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2020

Annual Medical Student Research Journal

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Summer Research

Basic Science, Clinical & Translational Research

Albertson, Brent

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Effect of Depression on Physical Therapy Compliance and Post-operative Outcomes Following Rotator Cuff Repair Surgery

Approximately 300,000 rotator cuff repairs (RCR) are performed each year in the US. Although depression appears common in patients with musculoskeletal injuries, the effect of depression on patient outcomes following RCR remains unknown. This retrospective study investigated whether pre-operative depression predicts worse post-operative outcomes, including physical therapy (PT) compliance and patient-reported outcomes using PROMIS, following RCR surgery. Patients who had undergone arthroscopic RCR at URMC between 1/1/2018-7/1/2018 were evaluated for inclusion, and the 117 (36%) that met inclusion and exclusion criteria were included in the study. Mean age at time of surgery was 59.3 years (SD 9.3), and the average follow-up period was 18.0 months (SD 8.3). 31 patients (26%) carried a clinical depression diagnosis. 36 patients (31%) had a pre-op PROMIS Depression score above the previously established depression threshold (PROMIS-D>52.5). Overall, the entire cohort showed significantly improved PROMIS Physical Function (PROMIS-PF) and Pain Interference (PROMIS-PI) scores from pre-operative to post-operative. Diagnosed depressed patients had a lower rate of PT compliance (74.1% vs 84.9%; p=0.0004), lower post-operative PROMIS-PF (41.3 vs 45.6; p=0.02), and higher post-operative PROMIS-PI (59.0 vs. 54.5; p=0.01) (i.e. worse pain) compared to patients without depression diagnosis. Similarly, PROMIS-depressed patients had a lower rate of PT compliance (73.6% vs 83.8%; p=0.002), lower post-operative PROMIS-PF (39.1 vs 46.1; p=0.0002), and higher post-operative PROMIS-PI (60.9 vs 54.1; p=0.0003) compared to patients without PROMIS depression. In conclusion, the results of this study identify behavioral health as an area for resource allocation to improve outcomes following arthroscopic RCR.

Basic Science, Clinical & Translational Research

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Peripheral edema: A common and growing marker of ill health in older Americans

Chronic peripheral edema is a debilitating condition that affects the elderly population, yet it's U.S. prevalence and population-level risk factors have not been assessed. This secondary analysis of data from the Health and Retirement Study (n=19,988) used weighted descriptive statistics and weighted logistic regression models to identify associations between persistent lower limb swelling (a self-report measure of chronic peripheral edema) and demographic variables and clinical variables, activity, and functional limitations.

The prevalence of persistent lower limb swelling increased from 13.7% in 2000 to 19% in 2016. Persistent lower limb swelling was significantly associated with older age, female sex, non-white race, lower wealth, hypertension, diabetes, obesity, and mild, moderate and severe pain ($p<0.0001$ for all associations).

People who reported peripheral edema were 2.2 (95% CI: 2.0-2.5) times more likely to report difficulty standing up from a chair, 2.3 (95% CI: 2.1-2.6) times more likely to report difficulty with climbing several flights of stairs, and 3.0 (95% CI: 2.6-3.4) times more likely to report difficulty walking several blocks. They also consistently reported performing less frequent mild, moderate, and vigorous physical activity ($p<0.0001$).

These results support a "vicious cycle" model where peripheral edema causes pain, limiting physical activity and further precipitating edema. They also suggest that peripheral edema places a disproportionate burden on people of color and families with low SES. Given the fact that few effective treatments are available for peripheral edema and the results of this study, future research should investigate novel treatments for this highly unmet medical need.

Basic Science, Clinical & Translational Research

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Antepartum management and neonatal outcomes of pregnancies with vasa previa

Introduction: Vasa previa (VP) is the when unprotected fetal vessels cross the internal cervical os. Because the incidence is so rare (1 in 2500 deliveries), there is limited evidence to guide clinicians in antenatal management and prenatal counseling regarding potential post-natal complications. This study aims to better characterize antenatal management and post-natal complications which may occur in pregnancies affected by VP.

Methods: This is a retrospective cohort study of a single tertiary care University center of prenatal ultrasound-identified persistent VP from 2011-2020. The primary outcome was divided into 1) characterization of maternal antenatal management of VP and 2) neonatal outcomes in pregnancies complicated by VP. Outcomes evaluated with descriptive statistics, chi square tests, and Mann-Whitney-U tests.

Results: 23 maternal subjects (19 singleton, 3 dichorionic, 1 monochorionic twin pregnancies) and 27 neonates included. Maternal demographics and strategies of antenatal management shown in Table 1. The majority of subjects (73.9%) were hospitalized for antepartum fetal monitoring, beginning at mean gestational age (GA) of 30±3 weeks (w). Monitoring included nonstress tests (daily: 41.2%; multiple times/week: 41.2%) and serial ultrasound exams (bimonthly: 23.5%; weekly: 35.3%). Most subjects (73.9%) received a full course of antenatal corticosteroids (ANC). Median GA at delivery was 34w (IQR 2w) and 34.8% required emergency Cesarean delivery. Composite immediate neonatal morbidity occurred in 81.5% and composite delayed neonatal morbidity in 14.8% of neonates (Table 2). Neonatal transfusion was required in 14.3%.

