic kidney diseases

Methods: Five months old male ZSF1 rats (n = 6 rats / group) were treated orally with tap water or GDT-01 in bottle tap water over a period of 7 months. Measurement of proteinuria, BUN, creatinine, blood glucose, and other blood parameters were performed weekly, and renal histological changes were assessed on the termination of the study.

Results: A declining dose regimen for GDT-01 was used, and the actual dose delivered (mg / Kg; mean + SE) over 3 separate periods was as follows: Period A, Days 0 to 95, 136.8 + 11.8; Period B, Days 96 to 122, 21.5 + 5; Period C, Days 123 to 222, 3.7 + 0.2. Proteinuria was consistently lower in the treated group in Period C (10/14 readings, P<0.05), occasionally in Period B (1/4 readings), and rarely lower in Period A (2/14 readings). Blood glucose levels were similar between the GDT-01 and water groups. BUN and creatinine were consistently lower in the treatment group in Period C (BUN, 7/14, P < 0.05 to 0.01; creatinine, 5/14, P<0.05), and only occasionally in Periods A and B. Detailed renal histology and sialylation analysis are ongoing

Conclusion/Significance: Low oral doses of the sialylation inducing compound GDT-01 improve GFR and proteinuria over prolonged periods of time without worsening hyperglycaemia in ZSF1 diabetic rats.
ROLE OF RENAL PCSK9 IN NEPHROTIC SYNDROME

Presenting Author: Eduardo Molina-Jijon, PhD
Authors: Eduardo Molina-Jijon PhD (RUMC); Stephanie Gambut MS (RUMC); Camille Mace PhD (RUMC); Lionel Clement PhD (RUMC)

Introduction: Nephrotic syndrome is a major component of human kidney disease, and patients with this condition develop large amounts of proteinuria and elevated levels of plasma lipids (triglycerides and cholesterol). Percentage of nephrotic syndrome patients that develop high levels of low density lipoproteins (LDL) is much more important than in the general population. We hypothesize that in nephrotic syndrome, the kidney directly plays a major role in the development of hypercholesterolemia.

Objective: We study a potential role of kidney cortical collecting duct (CCD) secreted proprotein convertase subtilisin/kexin type 9 (PCSK9) in the molecular mechanisms of the pathogenesis of hypercholesterolemia in nephrotic syndrome. Temporality between kidney and hepatic PCSK9 expression and serum cholesterol levels was studied during the development of nephrotic syndrome in mouse. The proof of concept of the phenomenon will come from the use of generated PCSK9-CCD knock-out mice in which nephrotic syndrome will be induced.

Methods: We followed Rrm2b mice (IACUC 16-045), a model of collapsing glomerulopathy a kidney disease presenting nephrotic syndrome, weekly between 5 and 12 weeks of age. We collected urine for 18 hours and measured albuminuria. We assessed serum levels of cholesterol, and studied PCSK9 protein expression in glomerular cortex, liver and serum.

Results: In Rrm2b mice, we showed that PCSK9, a protein implicated in the pathogenesis of hypercholesterolemia in liver, is present in the kidney of these mice, especially in the CCD. Its protein expression occurs in temporal correlation with the development of hypercholesterolemia. Furthermore, as disease progresses, PCSK9 expression is increased in glomerular cortex, but decreased in liver and serum. We generated CCD-PCSK9 knock-out mice. When injected with Tπ2-nephrotoxic serum to induce kidney disease, CCD knock-out mice develop less albuminuria and no hypercholesterolemia compared to control mice.

Conclusion/Significance: Lack of expression of PCSK9 from the CCD in mice seems to protect them from developing hypercholesterolemia. A link between renal PCSK9 and hypercholesterolemia would be a novel and logical mechanistic component of nephrotic syndrome. This link could then become a therapeutic target to prevent the development of hypercholesterolemia in nephrotic syndrome.
Abstract #: 185

Session Type: Poster
Category: Nephrology

SOLUBLE UROKINASE-TYPE PLASMINOGEN ACTIVATOR RECEPTOR (SUPAR) MEDIATES THE PATHOGENESIS OF CONTRAST-INDUCED ACUTE KIDNEY INJURY

Presenting Author: Gary Wu, BS
Authors: Gary Wu, BS (Rush); Jing Li (RUMC); Changli Wei MD, PhD (RUMC); Jochen Reiser MD, PhD (RUMC)

Introduction: Iodinated contrast agents are commonly used in diagnostic imaging including computed tomography and magnetic resonance imaging to enhance visualization of internal anatomical structures. A common iatrogenic insult due to contrast use is acute kidney injury (AKI). Although the association between contrast use and AKI is well documented, there is no clear mechanism in the literature regarding the pathogenesis of contrast-induced AKI (CI-AKI).

Objective: suPAR is a marker well studied for its association with focal segmental glomerulosclerosis and its chemotactic ability to recruit inflammatory cells. Our goal is to determine whether suPAR plays a role in the pathogenesis of CI-AKI.

Methods: We used four groups of mice for this pilot study. There is a wildtype group as control, two suPAR transgenic (overexpresses suPAR) groups, and a uPAR knockout group. Baseline urine and serum samples were collected from each mouse before a 48-hour dehydration period. One of the suPAR transgenic groups was given an IV dose of suPAR blocking antibody 30 minutes prior to contrast introduction. All four groups received an AKI inducing cocktail of iodinated contrast (Iohexol), Indomethacin, and N(G)-Nitro-L-arginine methyl ester. Urine and serum samples were collected from each mouse at 24 and 48-hour timepoints and analyzed for markers of renal injury including creatinine, BUN, suPAR, and KIM-1.

Results: There was no significant difference in levels of serum creatinine between the control and experimental groups through the first 48 hours post contrast injection. There were statistically significant fold changes in the transgenic group that did not receive the suPAR blocking antibody for serum BUN, serum suPAR, and urine KIM-1 levels when compared with the control group, transgenic group without suPAR blocking antibody, and uPAR knockout group.

Conclusion/Significance: From our limited pilot study, suPAR seems likely to play a role in the pathogenesis of CI-AKI. Replication of this study with a larger sample size may help elucidate a firmer conclusion between the role of suPAR in CK-AKI. By understanding the pathogenesis of CK-AKI, researchers and physicians can implement ways to prevent contrast-induced complications during and post diagnostic imaging or procedures that use iodinated contrast agents.
Introduction: Fragile X-Associated Tremor/Ataxia Syndrome (FXTAS) occurs in some carriers of a premutation size 55-200 CGG repeat expansion in the fragile X mental retardation 1 gene. FXTAS patients characteristically develop progressively debilitating tremor, incoordination and cerebellar ataxia. However, early predictors of FXTAS onset are needed and quantitative measurements of tremor profiles and fine motor function may be useful in natural history studies, response to medications and as outcome measures in future clinical trials in FXTAS.

Objective: To test if the inertial sensor based ETSense™ system can quantify the presence and severity of tremor subtypes and bradykinesia in FXTAS and potentially predict preclinical symptoms in premutation carriers (PMC) without a diagnosis of FXTAS.

Methods: Healthy controls (n=27, Mean age=65.4 + 9.1), PMC without FXTAS (n=20, Mean age=53.5 + 10.6) and PMC with FXTAS (n=39, Mean age=67.8 + 8.5) performed a series of upper extremity motor tasks while wearing the inertial sensor and different types of tremor and bradykinesia were quantified. Regression analysis controlling for age and sex was performed with FXTAS diagnosis group as the main predictor variable. The FXTAS Rating scale (FXTAS-RS) was administered to determine whether these scores correlate with tremorography measures.

Results: PMC with FXTAS had significantly greater postural and kinetic tremor compared to PMC without FXTAS (p=0.04;0.03) and controls (p=0.001;0.0001), respectively. FXTAS participants also had significantly reduced finger tap (p=0.0009), hand movement (p=0.0001) and rapid alternating movement (RAS) speed (p=0.003) and amplitude (p=0.04) than controls. PMC without FXTAS had significantly worse right finger tap (p=0.004), hand movement (p=0.01) and RAM speed (p=0.003) and RAM amplitude (p=0.02) than controls. All quantitative scores from the ETSense™ tremorography system except for finger tap speed/amplitude were significantly correlated with the FXTAS-RS (p=0.02 to < 0.0001).