Conclusions: The majority of subjects with VP were managed in the hospital with fetal surveillance and delivered at preterm gestational ages. Neonatal complications of VP are mostly related to sequelae of preterm birth or neonatal anemia. The premature neonates had high rates of ventilatory support after birth despite high rates of completion of ANC.

Table 1. Characteristics and antenatal management of included maternal subjects

	Vasa previa (VP) (n=23)
Age[1] (years)	32.8 ± 4.6
BMI[1] (kg/m^2)	29.0 ± 6.1
Race	
White	13 (56.5%)
Black/ African American	5 (21.7%)
Other	5 (21.7%)
Ethnicity	
Non-Hispanic	18 (78.3%)
Hispanic	4 (17.4%)
Other/unknown	1 (4.3%)
Multiparous	14 (60.9%)
Conceived through in vitro fertilization	5 (21.7%)
Placenta bilobed or succenturiate lobe	12 (52.2%)
Velamentous/marginal umbilical cord insertion	13 (56.5%)
Type	
Type I Vasa Previa (velamentous cord insertion)	7 (30.4%)
Type II Vasa Previa (succenturiate or bilobed placenta)	9 (39.1%)
Unknown type	7 (30.4%)
Inpatient management	17 (73.9%)
Gestational age at inpatient management (weeks)	30 ± 3
Completed antenatal corticosteroid course	18 (78.3%)
Inpatient monitoring strategy	
Daily non-stress test	7 (41.2%)
Multiple times/week non-stress test	7 (41.2%)
Bimonthly ultrasound	4 (23.5%)
Weekly ultrasound	4 (35.3%)
Emergent/urgent Cesarean delivery	8 (34.8%)
Indication for emergent/urgent Cesarean delivery	
Non-reassuring fetal heart rate tracing	3 (37.5%)
Vaginal bleeding	2 (25%)
Preterm labor	2 (25%)
Preterm prelabor rupture of membranes	1 (12.5%)
All results displayed as n(%) except: [1] mean ± standard deviation	

Table 2. Characteristics and post-natal complication rates of included neonatal subjects

	Vasa previa (VP) (n=27)
Gestational age at birth[1] (weeks)	34 (33-35)
Birthweight[2] (g)	2311.6 ± 423.4
Birthweight percentile[2] (%)	55.4 ± 24.5
5-minute Apgar score[1]	8 (7-9)
Umbilical cord pH[2]	7.30± 0.04
Immediate assisted ventilation at delivery	19 (70.4%)
Assisted ventilation > 6 hours	17 (63.0%)
Antibiotics for neonatal sepsis	17 (63.0%)
Intraventricular hemorrhage	0 (0%)
Necrotizing enterocolitis	3 (11.1%)
Bronchopulmonary dysplasia	2 (7.4%)
Composite early neonatal morbidity[3]	22 (81.5%)
Composite delayed neonatal morbidity[4]	4 (14.8%)
Neonatal intensive care unit length of stay[1]	11 (8.5-24)
Neonatal hematocrit[2](%)	42.7 ± 6.9
Neonatal transfusion	4 (14.8%)
All results displayed as n(%) except: [1] median (IQR) [2] mean ± standard deviation	
[3] includes immediate assisted ventilation at delivery, assisted ventilation > 6 hours, or antibiotics for neonatal sepsis [4] includes intraventricular hemorrhage, necrotizing enterocolitis, bronchopulmonary dysplasia	

Basic Science, Clinical & Translational Research

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Preceptor
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Thoracic Cage Injuries: Incidence of Sternal Fractures Accompanying Thoracic Spinal Fractures and Associated Factors

Introduction: This study aimed to identify the incidence of concomitant thoracic spinal and sternal fractures, and factors associated with concomitant fractures.

Methods: We retrospectively analyzed electronic medical record data of patients treated at a Level 1 Trauma Center who underwent surgery for thoracic spinal fracture between 2008-2020. We recorded injury characteristics, surgical outcome data, and demographic information.

Results: 107 patients with thoracic spinal fractures had a sternal fracture incidence of 18.7%. The average age was 53.2 [15-90]. 72 were male and 35 were female, 92 (85.9%) were White, 10 (9.3%) were African American, 3 (2.8%) were Hispanic, and 2 (1.9%) were Asian. The average age of patients with sternal fractures was 48.7 years, compared to those without sternal fractures, 54.3 years (p=0.251).

Patients with T1-T7 fractures [14 of 48 (29.2%)] had a significantly higher rate of sternal fractures compared to patients with T8-T12 fractures [6 of 59 (10.2%)] (p=0.012). 7 of 40 (17.5%) patients with burst or compression fractures, 12 of 41 (29.3%) with chance or distraction fractures, 0 of 19 (0.0%) with hyperostotic fractures, and 1 of 7 (14.3%) with other fracture morphologies had sternal fractures (p=0.057).

Sex, age, mechanism of injury, and surgical outcome factors were not associated with sternal fractures.

Conclusions: The incidence of concomitant thoracic spinal fracture and sternal fracture in our series is 18.7%. T1-T7 fractures and fracture type (burst, distraction) were significantly associated with the presence of sternal fractures.

Basic Science, Clinical & Translational Research

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Patient outcomes following angiography for gastrointestinal hemorrhage Place of Research Completion

This study examined patient outcomes following angiography of upper or lower gastrointestinal (GI) bleeding. A retrospective review of the electronic medical record was conducted between January 2015 and December 2018. 127 patients were identified as having a GI hemorrhage requiring angiographic localization with potential treatment. The review included 48 females and 79 males, with an average age of 69.7 years (range 23-97 years). Fifty-four patients had an upper GI bleed (above the ligament of Treitz), 60 patients had a lower GI bleed, and 13 patients had a bleed that was never identified through radiological or endoscopic evaluation. Of the 127 total patients, 92 did not have active extravasation of contrast, and 35 patients did have evidence of extravasation. Eighteen patients with negative angiographic findings underwent empiric embolization based on prior endoscopic evaluation. Clinical success was defined as a resolution of GI bleeding symptoms without a subsequent angiographic/endoscopic/surgical procedure before discharge. Clinical success occurred in 50/92 (54%) patients with negative angiography, and 19/35 (54%) patients with a positive angiogram. All-cause mortality after 1 year for a negative angiogram in the setting of GI hemorrhage was 31/92 (34%); 16/31 (51%) patients died during that hospitalization. All-cause mortality within 1 year for a positive angiogram was 7/35 (20%); 4/10 (40%) patients died during that hospitalization. There was no significant difference in 1-year all-cause mortality ($p = 0.13$) or clinical success ($p = 0.99$) between negative and positive angiography.

Basic Science, Clinical & Translational Research

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Prostate Cancer Detection on Restriction Spectrum Imaging

Introduction: Prostate cancer remains the most common non-cutaneous malignancy and second most common non-cutaneous malignancy to cause death among men within the United States. Screening for prostate cancer involves an evaluation of serum prostate-specific antigen (PSA) and a digital rectal exam (DRE). If screening is suspicious, a biopsy will be performed using 12 cores in specific regions of the prostate. Recently, the use of multiparametric MRI (mpMRI) is gaining traction for its use in identifying lesions while also providing imaging for ultrasound fusion targeted biopsies. Despite these benefits, there are some clinically significant prostate cancer lesions that can be missed. In this project, we studied the use of restriction spectrum imaging (RSI), which is a diffusion-weighted imaging (DWI) technique used during the acquisition of mpMRIs to test whether it can improve the detection of aggressive prostate cancers earlier and thus subject patients to fewer invasive biopsies as well as receive appropriate treatment.
Methods: Data was obtained from a retrospective database of patients who underwent mpMRI with RSI after November 1, 2019, through eRecord. We collected demographics, PSA, DRE, and biopsy data from patient records. Radiologists were blinded to the patient information and re-evaluated the RSI and DWI images obtaining a likelihood of prostate cancer score, called Prostate Imaging Reporting Data System (PI-RADS).
Results: Fifty patients had complete clinical and radiographical data. For all 50 patients, the RSI and DWI PI-RADS averages were 4.48 and 4.32 respectively. Of the 50 patients, 40 patients had the same PI-RADS scores at the same prostate location (i.e. left apex, right mid, etc). For 8 out of 10 patients that had different PI-RADS, there was a 1-2 increase in PI-RADS from RSI compared to DWI. For 2 patients, one had a lesion that RSI missed compared to DWI and another one where

RSI found a lesion at the left base while DWI found a lesion at the right apex. For the 3 patients that displayed 3+3=6 Gleason score, 2 patients had a higher RSI PI-RADS (4 and 5) compared to DWI PI-RADS (3 and 3) while 1 patient had a lower RSI PI-RADS (2) compared to DWI (3). Due to the small number of patients showing this difference, we were unable to make any statistically significant conclusions.

Discussion: The similarities in the PI-RADS between the DWI and RSI is likely due to the additional processing from RSI being insufficient to provide a significant difference to the radiologist. However, there still remains additional data to be interpreted, and based on the data there is still some difference although slight. We are currently awaiting data on pathology which can potentially lead to correlations between RSI PI-RADS and high risk features of prostate cancer such has cribriform morphology and perineural invasion.