Conclusion/Significance: The inertial sensor-based ETSense™ system is a feasible, portable and low cost method of quantifying UE tremor and bradykinesia in FXTAS and may have potential in detecting preclinical symptoms of UE speed deficits and the quality of RAM in PMC without a FXTAS diagnosis. Further validation of these measures and confirmation of preclinical disease identification in longitudinal studies with higher subject numbers are needed.
INVolVEMENT OF MITOCHONDRIAL COMPLEXES IN METHAMPHETAMINE-INDUCED VULNERABILITY TO DEVELOP PD

Presenting Author: I. Daphne Calma, BS, MS
Authors: I. Daphne Calm, MS (Rush University); Amanda Persons, PhD (Rush University); and T. Celeste Napier, PhD (Rush University)

Introduction: Methamphetamine (meth) abusers are at risk for developing Parkinson's disease (PD). We revealed that rats self-administering (SA) meth exhibit late-emerging PD-like motor deficits (bradykinesia), reductions in striatal tyrosine hydroxylase (TH) levels and mitochondrial dysfunction (cytochrome c translocation).

Objective: Here, we tested the hypothesis that deficits in electron transport chain complexes underlie meth-induced mitochondrial dysfunction. Thus, we tested the ability of rotenone, a mitochondrial toxin that disrupts electron transport, to enhance the neuropathological effects of meth, when rotenone is given in a dose that is subthreshold to causing pathologies alone.

Methods: Male Sprague-Dawley meth SA rats (0.1mg/kg/0.1mL infusion) and saline-yoked controls were subjected to 14 once-daily, 3hr sessions. On meth forced-abstinence (FA) day 14, rats were randomly assigned to receive vehicle or rotenone (1mg/kg/day) via subcutaneous osmotic minipumps for 6 days. Rats were sacrificed on meth FA 60. In the striatum, TH was measured using immunohistochemistry and mitochondrial complexes were assessed via immunoblotting.

Results: TH staining showed a main meth effect, no rotenone effect, but a significant interaction. Post hoc analysis indicated meth SA+rotenone rats had lower levels of TH compared to meth SA+vehicle rats (p<0.05). There was a main rotenone effect for complex I and complex II (p<0.05), a main meth effect for complex II (p<0.05), but no interaction. A post hoc analysis revealed meth SA+rotenone rats had significant reductions in complex II compared to saline-yoked rats (p<0.05). These trends parallel the exaggerated bradykinesia seen in meth SA+rotenone rats.

Conclusion/Significance: A subthreshold dose of rotenone was sufficient to exacerbate the TH loss and motor deficits seen in rats with a history of meth SA. Both meth and rotenone reduced the levels of mitochondrial complex I and II proteins. We plan to determine if changes in activity levels of these complexes are involved.
LOSS OF ONE ENGRAILED1 ALLELE ENHANCES INDUCED ALPHA-SYNUCLEINOPATHY

Presenting Author: Diptaman Chatterjee, BS
Authors: Diptaman Chatterjee (Rush), Daniel Saiz Sanchez (Van Andel Institute), Emmanuel Quansah (Van Andel Institute), Nolwen L. Rey (Van Andel Institute), Sonia George (Van Andel Institute), Katelyn Becker (Van Andel Institute), Zachary Madaj (Van Andel Institute), Jiyan Ma (Van Andel Institute), Jeffrey H. Kordower (Rush, Van Andel Institute), Patrik Brundin (Van Andel Institute)

Introduction: Parkinson's disease (PD) is a synucleinopathy that has multiple neuropathological characteristics, with degeneration of the nigrostriatal dopamine system being a core feature. Current models of PD pathology typically fail to recapitulate several attributes of the pathogenic process and neuropathology. We aimed to define the effects of combining two primary pathogenic factors, mitochondrial deficits and proteostatic stress, on the formation and distribution of pathological protein aggregates. We employed the heterozygous Engrailed 1 (En1+/−) mouse that features progressive loss of nigral dopamine neurons, striatal dopamine deficiency, axonal degeneration, terminal dysfunction, perturbed autophagic signaling and neuroinflammation. All these features have previously been characterized and are consequential to partial loss of En1 in nigral dopamine neurons.

Objective: We tested the hypothesis that heterozygous loss of En1+/− will promote formation of α-synuclein (α-syn) aggregates following intrastriatal injections of pathogenic human α-syn pre-formed fibrils (PFFs).

Methods: We unilaterally injected the striata of 1 month-old En1+/− and control WT mice with PFFs and euthanized animals at 3 months of age for post-mortem analysis.

Results: Using immunohistochemistry and unbiased stereology, we established that, following the intrastriatal PFF injection, En1+/− mice exhibited a near-threelfold increase in pS129-α-syn-positive neurons (pathological α-syn) in the substantia nigra when compared to WT mice injected with PFFs. The PFF-injected En1+/− mice also displayed significant increases in pS129-α-syn-positive neurons in the amygdala and ventral tegmental area; regions of known PD pathology with direct projections to the striatum. Additionally, we qualitatively observed amplified pS129-α-syn-positive aggregates in En1+/− mice in cortical regions including, but not limited to, motor cortex, perirhinal/entorhinal cortices, and somatosensory cortex.

Conclusion/Significance: In conclusion, we found that following intrastriatal injection of PFFs, absence of an En1 allele leads to additional aggregation of pathological α-syn, potentially due to the mitochondrial impairment which is specific to the nigrostriatal pathway. Because it exhibits multiple neuropathological features that are analogous to those seen in PD and has underlying pathogenic factors relevant to PD, we propose that further development of this double-hit model could be predictive of pre-clinical therapeutic development and success for PD than existing mouse models.
Abstract #: 189

Session Type: Poster
Category: Neurology

ANTIRETROVIRAL DRUGS INCREASE EXCITABILITY OF PYRAMIDAL NEURONS IN THE RAT MEDIAL PREFRONTAL CORTEX BY ENHANCING VOLTAGE-SENSITIVE CA2+ CHANNEL ACTIVITY

Presenting Author: Lihua Chen, PhD
Authors: Lihua Chen (RUMC), Lena Al-Harthi (RUMC), Xiu-Ti Hu (RUMC)

Introduction: Combined antiretroviral therapy (cART) suppresses HIV replication, improves immune function, and prolongs life of HIV+ patients. Despite cART, the prevalence of HIV-associated neurocognitive disorders (HAND) occurs in ~50% of HIV+ patients. Compiling evidence suggests that many anti-retroviral medicines (ARVs) could induce neurotoxicity, causing reduced dendritic processes, neuronal shrinkage, and mitochondrial dysfunction. But very little known is the impact of the side effects of ARVs on the neuronal activity in the brain regions that regulate neurocognition, but are profoundly altered by HIV.

Objective: 1 to 2 months old male rats were used in current study.

Methods: Triumeq is a first-line cART regimen for treating HIV/AIDS. It is formulated by three ARVs: abacavir (ABC, a nucleoside reverse transcriptase inhibitor, NRTI), dolutegravir (DTG, an integrase inhibitor), and lamivudine (3TC, another NRTI). In current study, we assessed the acute (10min) effects of 3TC and the acute or chronic (2 or 4 weeks S.C. injection) effects of Triumeq on the firing of pyramidal neurons in the medial prefrontal cortex (mPFC, a key regulator of neurocognition) using whole-cell patch-clamp recording in rat brain slices.

Results: We found that 3TC in bath induced a significant increase in firing of mPFC neurons in a dose-dependent manner. This hyperactivity was associated with a significantly-enhanced Ca2+ influx through voltage-gated Ca2+ channels (VGCCs). We found that at a concentration similar to that detected in the cerebrospinal fluid (CSF) of HIV+ patients, acute Triumeq did not affect firing; but at 10x or 100x higher concentrations, it significantly increased firing. Moreover, at the level similar to the dosage HIV+ patients are taking, chronic Triumeq treatment for 4 weeks (but not 2 weeks) also significantly increased firing of mPFC neurons in rats, which was associated with a significant enhancement in Ca2+ influx through VGCCs.