Basic Science, Clinical & Translational Research

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Long-term Patient Outcomes Following Balloon Dilation of the Carpentier-Edwards 4300 valved conduit model in patients with Congenital Heart Disease

Congenital heart disease is one of the most common birth defects in the US, affecting 1% of births per year. Several forms of congenital heart disease require surgical reconstruction of the right ventricular outflow tract(RVOT), involving the placement of a valved right-ventricle-to-pulmonary-artery (RV-PA) conduit. All valved conduits ultimately fail over time due to conduit stenosis or regurgitation, which warrants transcatheter or open surgical intervention. Fortunately, transcatheter valvuloplasty may delay the need for surgical conduit replacement.

Valved RV-PA conduits can be made from a variety of materials, ranging from cadaveric homografts to bioprosthetic valved conduits. A previous study on the short-term outcomes following balloon dilation of stenotic valved RV-PA conduits demonstrated more likely effective stenosis relief with the model 4300 Carpentier-Edwards valved conduit compared to other conduits. Based on these results, the aim of this study is to observe and report long-term patient outcomes following the implantation of the model 4300 CE valved conduit in patients with congenital heart disease at University of Rochester Medical Center in order to provide an improved understanding of factors affecting conduit longevity. A current hypothesis for this study is that following balloon dilation, the model 4300 CE valved conduit will demonstrate a longer time to re-intervention compared to other conduit types.

For this study, de-identified patient data are collected from review of the electronic medical records of the URMC pediatric cardiology catheterization lab database and Crouse Hospital catheterization lab database to conduct a retrospective cohort study. Once all the data are

collected, logistic regression analysis will be used to evaluate time to re-intervention, balloon angioplasty pressure, and balloon:nominal conduit diameter ratio.

Basic Science, Clinical & Translational Research

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Facilitators and barriers to Tdap and influenza vaccination in OB/GYN practices: a qualitative study

Background: Influenza and pertussis are vaccine preventable diseases that can lead to high rates of hospitalization and morbidity, particularly for pregnant women and their infants. Despite the seriousness of these diseases, the availability of safe and effective vaccines, and a long-standing universal recommendation, maternal influenza and Tdap vaccination coverage rates reported as of April 2019 were 53.7% and 54.9%, respectively, leading to unnecessary morbidity and mortality in mothers and infants.

Objective: To generate strategies to increase influenza and Tdap vaccination rates in obstetric settings.

Methods: We conducted key informant interviews to assess nurse and provider perspectives and current office processes. Interview participants were nurses, midwives and obstetricians affiliated with one of four participating health systems across two states, New York and California. My work focused on the qualitative analysis of the interviews in order to identify important topics and themes.

Each interview was independently coded by two trained reviewers. A third team member reviewed each coded transcript for accuracy and consistency, and discrepancies were resolved by team consensus. Currently, ~90% of interviews have been coded and resolved.

Results: Themes from coded interviews include: practice organization, refusal, education, visit flow, standing order, QI training

Conclusion: Despite strong personnel support, significant barriers to vaccination remain. EHR tools were used, but often identified as unhelpful or unintuitive. Patient hesitancy is common. Few improvement initiatives have been pursued, though opportunities have been identified. Analysis is ongoing, but this information will be used to guide a quality improvement program to increase vaccination rates.

Basic Science, Clinical & Translational Research

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Racial Disparities in the Treatment of Pituitary Tumors

Background: Pituitary gland tumors are the third most common intracranial tumor, with an overall estimated prevalence of 16.7%. Surgical resection is considered first-line treatment in many instances, particularly when symptomatic mass effect or visual deficits are present. Given the frequency of pituitary tumors and their associated morbidity, it is important to determine the factors that influence management and survival outcomes for these patients. To date, few studies have investigated the role of social factors such as race in determining pituitary tumor outcomes.

Objective: To investigate whether racial disparities exist in the management and outcomes of patients with pituitary gland tumors treated at the neuro-endocrine clinic at Strong Memorial Hospital.

Methods: Records of over 2,700 patients treated at Strong for pituitary tumors were obtained and compared with respect to race on measures of management and outcome such as treatment course, post-operative complications, and resolution of initial symptoms post-treatment.

Results: While analysis is still ongoing, patients who self-identified as Asian or Black received imaging (CT/MRI) more frequently compared to patients who self-identified as White. Additionally, patients were more likely to receive medication than surgery for their pituitary tumor regardless of race. Asian patients were significantly more likely to receive medication than patients who identify as White, Black, or Hispanic.

Conclusions: Although the data are limited, racial disparities appear to exist in the demographics and treatment of patients with pituitary tumors treated at Strong Memorial Hospital. Further research is required to elucidate the extent of these disparities in addition to their underlying cause.