Conclusion/Significance: These novel findings demonstrate that: 1). acute exposure to 3TC and Triumeq can increase neuronal firing dose-dependently; and 2). chronic Triumeq treatment increase the functional activity of mPFC pyramidal neurons by enhancing Ca2+ influx via over-activated VGCCs. All these suggest that such side effects of cART could exacerbate HIV-induced neurotoxicity in the mPFC, especially during aging.
Abstract #: 190
Session Type: Poster
Category: Neurology

ANALYZING TYROSINE HYDROXYLASE IN OLFACTORY BULB OF METHAMPHETAMINE SELF-ADMINISTERING RATS

Presenting Author: Patryk Czyzewski, BS
Authors: Patryk Czyzewski (Rush); I. Daphne Calma (Rush), T. Celeste Napier (Rush), and Brinda Bradaric (Rush)

Introduction: Use of psychostimulant methamphetamine (meth) has been linked to increased risk for developing Parkinson's disease (PD) later in life. PD patients exhibit motor disturbances resulting from the degradation of nigrostriatal dopaminergic neurons. Our lab revealed that meth self-administering (SA) rats exhibit bradykinesia that corresponds to reduction of striatal tyrosine hydroxylase (TH) in a drug-withdrawal time-dependent manner. Prior to clinical symptoms, olfactory dysfunction occurs in many PD patients. PD-like changes within the olfactory bulb (OB) of meth SA rats are unknown. The glomerular layer (GL) of the OB is composed of dopaminergic interneurons that regulate olfactory transmission. PD pathology, such as Lewy bodies and changes in TH, a marker of dopamine, is evident in the OB of PD patients, which may account for the olfactory dysfunction exhibited in PD. Thus, we hypothesized that changes in the GL will occur following meth use. Further, PD-like changes may be exacerbated following meth if a secondary insult, which on its own would not induce pathology. Thus, a subthreshold dose of rotenone, a mitochondrial toxin, was utilized.

Objective: To determine whether the GL exhibit decreases in TH expression in meth SA rats, and if the addition of rotenone exaggerated the meth effects on TH expression in the OB.

Methods: Male Sprague-Dawley rats self-administered meth for 14 days (n=18); controls were saline-yoked (n=21). On meth forced-abstinence day 14, rats were randomly assigned to receive vehicle (n=19) or rotenone (n=20) for 6 days. Brain tissue was harvested 60 days after the last operant session and prepared for TH immunohistochemistry. Immunoreactivity was determined by optical density. Data was analyzed using a two-way ANOVA.

Results: Meth intake was 1.9+/−1.05 mg/kg. TH immunoreactivity showed no meth effect (p>0.05), no rotenone effect (p>0.05) and no effect of interaction of the two (p>0.05) within the GL.

Conclusion/Significance: The GL of meth SA rats did not exhibit changes in TH immunoreactivity compared to control. A subthreshold dose of rotenone (i.e. one that did not alter motor function) did not exacerbate changes in TH immunoreactivity in rats with a history of meth. Future studies will determine if higher doses of rotenone are efficacious.
EVALUATION OF THE OLFACTORY BULB IN METHAMPHETAMINE SELF-ADMINISTRATING RATS

Presenting Author: Asra Fahsal, BA
Authors: I. Daphne Calma, MS (Rush University), Brinda Bradaric, Ph.D. (Rush University), Amanda Persons, Ph.D. (Rush University), T. Celeste Napier, Ph.D. (Rush University)

Introduction: Use of methamphetamine (meth), a psychostimulant drug that increases dopamine, enhances the risk for developing Parkinson's disease (PD), a neurodegenerative disorder characterized by loss of dopaminergic neurons. The neurodegeneration is attributable to misfolded alpha-synuclein and associated inflammation, induced by microglia. The Braak hypothesis of PD poses that the olfactory bulb (OB) is an initial pathogenic site; pathology occurs here before onset of PD motor symptoms (e.g., akinesia, bradykinesia). We hypothesized that PD-like changes occur in the OB of meth users. To test this, we used meth self-administering (SA) rats to model human drug-taking, and assayed the OB for PD-like pathology.

Objective: To determine if meth SA increases levels of Ionized calcium binding adaptor molecule 1 (Iba-1, a protein marker for microglia) in the OB or levels of alpha-synuclein in the glomerular layer. This layer provides direct projections to the brain.

Methods: Male Sprague-Dawley rats self-administered meth in 3 hour sessions/day for 14 days (n=4), and controls (n=4) were saline-yoked. OB were harvested 7 days after forced-abstinence from meth; this phase is preclinical, because PD-like motor symptoms are not expressed in meth SA until 14 days of abstinence. For one group of rats, tissues were prepared for Iba-1 immunoblotting. For another group, tissues were prepared for alpha-synuclein immunohistochemistry. Unpaired Student's t-test and Pearson's correlation were used, with significance set at alpha=0.05.

Results: For the first group, average intake of meth ranged from 6-15 mg/kg/day, and meth SA had no significant effect on Iba-1 protein level (Student's t-test). Meth intake for the second group was 15-31 mg/kg/day. Alpha-synuclein immunoreactivity of the glomerular layer was not different between the two treatment groups. Pearson's correlation determined that the amount of drug taken by the rats did not correlate with the level of either protein.

Conclusion/Significance: Level of Iba-1 or alpha-synuclein in the OB were not altered by meth. Results suggest that changes in inflammation and alpha-synuclein accumulation may not occur seven days following forced-abstinence. Future studies will evaluate changes with longer withdrawal times, when PD-like motor symptoms occur.
THE PROTECTIVE CAPABILITIES OF GEMFIBROZIL IN MODELS OF PARKINSONS DISEASE

Presenting Author: C. Gunnar Gottschalk, MS
Authors: Avik Roy (Rush Medical College), Kalipada Pahan (Rush Medical College)

Introduction: Parkinson's disease (PD) is the devastating neurodegenerative disease of ventral midbrain, which is characterized by the progressive loss of dopaminergic (DAergic) neurons. It has become clear that the neurodegenerative process relies on complex interplay between host genetics environmental exposures. For example, individuals harboring mutations in disease causative genes including SCNA and Nurr1 represent a mere fraction (less than 10%) of all reported cases of PD; yet post mortem brain analysis of the nigrostriatal pathway of sporadic cases of the disease (90% of all cases) reported to have consistent Lewy Body pathology and a reduction in the expression of genes responsible for the maintenance of the DAergic phenotype, including Nurr1. There is a very clear need to develop interventions aimed at reducing α-syn aggregation while simultaneously increasing the expression of protective and anti-inflammatory genes like Nurr1. Peroxisome Proliferator Activated Receptors (PPARs), serve a dual function as both ligands and transcription factors. Our lab has reported the protective characteristics of increased PPARα expression in CNS tissue via gemfibrozil, an FDA approved fibrate drug developed for the treatment of lipid disorders.

Objective: I plan to show data to test the hypothesis that gemfibrozil, via its stimulation of PPARα, transcriptionally regulates Nurr1 expression in vivo and that PPARα activation, protects DAergic neurons in a model of both sporadically induced nigrostriatal degeneration and a model of α-synucleinopathy.

Methods: Utilizing a combined in vitro and in vivo approach we will identify the mechanisms delineating gemfibrozil’s protective qualities in both sporadic and familial onset PD. Both a drug induced model of PD and a A53T (a-syn) overexpressing mode will be used.

Results: Gemfibrozil up regulates Nurr1 expression via PPAR alpha in vivo (In Review at JBC) My pilot data indicates that gem is protective in both sporadic and familial models of nigrostriatal via the induction of PPAR alpha.

Conclusion/Significance: Gemfibrozil, the commonly prescribed fibrate drug used for the treatment of dyslipidemia, induces Nurr1 expression via PPARα in Dopaminergic neurons, in vivo. Gemfibrozil is also protective in a model of sporadic nigrostriatal degeneration (acute MPTP), and a synucleinopathy model of PD.
Abstract #: 193

Session Type: Poster

Category: Neurology

THE EFFECTS OF DUAL TASK COGNITIVE INTERFERENCE AND FAST PACED WALKING ON GAIT AND TURN DEFICITS IN FXTAS

Presenting Author: Joseph Guan, BS, MPH

Authors: Joseph Guan, MPH (Rush), Jessica Joyce (Rush), Danielle Carnes, MS (Rush), Erin Robertson (Rush), Nicollette Purcell (Rush), Elizabeth Berry-Kravis, MD, PhD (Rush), Deborah A. Hall, MD, PhD (Rush), Joan A. O'Keefe, PhD, PT (Rush)

Introduction: Individuals with a 55-200 CGG repeat expansion in the fragile X mental retardation 1 gene are at risk for developing Fragile X-associated tremor/ataxia syndrome (FXTAS), a neurodegenerative disorder characterized by cerebellar ataxia, balance deficits, tremor and cognitive dysfunction.

Objective: We examined the effects of a dual-task (DT) cognitive motor testing paradigm and fast paced gait, which are likely to reflect real life, challenging situations, on gait and turning deficits in participants with FXTAS compared to controls.

Methods: 36 individuals with FXTAS (mean age 67.8 ± 8.4 years) and 36 controls (65.3 ± 8.3) participated in the study. Gait analysis was conducted using an inertial sensor-based 25-meter 2 minute walk test (APDMTM) under three conditions: 1) normal self-selected pace/single task (ST), 2) fast as possible (FAP) pace, and 3) DT cognitive interference paradigm asking subjects to perform a concurrent verbal memory task (animal naming) while walking at their normal speed. Dual task cost (DTC) for gait and turn parameters was calculated as (DT-ST)/ST value X 100. Linear regression analyses were performed to assess the association between FXTAS diagnosis on gait and turn outcomes under the three different gait conditions, while controlling for age, sex, and cognitive function.

Results: FXTAS participants had significantly reduced stride velocity, swing time, and peak turn velocity and greater double support time compared to controls under all three testing conditions (0.0001 > p < 0.038). They also had a significantly shorter stride length (p=0.038) than controls under the ST condition. Unexpectedly, gait variability was not increased in FXTAS participants under any condition. There was significantly greater DTC of the concurrent verbal fluency task on peak turn velocity (p = 0.037) in men with FXTAS compared to controls participants such that maximum turning speed was negatively impacted by the DT cognitive interference.

Conclusion/Significance: Men participants with FXTAS had significantly elevated DTC for turning speed, indicating cognitive interference for turning, which has greater motor control requirements than straight walking. There were no elevated DTC for spatiotemporal aspects of gait during straight walking, suggesting that men and women with FXTAS prioritized gait over cognition during the DT walking.
KICK-OUT PD: QUALITATIVE ANALYSIS OF EXPECTATIONS AND OUTCOMES IN A PILOT STUDY OF A PARKINSON'S DISEASE KARATE INTERVENTION

Presenting Author: Claire Niemet, Master of Public Health
Authors: Jori Fleisher (RUSH), Claire Niemet (RUSH), Brianna Sennott (RUSH), Monica Lee (RUSH), Courtney Whitelock (RUSH), Deborah Hall (RUSH), and Cynthia Comella (RUSH)

Introduction: Different exercise modalities benefit PD patients, including aerobic, resistance, and mindfulness-based activities. Karate incorporates these in a community-based class. The combination of exercise modalities and the class setting may lead to improved mobility and wellbeing.

Objective: To investigate expectations regarding exercise, karate, and mindfulness in individuals with early- to middle-stage Parkinson's (PD) prior to a community-based karate class, and post-intervention perceptions of change in mobility, wellbeing, and quality of life.

Methods: PD patients participating in a 10-week, open label feasibility study of karate were invited to participate in a focus group prior to and following the karate course. The classes were twice weekly for one hour. Patients were included in a one-hour, pre-intervention focus group led by the PI (JF) exploring prior experience with exercise and expectations for the intervention. Post-intervention focus groups explored patient perceptions of changes in their balance, mobility, and overall wellbeing, whether the intervention met expectations, and opportunities for program improvement. Qualitative data were analyzed using a grounded theory approach. The Institutional Review Board at Rush University Medical Center approved this study. Written informed consent was obtained from each participant.

Results: Fifteen participants (8 women), 93% at Hoehn & Yahr stage 2, with median age 68 years (range: 39-80) and PD duration 6 years (2-20), completed the pre- and post-intervention focus groups. Each group comprised 6-9 individuals, the majority endorsing prior experience with and positive attitude towards exercise. Participants expressed goals of improving balance and mindfulness. Following the intervention, participants felt karate had been beneficial for movement, breathing, and wellbeing. Additional themes were camaraderie and encouragement from the instructors and each other. All participants planned to continue their karate practice and recommend it to others.

Conclusion/Significance: A twice weekly karate class tailored to individuals with PD yielded subjective improvements in balance, mobility, and general wellbeing, as well as unexpected camaraderie. There was enthusiasm for continued participation, highlighting the need for further long-term, controlled studies of this promising intervention.
THE BLOOD-BRAIN BARRIER IS DYSREGULATED IN THE HIPPOCAMPUS OF METH SELF-ADMINISTERING HIV-1 TRANSGENIC RATS

Presenting Author: Michael Ohene-Nyako, BSc, MHS
Authors: Michael Ohene-Nyako (RU); Amanda L. Persons (RU); and T. Celeste Napier (RU)

Introduction: The neurological profile of HIV/AIDS has improved with cART, which controls plasma viral load and prolongs life. Yet, the brain remains a viral reservoir and neurological disorders, including hippocampal-mediated memory impairments, are associated with the increased life span. The blood-brain barrier (BBB) is the primary route by which HIV gains access to the brain. Abuse of methamphetamine (meth) can damage the BBB, but effects of HIV-meth co-morbidity on the BBB and the hippocampus are unclear.

Objective: Here we attempt to address this knowledge gap.

Methods: We trained HIV-1 transgenic (Tg) and non-Tg rats to self-administer meth (0.02-0.04mg/kg/0.05ml iv infusion, 2h/day for 21 days). Cumulative meth intake was 4.5 ±0.3 and 5.2±0.5mg/kg, respectively. We evaluated BBB tight junction proteins occludin and claudin-5 in the hippocampus. To indicate a mechanism that may contribute to the BBB dysregulation, we assessed MMP9 levels.

Results: Two way ANOVA revealed a genotype effect for occludin and claudin-5, but no meth effect. Post hoc analysis revealed differences between saline Tg and saline non-Tg for both proteins, and meth non-Tg and saline non-Tg rats for occludin. There was an overall genotype effect for MMP9, but no meth effect. Post hoc analysis revealed differences between saline Tg and saline non-Tg, and meth non-Tg and saline non-Tg rats. Evaluations of protein markers of two signaling pathways that regulate MMP9 transcription; NFκB and MAPK (ERK), revealed an overall genotype effect for NFκB but not the MAPK pathway.

Conclusion/Significance: Hippocampal BBB dysregulation by HIV-1 proteins and meth may involve NFκB/MMP9.
Cinnamon and its metabolite mitigate Parkinsonian pathology in a MPTP mouse model of PD via astrocytic GDNF

Presenting Author: Dhruv Patel, BS, MS
Authors: Dhruv Patel (RUMC); Arundhati Jana (UIC); Avik Roy (RUMC); and Kalipada Pahan (RUMC).

Introduction: Glial cell line-derived neurotrophic factor (GDNF) has potent neurotrophic effects and is known to promote the dopaminergic (DA) neuronal survival in cellular and animal models of Parkinson's disease (PD). However, long-term ectopic GDNF delivery is associated with long-lasting adverse side effects in PD patients. Therefore, finding safer and effective ways to elevate endogenous GDNF levels is an active area of research.

Objective: During PD and other neurodegenerative disorders, while neurons die, usually glial cells such as astroglia do not die, but undergo activation and gliosis. Moreover, astrocytes are major cell type in the CNS, indicating that any contribution to nigral trophic effect from astrocytes would be significant. Here, we delineate that cinnamon metabolite sodium benzoate (NaB) upregulates GDNF in mouse and human astrocytes and that oral administration of cinnamon and NaB protect the nigrostriatum in MPTP mouse model of PD via astrocytic GDNF.

Methods: We first investigated the effect of NaB on Gdnf mRNA levels using RT-PCR and real-time analyses and GDNF protein levels by immunoblotting and immunofluorescence analyses. Following mGDNF promotor analysis by MatInspector program, we examined the recruitment of CREB, CBP and p300 on the mGdnf promoter using ChiP assay. Next, using battery of assays that include immunoblotting and densitometric analyses, immunohistochemistry, HPLC, rotarod and open field tests, we monitored nigral dopaminergic neuronal protection, striatal innervation, striatal neurotransmitters restoration and locomotor activities in control and MPTP insulted non-transgenic littermates (Gfap-cre) and astrocyte specific Gdnf conditional knockout (Gdnf-Δastro), mice.