Basic Science, Clinical & Translational Research

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Analysis of Oculomotor Performance to Understand Mild Traumatic Brain Injury

Concussion, also called mild Traumatic Brain Injury (mTBI), is one of the leading causes of disability worldwide. Sequelae of such an injury include reduced cognitive function, difficulty with attention, vision issues, and more. Efforts to tease apart underlying mechanisms have focused on white matter changes within the cerebral hemispheres. Recent evidence points to the midbrain as an area critically affected in performance degradations as the result of concussion (Hirad et al., 2019). Pathways involved in eye movements run through the midbrain, including connections that travel between the frontal eye fields, the superior colliculus, paramedian pontine reticular formation, and the abducens and oculomotor nuclei. Axonal injury as a result of mTBI may disrupt these connections, producing deficits in eye movement performance. Several cohorts were analyzed: concussed athletes, sub-concussed athletes with repetitive head hits, and non-contact athlete controls. We hypothesized that head impact groups would have deteriorated performance in horizontal and vertical smooth pursuit and saccade metrics compared to controls due to interrupted inputs traveling through the medial longitudinal fasciculus and rostral interstitial nucleus. Oculomotor data showed a marked decrease in the number of fixations and saccades in concussed athletes compared to controls. These findings support the hypothesis that mTBI is associated with reduced oculomotor performance. This project will next study diffusion MRI data to delineate specific white matter tracts and their relation to oculomotor dysfunction. This will support a more complete understanding of the functional consequences of mTBI.

Basic Science, Clinical & Translational Research

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CT Angiography Derived Duplex Ultrasound Velocity Criteria with a Comparison to Digital Subtraction Angiography in Patients with Carotid Artery Stenosis

Background: Carotid duplex ultrasound (CDUS) velocity criteria have been traditionally derived from angiography. Recent studies support a shift toward computed tomography angiography (CTA) derived velocity criteria, however, they lack a comparison to angiography. The purposes of this study are to correlate CTA to digital subtraction angiography (DSA) and to update our previous CTA-derived CDUS velocity criteria.

Methods: Vessel diameter and corresponding CDUS data were recorded from all patients who underwent CDUS and a neck CTA within 6 months between 2010 and 2019. DSA measurements were recorded for a subset of patients. Spearman rank correlation was used to correlate measurements obtained by CTA to those obtained by DSA. Receiver operating characteristic (ROC) curves were generated to determine optimal velocity thresholds.

Results: A total of 563 vessels from 325 patients were analyzed. ROC analysis to identify ≥50% stenosis resulted in optimized thresholds of 144 cm/sec, 42.7 cm/sec, and 2.10 for peak systolic velocity (PSV), end-diastolic velocity (EDV), and PSV to common carotid artery PSV ratio (PSVR), respectively. ROC analysis to identify ≥80% stenosis resulted in optimized thresholds of 319 cm/sec, 87.2 cm/sec, and 4.90 for PSV, EDV, and PSVR, respectively. The degree of carotid artery stenosis for a subset of 124 vessels on CTA correlated well with that of DSA ($\rho = 0.89$, $p < 0.0001$).

Conclusions: These data demonstrate a high correlation between measurements obtained on CTA and DSA while forming a reliable CTA-derived CDUS velocity criteria.

Basic Science, Clinical & Translational Research

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The Patient-Reported Outcomes Measurement Information System (PROMIS) in pediatric populations served by orthopaedic clinics: a systematic review

Objectives:
The Patient-Reported Outcomes Measurement Information System (PROMIS) is a validated tool for patients to report their symptoms, providing a measurable way to track outcomes. The literature on PROMIS in pediatric orthopaedic populations is limited. This systematic review will guide future research on PROMIS, and inform its use in pediatric orthopaedic settings. The main objectives of this study are: 1) To evaluate publication trends of literature on PROMIS use in pediatric populations seen in orthopaedic clinics, and 2) To assess how these studies have used PROMIS. The secondary aim is: To determine the correlations between PROMIS and legacy patient-reported outcome measures (PROMs) in pediatric orthopaedics.
Methods:
Studies were selected from PubMed, Cochrane CENTRAL, Embase, and Web of Science. Included studies were published in a peer-reviewed journal, contained Level I-IV evidence, included patients ages ≤21 years with an orthopaedic condition, and focused on the pediatric PROMIS tool. Non-English studies were excluded.
Results:
Of the twenty-five included studies, 10 pertain to upper extremity conditions, 5 to lower extremity, 3 to spine, and 7 to mixed/full-body conditions. 13 studies assess PROMIS validity; 12 studies utilize PROMIS as an outcome measure. Correlations to legacy PROMs are moderate to strong.
Conclusions:
Since 2013, the number of articles published about the use of PROMIS in pediatric orthopaedic populations has increased considerably. Moderate-strong correlations are demonstrated between PROMIS and multiple legacy PROMs. These results indicate that PROMIS is a valuable tool for use in pediatric orthopaedic populations. However, further research is needed to improve its use.
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Basic Science, Clinical & Translational Research

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Number of Lantibiotic Biosynthesis Genes from Skin Swabs Inversely Associates with *S. aureus* Culturability in Atopic Dermatitis Subjects

Atopic Dermatitis (AD) is the most common inflammatory skin disorder and is characterized by skin colonization with *Staphyloccocus aureus*[1-9]. The Atopic Dermatitis Research Network performed a cross-sectional analysis of microbial ecology at non-lesional and lesional skin sites in 92 adult AD subjects and 39 nonatopic (non-AD) controls based on *S. aureus* culture positivity. Taxonomic analysis of skin swabs from 20 disease severity-matched AD (N=10 S. aureus culture+ and N=10 culture-) and 9 culture-, non-AD subjects revealed discrepancies between molecular evidence and culture positivity for *S. aureus*.