Results: NaB is capable of upregulating GDNF mRNA and protein levels in mouse and human astrocytes. NaB recruited CREB to the mGdnf promoter leading to its transcription in mouse astrocytes. Accordingly, oral administration of NaB and cinnamon increased astroglial expression of GDNF in the nigra of normal as well as MPTP-intoxicated mice. Interestingly, NaB and cinnamon protected nigral dopaminergic neurons, preserved striatal innervation, restored striatal neurotransmitters, and improved locomotor activities in MPTP-intoxicated Gfap-cre mice, but not Gdnf-Δastro mice.

Conclusion/Significance: These findings highlight the importance of astroglial GDNF in cinnamon and NaB-mediated protection of the nigrostriatum in MPTP mouse model of PD and suggest possible therapeutic potential of cinnamon and NaB in PD patients.
COMPARATIVE ANALYSIS OF ANTERIOR VERSUS TRANSFORAMINAL LUMBAR INTERBODY FUSION

Presenting Author: Sharmeen Razvi, BS
Authors: Christopher Witiw, MD, MS, (Rush University Neurosurgery), Brian T. David, PhD, (Rush University Neurosurgery), Nadine M. Lerret, PhD (RUMC), Lela Buckingham, PhD (RUMC), Richard G. Fessler, MD, PhD (Rush University Neurosurgery)

Introduction: Anterior (ALIF) and Transforaminal Lumbar Interbody Fusions (TLIF) are two surgical techniques used to treat symptoms of back and leg pain resulting from degenerative spinal pathology. Both procedures provide nerve root decompression and spinal stability through fusion, however they differ in surgical access approaches. During an ALIF, the spine is approached through an abdominal incision and nerve root decompression is accomplished indirectly, while for a TLIF the access is through paraspinal muscles and the decompression is both direct and indirect. We hypothesize that a TLIF will yield superior clinical outcomes because of the ability to provide direct surgical decompression of the nerve roots, while ALIF will provide better radiographic outcomes due to superior access to the intervertebral disc space.

Objective: The goal of this study is to compare the two procedures for radiographic and clinical outcomes.

Methods: This was a retrospective chart review of Rush Neurosurgery patients (n=23 and 76 for ALIF and TLIF, respectively) who underwent one-level fusion at either L4/L5 or L5/S1. Radiological data was measured for baseline, 6- and 12-months postoperative. Clinical data was accessed via Oberd for the following: Oswestry Disability Index (ODI), 12-Item Short Form Survey (SF-12) for physical and mental health score, and Numeric Rating Score (NRS) for back and leg pain. Age, gender, BMI, and Estimated Blood Loss (EBL) was also analyzed. Levene's test was used to assign variance assumptions and t-tests were used to evaluate significance of the numerical data, while chi-square analysis was used for gender comparisons. SPSS was used for statistics.

Results: The physical health score demonstrated significantly greater improvement in the TLIF group versus the ALIF group (final improvement: 17.8 vs 9.7, p<0.05), but there was no significant difference between the groups in mental health. Similarly, there were no differences on the ODI or in back/leg pain (NRS), as both surgical approaches yielded similar levels of functional improvement. There was no significant difference in postoperative radiological correction between the ALIF and TLIF cohorts (segmental correction: 2.9° vs 0.2°, p>0.05).

Conclusion/Significance: This study demonstrated a significant improvement in overall physical health in subjects that underwent TLIF vs ALIF.
Abstract #: 198

Session Type: Poster
Category: Neurology

NMDAR SUBTYPE AND AMPAR SUBTYPE DYSREGULATION IN CA1 AND CA3 PYRAMIDAL NEURONS

Presenting Author: Joshua Roberts, BA
Authors: Joshua G Roberts (Rush University), Corinne L Hill (Rush University), Daniel A Nicholson (Rush University Medical Center), John F Disterhoft (Northwestern University)

Introduction: Cognitive aging can be defined with two separate outcomes: successful cognitive aging and unsuccessful cognitive aging. Unsuccessful cognitive aging is defined as the loss or weakening of cognitive abilities. These abilities include spatial and temporal memory formation and recall, information handling and other cognitive abilities. Successful cognitive agers more readily retain these cognitive abilities at a young adult-like level.

Objective: The purpose of this study is to tease out differences in protein expression of several important ligand- and voltage-gated ion channels. These channels are involved in signaling pathways that are highly critical for neuronal integration and computation and have been shown to be dysregulated in cognitive aging.

Methods: Young rats and aged rats trained using two hippocampus-dependent behavioral learning tasks are assessed using a composite behavioral index (CBI) to assess their level impairment. Rats are then processed and hippocampal slices are micro-dissected in-order to separate the regions of CA1, CA3 and dentate gyrus (DG). The main synaptic targets we have selected are GluN and GluA subtypes. Western blots are then performed and membranes are imaged using NIR and are analyzed. The statistical analysis is carried out, normalizing each target to its corresponding total protein load, then normalizing to the YA cohort. Finally, all data from each cohort are then averaged to get a mean for each cohort. An ANOVA is then performed on for each target and the data is plotted.

Results: Preliminary Data has been collected for the first round of tissue, however, a second round of tissue is currently being processed. The first round of tissue had a sample size of 3 animals per cohort, with at least an additional 3 animals per cohort to be added. Data showed no significant change in protein load between cohorts. The largest difference observed concerned CA3 GluN1, p-value 0.105. More data needs to be collected in-order to accurately assess if any changes have occurred in receptor protein level in cognitively aged animals.

Conclusion/Significance: Results so far show no change in protein levels. More tissue needs to be processed in-order to effectively determine if any protein changes are present in aged animals.
ULTRASTRUCTURAL AND FUNCTIONAL EVIDENCE OF DECREASED WHITE MATTER INTEGRITY WITH ALZHEIMER’S PATHOLOGY

Presenting Author: Matthew Russo, BS
Authors: Matthew L. Russo (Rush University), Gelique D. Ayala (Rush University), Timothy F. Musial (Rush University), Linda A. Bean (Rush University), Daniel A. Nicholson (Rush University)

Introduction: Evidence suggests that the integrity of white matter (WM), consisting primarily of myelinated axons, is disrupted in response to Alzheimer’s disease (AD) pathology. For instance, in vitro experiments have demonstrated that oligodendrocytes are sensitive to amyloid beta-induced cytotoxicity. Such findings appear to be relevant in vivo, as imaging studies have shown that both WM volume and fractional anisotropy decrease in early AD and mild cognitive impairment patients. Moreover, measures of WM integrity are significantly decreased even when controlling for changes in grey matter volume, indicating that WM changes are likely not due to Wallerian degeneration. These findings suggest that WM deterioration may represent a key pathological process in the progression of AD.

Objective: We investigated how AD pathology contributes to WM deterioration in the alveus of CA1, a major output pathway of the hippocampus. Specifically, the present study examined how decreases in myelin integrity contribute to WM degeneration in AD.

Methods: We employed electron microscopy (EM) to examine ultrastructural changes in 5xFAD mice and post-mortem human AD tissue. Measures of myelin disruption, such as myelin abnormalities and myelin thickness, were quantified using unbiased stereology. In addition, we used whole-cell current clamp to investigate if amyloid pathology alters the ability of APs to propagate along the axon. Specifically, a stimulating electrode placed in the alveus was used to generate APs in the axon, and successful propagation of antidromic APs was monitored using a somatic recording electrode.

Results: Our data show that myelin is substantially disrupted at the ultrastructural level in response to AD pathology in both humans and mouse models relative to healthy controls. Electrophysiology findings indicate that this disruption corresponds to a functional deficit in the ability of CA1 pyramidal neurons to reliably propagate antidromic APs from the distal axon in the alveus back to the cell body.

Conclusion/Significance: These results provide evidence that changes in WM tracts observed in early AD and MCI patients in imaging studies are likely indicative of changes in myelination status, and that such changes can contribute to deficits in neuronal communication.
Abstract #: 200

Session Type: Poster
Category: Neurology

KICK-OUT PD: MOBILITY, QUALITY OF LIFE, AND FEASIBILITY OUTCOMES IN A PILOT STUDY OF A PD-SPECIFIC KARATE INTERVENTION

Presenting Author: Brianna Sennott, BA
Authors: Brianna Sennott (RUMC); Claire Niemet (RUMC); Monica Lee (RUMC); Courtney Whitelock (RUMC); Yuanqing Liu (RUMC); Deborah Hall (RUMC); Cynthia Comella (RUMC); and Jori Fleisher (RUMC)

Introduction: Different exercise modalities benefit PD patients. The karate program evaluated here incorporates vigorous resistance and aerobic activity with mindfulness in a community-based class of mild to moderate PD subjects.

Objective: To evaluate feasibility of a community-based karate class tailored for individuals with early-to-middle-stage Parkinson's Disease (PD); to assess effect of karate on objective and patient-reported outcomes.

Methods: Open label, 10-week study of twice weekly, PD-specific, non-contact karate classes for patients with Hoehn & Yahr (HY) stage 1-3. Feasibility was assessed by overall dropout rate and adherence via attendance records. Participants completed pre- and post-intervention assessments of mobility (Timed up and Go), gait (Tinetti mobility test), quality of life (PDQ-8), and global impression of change (PGIC). The Institutional Review Board at Rush University Medical Center approved this study. Written informed consent was obtained from each participant.

Results: We enrolled 19 participants; 15 completed all ten weeks of classes (79%), with mean adherence of 87% among completers. Reasons for withdrawal: scheduling conflicts, no given reason, pre-existing sciatica, and appendicitis. Among those completing the study, 53% were women, median age 68 (range 39-80), PD duration of 6 years (range 2-20), and 93% were HY 2. We found significant improvements in quality of life (PDQ-8: 25.3 vs. 19.3, p = 0.01), and gait (Tinetti Mobility Test: 27.1 vs. 27.9 points, p = 0.01), and a trend toward improvement in mobility (Timed Up and Go: 9.6 vs. 9.0 seconds, p = 0.1). On the PGIC, 87% endorsed feeling moderately or considerably better. All met their self-defined pre-intervention goal, planned to continue karate, and would recommend it to a friend, respectively.

Conclusion/Significance: A twice-weekly karate class was met with high adherence and enthusiasm among people with early- to middle-stage PD. After ten weeks of participation, significant improvements were noted in gait, quality of life, and self-reported impression of change. Karate for PD is a promising intervention with potential to impact quality of life and mobility.
Abstract #: 201

Session Type: Poster
Category: Neurology

LEARNING FROM TRAUMA AND STEMI DEVELOPMENT TO PAVE THE WAY FORWARD FOR STROKE PRE-HOSPITAL TRAIGE

Presenting Author: Courtney Whitelock, BS
Authors: Courtney Whitelock (Rush) and Dr. Michael Chen (Rush)

Introduction: Optimizing patient access to specialized care is a feature among trauma, STEMI, and now stroke care given the recent development of mechanical thrombectomy. A review of major challenges in the development of trauma and STEMI pre-hospital systems highlighted essential concepts that may help guide the development of new strategies to centralize and optimize pre-hospital stroke triage. Government policy, training and technology, and organized regionalization were most important and beneficial in improving STEMI and trauma but have not been explored.

Objective: Given the inherent multifaceted nature pre-hospital stroke triage, our aim was to identify key concepts from various stakeholders in trauma, cardiology, and stroke neurology to identify challenges and trends to guide the improvement of pre-hospital stroke triage system.

Methods: Physicians and EMS personnel in a number of fields were interviewed to assess key concepts, challenges and trends that could be relevant to stroke. Questions were designed with semi-structured and open-ended questions. These interviews were recorded, transcribed, and analyzed following a thematic content analysis.

Results: 1 trauma surgeon, 3 cardiologist, 6 emergency medicine, 3 neurology physicians and 2 paramedics were interviewed. Government policy was the least important factor. 76% of physicians and 100% of EMS agreed training and technology was instrumental in improving STEMI, and will be critical in improving stroke. Organized regionalization was often regarded as an issue of geographical location rather than local organization with 53% using the phrase 'urban vs. rural.' Financial constraints and 'money' was the most commonly cited obstacle to centralized pre-hospital stroke triage, mentioned in 75% of participants. 69% of participants mentioned the idea of 'losing business' as a barrier to improving the current system, with 3 physicians using the word 'business' directly.

Conclusion/Significance: Among the themes identified, training and technology in this small sample size was not only most influential for STEMI and trauma development but will have the greatest impact in improving stroke pre-hospital triage. The concept of 'business' and money as the greatest barrier to stroke pre-hospital triage is an unpredicted trend that warrants exploration and will potentially hinder any attempts to create improvements.
Abstract #: 202

Session Type: Poster
Category: Neurology

OBJECTIVE GAIT AND BALANCE OUTCOME MEASURES FOR EFFICACY OF LONG TERM INTRATHECAL 2-HYDROXYPROPRL-ÂŸ-CYCLODEXTRIN TREATMENT IN NIEMANN-PICK TYPE C1 (NPC1): A CASE SERIES

Presenting Author: Kathryn Wrobel, BS
Authors: Joan A. O'Keefe (Rush); Jamie Chin (Rush); Kathryn Wrobel (Rush); Andrew McAsey (Rush); Medha Parulekar (Rush); Elizabeth Berry-Kravis (Rush)

Introduction: Niemann-Pick C (NPC) is a neurodegenerative disorder characterized by lysosomal accumulation of cholesterol in brain and peripheral tissues. Cerebellar ataxia, apraxia, balance deficits and cognitive decline are seen in NPC patients. 2-Hydroxypropyl-β-cyclodextrin (HP-β-CD) extends life and slows disease in NPC animal models.

Objective: To examine the effects of intrathecal HP-β-CD treatment on measures of gait, balance and fine motor function of NPC patients.

Methods: Five NPC patients were treated biweekly with HP-β-CD intrathecally. Gait and balance parameters were tracked every 2 to 3 months with an inertial sensor system (APDM) and computerized dynamic posturography (CDP). Gait and turn variables were in the domains of pace, rhythm, variability, gait phase cycle and turn duration/number of steps to turn. Global function was assessed by the NPC Severity Scale.

Results: Subject 1 (age 14; treated for 48 mo.) presented with apraxia and cognitive dysfunction. No gait variables improved, 5/10 remain unchanged and 5/10 worsened. Subject 2 (age 15; treated for 54 mo.) presented with normal gait except for increased gait variability and DS time. 8/10 gait variables remained in the normal range and gait variability and DS time improved. CDP postural sway scores improved by 37%. Subject 3 (age 17; treated for 48 mo.) presented with gait ataxia. Gait variability improved 28-42% and 8/10 variables remained unchanged. CDP postural sway scores improved 91%. Subject 4 (age 31; treated for 24 mo.) presented with gait ataxia. 10/10 variables worsened. CDP scores were stable at 15 months but the subject declined further testing. Subject 5 (age 30; treated for 30 mo.) presented with gait ataxia. 5/10 gait variables remained unchanged and 5/10 worsened. CDP postural sway scores improved 44%.

Conclusion/Significance: These gait and balance measures shows NPC disease stability or improvement in 3 of the 5 patients receiving HP-β-CD treatment. Inertial sensor-based gait analysis and CDP balance measures are feasible to determine efficacy of pharmaceutical interventions. Ongoing tracking with these measures will quantify the impact of HP-β-CD on gait and balance function in NPC and may help differentiate good responders from poor responders.
ULTRASONOGRAPHIC AND OPERATIVE FINDINGS IN PATIENTS WITH OVARIAN TORSION: A RETROSPECTIVE COHORT ANALYSIS

Presenting Author: Marika Raff, MD  
Authors: Marika Raff MD (RUMC); Joseph M Maurice MD, MS, FACOG (RUMC)

Introduction: Ovarian torsion is a gynecologic emergency with a frequency of 2.5-7.5%. Diagnosis of ovarian torsion can be challenging. Delay in ovarian torsion diagnosis can result in ovarian necrosis necessitating oophorectomy. There are currently no specific diagnostic criteria for ovarian torsion, and clinicians often depend on clinical suspicion, in addition to imaging, to formulate a treatment plan. Ovarian artery doppler flow has been considered the gold standard for diagnosing ovarian torsion on ultrasound. However, doppler flow does not consistently correlate with intraoperative findings of ovarian torsion. This study looked for other ultrasound measurements that could more reliably predict intraoperative ovarian torsion.