We hypothesized that expression of lantibiotics, which exhibit antibacterial action against *S. aureus* and are commonly produced by commensal bacteria, may explain our observation of high relative abundance of *S. aureus* in skin samples that were not culture positive and vice versa. Since each lantibiotic class (I, II, III, and IV) has specific biosynthesis genes (lanB/C, lanM, labKC, and lanL, respectively)[10-12], Hidden Markov Models (HMMs)[10] were developed to search metagenomes for these gene clusters. *S. aureus* culture- non-AD skin contained significantly more lantibiotic gene hits than AD lesional culture+ samples. This relationship was not observed when samples were binned by metagenomic *S. aureus* detectability. Significantly fewer lantibiotic hits were found in non-lesional culture+ *S. aureus* samples from AD than in their metagenomic *S. aureus*+ counterparts.

Our findings suggest that expression of lantibiotics by commensal bacteria may significantly diminish the ability of *S. aureus* to remain viable. Importantly, this suggests that *S. aureus* burden present on AD skin are not accurately reflected by culture results.

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Basic Science, Clinical & Translational Research

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Understanding the current progress of targeted therapies for Thyroid Eye Disease

Name: Vardaan Gupta

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Poster title:

Location: **Abstract:**

Thyroid eye disease (TED) is a disfiguring and sight-threatening autoimmune disease that involves inflammation and remodeling of the orbit. While TED is the most common orbital pathology, it has perplexed clinicians and scientists for decades. Substantial fat accumulation along with increased scarring and hyaluronan deposition leads to protrusion of the eye (exophthalmos) and may result in visual loss from optic nerve compression. There is a fundamental lack of knowledge as to why only some Graves' disease patients manifest TED and show only a variable, incomplete response to anti-inflammatory agents such as corticosteroids. Development of TED may manifest itself when Graves' autoantibodies directed against the thyroid stimulating hormone receptor (TSHR) circulate to the orbital soft tissue. TSHR autoantibodies stimulate proliferation of orbital fibroblasts, inflammatory cytokine release and promote adipogenesis. Currently, there is no cure for TED and it is extremely challenging to treat. Corticosteroids, radiation therapy and invasive surgery are standards of care for TED. In January 2020, teprotumumab, a monoclonal inhibitory IGF1R antibody, became the first drug to be approved by the FDA to treat TED. While teprotumumab reduced symptoms of TED, the molecular mechanisms whereby IGF1R inhibition mitigates disease and why some patients were refractory to treatment are unclear. What is certainly clear is the urgent need for effective therapeutics to treat patients with TED. Recent advances by Drs. Woeller and Feldon have brought to light several different pathways and specific proteins involved in the pathogenesis of TED that can serve as potential targets for therapeutics.

Basic Science, Clinical & Translational Research

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Reconnecting for Recovery: Relational Motivational Multifamily Therapy Group for Young Adults with Anorexia Nervosa

Background:

Of all psychiatric disorders, anorexia nervosa (AN) has the highest rates of mortality. The etiology of anorexia is poorly understood, and it is unknown which forms of therapy are most effective in terms of pharmacology and psychotherapy. Currently, there is preliminary data on the efficacy of family-based treatments for AN.

Objective:

This study investigates how relational/motivational multifamily group therapy can impact patient perception of connection to themselves, their families, other group members in therapy sessions, and the therapist quantitatively and qualitatively. 6-month follow up will examine how such perceptions relate to downstream eating disorder outcomes such as weight, binging/purging, and disordered thought processes.

Methods:

Multifamily therapy was conducted with 2 cycles of 5 patients and their families for 16 sessions. Following each session, patients completed an evaluation to gather quantitative data on a Likert scale and qualitative responses to open response prompts.

Results:

Preliminary quantitative analysis suggests some increase in patient perception of connection to one's self between midpoint and final sessions, some increase in patient perception of connection to family members between initial and final sessions, an increase in patient perception of connection to other group members from initial to final sessions and some increase in patient perception of connection to the therapist between midpoint and final sessions. The qualitative analysis is pending using the Narrative Process Coding System.

Discussion:

Final analysis will provide insight on how multifamily group therapy can shape the relationships of patients with AN to themselves, their loved ones, and their therapists. Long term follow-up will examine how multifamily therapy can impact eating disorder outcomes.

Acknowledgements:

The Center for Advocacy, Community Health, Education, and Diversity (CACHED) at University of Rochester Medical Center provided funding for Carley Haft to conduct analysis on the data collected by the project in the form of a Basic Science, Clinical, and Translational Medical Education Award Project grant.