Objective: This study's aim was to compare ovarian volume on ultrasound to ovarian artery doppler flow and evaluate which is a more reliable predictor of intraoperative ovarian torsion. A secondary aim was to conduct a sensitivity and specificity analysis to determine a volume cutoff above which intraoperative torsion was more likely.

Methods: This retrospective cohort analysis examined women with the suspected diagnosis of ovarian torsion between 2008 to 2018. Data from ultrasound reports, including presence or absence of doppler flow, presence or absence of ovarian torsion and ovarian dimensions were collected. Presence or absence of intraoperative ovarian torsion was determined from operative reports. This data was then compared to determine if a relationship existed between ultrasound measurements and intraoperative torsion.

Results: Ovarian volume was found to be the most effective predictor of intraoperative ovarian torsion when compared to other ultrasound measurements. Mean ultrasound volume in patients with intraoperative torsion was found to be twice as large as the volume in patients without intraoperative torsion. When comparing a range of volumes to determine a cut-off above which intraoperative torsion was more likely, 100 cm³ had the highest sensitivity (76.9%) and specificity (46.7%). Doppler flow was found to be inconsistent in predicting intraoperative torsion.

Conclusion/Significance: Ovarian volume on ultrasound is more effective than doppler flow at predicting intraoperative ovarian torsion.
Abstract #: 204

Session Type: Poster
Category: Research Administration

SYSTEMS DESIGN TO IMPROVE CLINICAL TRIAL START-UP PROCESS

Presenting Author: Santosh Basapur, MS
Authors: Santosh Basapur (RUMC); Dr Raj Shah (RUMC); Allecia Harley (RUMC)

Introduction: Rush initiates almost 400 clinical trials per year. Clinical trials start up is a lengthy process due to the necessary but complex requirements. Socio-technical systems design approach is necessary in addressing such complex issues. As the PIs and leadership of Institute of Translational Medicine, an opportunity emerged to utilize Systems Designer to identify targets for potential improvements in study start-up process.

Objective: The aim is to identify and optimize the delays caused in clinical trial study start-up process

Methods: Quantitative analysis was done on ~6 years of data. The patterns associated with study start-up times were determined from a research administration dataset. Qualitative data included 2 Focus Groups with 12 experienced managers and coordinators. Interviews with over 10 Office of Research Affairs team members in order to better understand start-up processes and themes were determined using grounded theory analysis.

Results: Preliminary quantitative results indicate federal studies have the longest path (300+ days) to start up. Internally funded studies tended to be significant bulk (1932/2355) over time but we realized that they are treated similar to externally funded trials. Simplifying study start up processes for students will streamline internal projects and provide bandwidth for external studies. Also path analysis of trials from IRB-submission to contract-execution showed repetitive loops, especially in coverage analysis, budget and sync. After interviews, key themes emerged: (1) lack of situational awareness about protocol, (2) lack of dashboard of key performance indicators and (3) lack of process management system and training.

Conclusion/Significance: Start-up process is much more complex. Key target areas for improvement identified and systems design techniques are being used to solve the issues.
STRENGTHENING RESEARCH INFRASTRUCTURE: DEVELOPMENT OF THE RUSH BIOINFORMATICS AND BIOSTATISTICS CORE

Presenting Author: Pankaja Desai, PhD
Authors: Pankaja Desai (Rush) Carlos Santos (Rush) Martha Clare Morris (Rush) Casey Frankenberger (Rush) Bala Hota (Rush)

Introduction: The Bioinformatics and Biostatistics Core (Core) at Rush University Medical Center aims to advance research through effective collaboration with investigators on their informatics and statistical needs. The Core has developed a research private cloud with innovative data storage and analytic capabilities. It offers multiple research support services including research design consultation, database development, extraction and provision of electronic medical records (EMR) data and biospecimen data, proposing and conducting statistical analysis, reporting and interpreting output, EMR content build, and survey instrument design and REDCap technical assistance.

Objective: The purpose of the proposed poster is to describe Core services, its growth, and how to work with the Core on research initiatives.

Methods: The Core request system and other request tracking methods will be utilized to describe type of requests and their increase over time. Strategies for collaborating with the Core will also be provided.

Results: EMR data extraction and statistical analysis service has grown over time. The Core is actively involved in large-scale clinical data research initiatives including CAPriCORN, All of Us, and the Institute for Translational Medicine.

Conclusion/Significance: The Core is actively engaged in marketing efforts, developing strategies for sustainability, with goals of continued expansion and to be embedded within the Rush research infrastructure.
Abstract #: 206

Session Type: Poster
Category: Urogenital/Reproductive

ASSESSMENT OF CONTRACEPTION AND FERTILITY KNOWLEDGE AMONG FEMALE ONCOLOGY PATIENTS OF CHILD BEARING AGE AND THEIR PROVIDERS

Presenting Author: Samantha Betman, BA
Authors: S. Betman (Rush), JM. Madrigal (Stroger), K. Stempinski-Metoyer (Stroger), R. Rao (Rush), and A. Patel (Stroger)

Introduction: Among young women diagnosed with cancer, their second largest concern following fears of cancer reoccurrence is about their future fertility. Current literature shows that women are less likely than men to receive information regarding possible infertility following cancer treatment, as well as information about their possible options for fertility preservation. Additionally, patients who are Hispanic/Latino are less likely to have a conversation with their provider about infertility as compared to White patients. Physicians play a huge role in this.

Objective: The goal of this study was to examine knowledge of contraception and cancer-related changes in fertility among women of childbearing age treated at John H. Stroger, Jr. Hospital of Cook County. We also aimed to assess whether or not medical providers prioritized having these educational conversations with their female patients.

Methods: We interviewed 20 female oncology patients to complete their reproductive life plan, and 14 completed an additional true/false fertility knowledge survey. We administered a ten-question survey to providers in the Medical Oncology department to assess how they prioritize talking about contraception and fertility preservation with their female patients of childbearing age. Data was summarized as frequencies and percentages.

Results: Among the 20 patients of reproductive age that we interviewed, half were recently diagnosed with cancer and 40% had indicated that they had completed childbearing. Ten women were currently sexually active, and eight were currently using contraception. Fertility knowledge scores ranged from 0 to 8, out of a total of 12. The median score was 2 (IQR 3), and many patients selected 'I don't know' as their response. Among the 16 oncology providers surveyed, only 25% felt confident educating their patients about fertility preservation, and only 37% prioritized talking to women of reproductive age about contraception.

Conclusion/Significance: Health disparities in cancer care are well-known. Low-income, minority women who seek cancer care at a safety-net health care institution may have limited knowledge on contraception and how their cancer treatment may affect their future fertility. A better understanding of how oncology providers can prioritize these topics when talking to patients about their cancer diagnosis is needed.
RETROSPECTIVE COHORT STUDY OF KIDNEY FUNCTION IN INDIVIDUALS WITH LOW BIRTH WEIGHT

Presenting Author: Andrea Kratzke, BA
Authors: Andrea Kratzke BA (RMC)/ Xixi Zhao (RUMC, Department of Internal Medicine and Pediatrics), Ballout, Fatima, MD (RUMC, Department of Internal Medicine); Poirier, Jennifer, PhD (RUMC, Department of Research Design and Statistics); Kimura, Robert E., MD (RUMC, Department of Neonatal-Perinatal Medicine); Jandeska, Sara E., MD (RUMC, Department of Pediatric Nephrology)

Introduction: Previous studies have established an association between low birth weight (LBW) and future kidney disease, but few have explored the progression of kidney dysfunction through the pediatric years leading up through adolescence and young adulthood.

Objective: To better understand the temporal effects of birth weight on kidney disease progression, we compared the glomerular filtration rate of individuals who were low birth weight and normal birth weight, both as infants and throughout childhood and adolescence, to observe whether there was significant difference or change in kidney function over time.

Methods: We conducted a retrospective cohort study comparing the glomerular filtration rate (GFR) between LBW (<2500 grams) and normal birth weight (NBW) infants who were admitted to the neonatal intensive care unit (NICU) at our institution from 1992 to 2006. Age at follow-up ranged 1-26 years old. Serum creatinine was measured using Jaffé method. GFR was calculated using the original Schwartz Equation, validated to be used in this particular age demographic. Differences in continuous and dichotomous variables between groups were analyzed using the Student’s t-test and chi-squared tests, respectively. The study protocol was approved by the Institutional Review Board at our institution.

Results: GFR was found to be significantly lower in participants born with LBW than those born with NBW, with a mean difference of 5.5 mL/min/1.73m² (P<0.01). These differences were found in the adolescent and young adult age group over 9 years of age, specifically in the extremely low birth weight group (ELBW) whose birth weight was less than 1000 grams.

Conclusion/Significance: This demonstrates that LBW as a lone risk factor for kidney disease, with a relative risk of 1.3 for CKD when compared to its NBW counterparts. This makes sense in context of kidney development, in that total nephron number is generally decreased in premature and ELBW individuals. Our study is limited in that we had to exclude many individuals due to lack of follow up data. Because of the increased risk of CKD in ELBW individuals, we recommend screening for CKD in this population starting at the age of 9 years old, regardless of their previous medical history.
PERINATAL MORBIDITY ASSOCIATED WITH ABNORMAL PLACENTAL INSERTION AND SHORT INTERPREGNANCY INTERVAL

Presenting Author: Jamie Masliah, BS
Authors: Jamie Masliah, M2 (RMC), Whitney Lewandowski, M4 (RMC), and Dr. Gary Loy MD, MPH (RUMC)

Introduction: During pregnancy, the umbilical cord normally extends from the fetal umbilicus to the center of the placenta, far from the placental edge. However, the cord can have alternate insertion sites, such as marginal and velamentous insertions, which are termed abnormal placental cord insertions (PCI). A marginal insertion is defined by a cord insertion at the edge of the placenta. A velamentous insertion occurs when the umbilical vessels branch off from one another into the membranes before reaching the placental margin, leaving it unprotected by Wharton's Jelly. It is well documented that abnormal PCIs are a contributory factor to perinatal morbidity. Many studies have found associations between velamentous and marginal insertions and adverse perinatal outcomes, including increased risk of pre-term birth, low Apgar scores, postpartum hemorrhage, and pre-eclampsia. Additionally, short inter-pregnancy intervals (<6 months) have also been associated with increased perinatal morbidity.

Objective: This study evaluates the link between abnormal PCIs and short inter-pregnancy intervals and associated perinatal morbidity outcomes.

Methods: In this IRB-approved retrospective cohort study, 242 patient charts and placental pathology reports from 2005-2018 for women with known velamentous or marginal insertions and short inter-pregnancy intervals were reviewed. Maternal and fetal outcome data were extracted, including presence of pre-eclampsia, maternal diabetes, postpartum hemorrhage, growth restriction, NICU days, and cord gas information, among many others. A control group without abnormal PCI was established and compared.

Results: Eleven out of 100 women with velamentous insertions, 1 out of 53 women with marginal insertions, and 2 out of 57 women without abnormal PCI were found to have short inter-pregnancy intervals.

Conclusion/Significance: This data suggests there are not enough cases to adequately compare perinatal outcomes of those with short inter-pregnancy intervals between abnormal PCIs. Future research will include expanding our data set to include new cases and establishing a morbidity index to evaluate the link between abnormal PCI and other morbidity indicators for both mother and baby. This will hopefully provide insight into informing prenatal care and patient education regarding inter-pregnancy length and the use of early detection methods to identify abnormal PCI.
PROSTATE CANCER IN CHICAGO: AN ANALYSIS OF DISPARITIES IN OUTCOMES USING NEIGHBORHOOD OF RESIDENCE

Presenting Author: John Ogunkeye, BS
Authors: Presenting Author: John T. Ogunkeye (RUMC)  Christopher L. Coogan, M.D (RUMC)

Introduction: Racial disparities related to Prostate Cancer (PCa) specific incidence and mortality in the United States are well-established. Although there have been significant improvements over the last 20 years, the disparity gap remains significant, as incidence and mortality for black men is 1.7 and 2.5 times higher respectively compared to white men nationally. In Chicago, the nation's third largest city, a unique history of laws and policies have created a diverse metropolis where communities are largely segregated by race. Several recent studies have demonstrated alarming disparities between these segregated Chicago communities in health-related topics, including life-expectancy, obstetric outcomes, and rates of chronic diseases. Additionally, unlike national trends, the disparity gap in certain health outcomes has increased over the last several decades.

Objective: The aim of this study is to investigate how trends in PCa-specific incidence and mortality vary between Chicago communities and to compare these trends to national outcomes.

Methods: Information was obtained from public databases made available through government support. Nationwide data was sourced from the SEER program of the National Cancer Institute. Community specific data for PCa outcomes in Chicago was acquired from the Illinois and Chicago Departments of Public health. An analysis was conducted to compare differences in PCa-specific incidence and mortality over the past 20 years.

Results: Consistent with national trends, neighborhoods with majority black populations have an incidence 1.5-times higher than majority white communities. The disparity gap in mortality statistics are more significant, as black neighborhoods have PCa-specific mortality nearly 3.5 times higher than white neighborhoods. Moreover, while mortality rates have decreased over the last two decades in majority white communities, the rates in black neighborhoods have moderately increased during the same time period.

Conclusion/Significance: Although important progress has been made nationally over the last several decades in improving outcomes for all men diagnosed with PCa, a focused analysis reveals that in Chicago, significant disparities remain. Future research should examine how PCa-specific outcomes in similar cities have changed, and whether evidence-based targeted screening interventions should be considered to improve mortality outcomes in high risk minority populations.
PROGRESSION OF ENDOMETRIOSIS IS ASSOCIATED WITH DECREASE IN CYTOTOXIC IMMUNITY

Presenting Author: Veronica Villanueva, BS
Authors: Veronica Villanueva (Rush); Itzel Lazcano (Rush); Aparna Yellapa (Rush); Paolo Gattuso (Rush); Pincas Bitterman (Rush) and Animesh Barua (Rush)

Introduction: Endometriosis is a chronic gynecological disease affecting 10-15% women of reproductive age, associated with chronic pelvic pain, dysmenorrhea, infertility and a risk factor for endometrial cancer. It affects quality of life as no curative treatment is available. Modulations of circulating estrogen and pain medication are the only available options. No etiology for endometriosis is known. Endometriosis develops with the establishment of endometrial stem cells or abnormally differentiated cells in tissues other than the uterus including the ovaries. A favorable environment in ovaries facilitates proliferation and maintenance of the disease. Local immune function in the ovary may play an important role in endometriosis development, however, information on cytotoxic immune function in endometriotic tissues in the ovary is not known.

Objective: The goal of this pilot study was to assess the status of cytotoxic immune functions in ovarian endometriotic lesions from patients with endometriosis.

Methods: 5um thick paraffin sections of ovaries with endometriosis from patients (n=10) and healthy subjects (n=10) were examined by immunohistochemistry for CD8 T cells. In addition, representative sections were also examined by hematoxylin and eosin for routine histopathology. Localization of immunopositive CD8 T cells in normal ovaries and ovaries with endometriosis were determined. Furthermore, CD8+ T cells in involved and uninvolved areas of ovarian endometriotic tissues were also examined. Differences in CD8+ T cell frequency between endometriotic and normal ovaries were determined by paired t-test and differences were considered significant when P<0.05.

Results: All ovarian endometriotic tissues showed presence of endometrial glands. In normal ovaries, CD8+ T cells were localized in the stroma and in the follicular theca. In ovaries with endometriotic lesions, CD8+ T cells were localized in the stroma with rare presence in intra-endometrial lesions. Low influx of CD8+ T cells into the endometriotic lesion suggests that endometrial lesion-induced factors might be involved in inadequate cytotoxic immune responses against endometriosis in the ovary.

Conclusion/Significance: These results suggest that endometriotic lesion-associated immunosuppression may be involved in weak response of CD8+ T cells in patients with endometriosis. These results will be a foundation for a larger study to develop immunotherapies against endometriosis.

Support: Swim Across America (2017)