Basic Science, Clinical & Translational Research

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Testing the sufficiency of ERRB2 activation for hair cell protection in a mouse model of ototoxicity

Antibiotic resistance is on the rise due to overprescribing medications, forcing physicians to use more aggressive, "last-resort" antibiotics like kanamycin. Kanamycin is an aminoglycoside antibiotic used to treat serious bacterial infections in different parts of the body but has severe ototoxic side effects. Acquired hearing loss at this point is not reversible and involves tremendous efforts to adjust to living in a hearing-dominant world. When cochlear hair cells are lost in mammals, they cannot be regenerated and lead to permanent hearing loss. Previous studies have shown that the epidermal growth factor (EGF) signaling pathway is present and required for supporting cell proliferation in chickens. Mammalian supporting cells also express the required receptors for the EGF signaling pathway and are responsive to EGF-related inhibitors (White *et al.,* 2012). ERBB2 is a receptor tyrosine kinase that is part of the EGF family involved in detecting stretch damage in epithelial tissues. Signaling from ERBB2 has been found to increase the number of mouse hair cells after damage *in vivo* and supporting cell proliferation into hair cells *in vitro* (Zhang *et al.,* 2018). The goal is to compare hair cell survival, supporting cell proliferation, and differentiation from supporting cell to hair cell after ototoxic exposure in Sox10 mice with ERRB2 to those without the gene activated. We hope to find the normally post-mitotic supporting cells entering the cell cycle after CA-ERBB2 activation through immunofluorescent stained cochlear tissue from transgenic mice given kanamycin. We also would like to determine whether or not hair cell death is necessary for entry into the cell cycle.

Basic Science, Clinical & Translational Research

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Using Machine Learning to Classify Schizophrenia Based on Retinal Images

Purpose: Changes in retinal structure have been documented in patients with chronic schizophrenia using optical coherence tomography (OCT) metrics, but these studies were limited by the variables provided by OCT machines. Our purpose was to utilize machine learning (ML) techniques to analyze OCT images and train algorithms to differentiate between schizophrenia patients and healthy controls.

Method: Intermediate features extracted from ReLayNet, a pretrained convolutional neural network (CNN) designed to segment macula layers from OCT images, were used to represent abstracted data from the OCT images of 14 first episode (FEP) schizophrenia patients, 18 chronic schizophrenia patients, and 20 or 18 age-matched controls for each group, respectively. Subsets of the abstracted data and OCT machine metrics were used separately to train support vector classification (SVC) models to differentiate between control and schizophrenia samples. The models were then tested on unseen data.

Results: With SVCs trained on OCT machine metrics, models that differentiated FEP schizophrenia patients from controls did not classify unseen samples with performance better

than chance, while models looking at chronic schizophrenia vs. controls did perform better than chance. With SVCs trained on OCT image data extracted from the CNN, classifiers differentiating FEP schizophrenia patients from controls as well as chronic schizophrenia patients from controls all performed with accuracies greater than chance.

Discussion: These results suggest that ML can be used to detect patterns in OCT images of patients with FEP schizophrenia that are more useful in identifying pathology than the metrics provided by OCT machines.

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Testing a Volume Sweep Imaging Protocol for Right Upper Quadrant

Background

Billions around the world lack access to diagnostic medical imaging. We previously piloted an asynchronous telediagnostic system in Peru which sends cine clips over low internet bandwidth with volume sweep imaging (VSI) acquisitions acquired by lay people without significant medical background circumventing many obstacles in delivering imaging to underserved communities. The system produced 96% diagnostic visualization of obstetric, right upper quadrant, and thyroid target regions. However, questions remain as to how this telediagnostic system compares to standard of care imaging.

Purpose

The goal of this study was to test the telediagnostic system specifically for scanning of the right upper abdominal quadrant (RUQ) in comparison to standard of care ultrasound in a routine outpatient Peruvian healthcare setting.

Materials and Methods

The telediagnostic system was piloted in the Conde de la Vega Health Center in Lima, Peru. A nurse and technician without significant ultrasound background were trained on the use of the telediagnostic system and the right upper quadrant VSI scan procedure over a 12 hour training period. The VSI scan procedure is based only on external body landmarks and requires no medical or anatomical knowledge. Cine clips involving simple probe sweeps are obtained of the target region and uploaded to the cloud with a telemedicine platform.

92 patients (average age 42, 82 female, 10 male) were scanned by the trained nurse or technician with the telediagnostic system using the RUQ VSI scan protocol from June 2018 to March 2019. These examinations were sent over the telemedicine software and interpreted remotely by two abdominal fellowship trained diagnostic radiologists who also commented on the image quality. Standard of care ultrasound was also performed by a Peruvian radiologist during the same clinic visit. These VSI scans sent via the telediagnostic system were compared to the same day standard of care imaging.

Results

Among VSI scans of acceptable or excellent imaging quality performed by individuals without prior ultrasound experience, there was 83% agreement on normal or abnormal exam between

VSI and standard of care imaging (Cohen's kappa 0.5). For liver echogenicity, there was 80% agreement (Cohen's kappa 0.33). For normal or abnormal liver, there was 97% agreement (Cohen's kappa 0.79). For normal or abnormal gallbladder, there was 79% agreement (Cohen's kappa 0.55). For normal/abnormal kidney there was 87% agreement (Cohen's kappa 0.18). 35% of exams were rated of low image quality, 42% of acceptable image quality, and 21% of excellent image quality. Cholelithiasis, hepatic cysts, and renal cysts were diagnosed with agreement between VSI and standard of care.

Average file size delivered over the telemedicine platform was 8.3 MB. Average sweep length was 11 seconds. Multinomial regression with image quality as the outcome, and date and time of scan as predictors showed no difference in quality of the exams over time ($p = .30$).

Conclusions

Among scans of at least acceptable imaging quality, the use of this telediagnostic system provides good agreement with standard of care imaging for scanning of the RUQ.

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Retrospective Analysis of the Efficacy of Solvent/Detergent Treated Pooled Plasma as Compared to Fresh Frozen Plasma in Thrombotic Thrombocytopenic Purpura: A Single Center Experience

Background: Plasma exchange is the primary treatment for acute episodes of Thrombotic Thrombocytopenic Purpura (TTP), a rare blood disorder characterized by clotting in small blood vessels, resulting in thrombocytopenia, hemolytic anemia and multi-organ failure. Plasma exchange replacement fluids in TTP include Fresh Frozen Plasma (FFP) and solvent/detergent treated pooled plasma (SDP), such as Octaplas. SDP is a virus-inactivated, pooled human plasma product that has been used in the treatment of TTP. This study evaluates the effectiveness of SDP as compared to FFP in treating acute TTP events.

Study Design and Methods: A retrospective analysis was conducted comparing SDP- to FFP-treated patients with suspected acute TTP episodes as a primary admitting diagnosis between December 2014 and December 2019. A total of 17 patients were included in this study. The FFP group consisted of 9 patients (6M/3F, median age 44.2 years), three of whom had relapsed TTP. The SDP cohort had 7 patients (2M/5F, median age 38 years), one of whom had relapsed TTP. The primary outcomes measured included reported thromboembolic and major bleeding events. Secondary outcomes included number of plasma exchange procedures, adverse effects including neurological changes, transfusion of other blood products, ICU and hospital length of stay (LOS), and changes in laboratory values.

Results: There were no adverse transfusion reactions reported in either group. 12 bleeding events were reported from 6 patients in the FFP group and 8 events from 4 patients in SDP group ($p=0.397$). No significant differences were detected in ICU stay, LOS, number of plasma transfused, daily percentage of change of laboratory values, or changes in neurological status.

Conclusions: These data confirm the previously reported efficacy of SDP for treating TTP. There were no significant differences in thromboembolic or bleeding events between FFP vs SDP patients. Laboratory value changes over the course of plasma exchange procedures as well as

adverse reactions and the clinical outcome between both groups imply the safety of SDP usage in TTP management.

Table: Patient Characteristics; Data shown in Mean ± Standard Deviation [Median (Range)].

	FFP (n=9)	**SDP (n=7)**	**p-value**
Number of plasma exchange procedures	5.5 ± 3.58 [4 (4-14)]	4 ± 1.4 [4 (2-6)]	0.447
ICU stay (day)	0.08 ± 0.08 [0 (0-4)]	0.16 ± 0.3 [0 (0-21)]	0.431
Hospital length of stay (day)	10.1 ± 2.7 [8 (5-20)]	20.4 ± 15.7 [17 (4-53)]	0.259
Number of plasma transfused (unit)	67.6 ± 19.4 [64 (41-94)]	58.7 ± 12.1 [59 (36-75)]	0.475
Number of RBC transfused (unit)	0.2 ± 0.63 [0 (0-2)]	2.1 ± 2.6 [2 (0-8)]	0.095
Number of platelet transfused (dose)	0.6 ± 0.7 [0 (0-2)]	1.7 ± 1.7 [2 (0-5)]	0.331
Daily Laboratory Values Percentage of Change: Data shown in Mean ± Standard Deviation			
Hemoglobin (g/dL)	-1.99 ± 1.49	-4.96 ± 4.00	0.138
Hematocrit (%)	-1.49 ± 1.7	-4.05 ± 4.53	0.125
Platelet Count (x10^{9}/L)	86.6 ± 29.49	52.19 ± 43.08	0.112
Prothrombin Time (Second)	5.82±11.58	-4.45 ± 3.8	0.270
International Normalized Ratio (INR)	-1.11 ± 0.00	-3.6 ± 2.3	0.242
Activated Partial Thromboplastin Time (Second)	-1.0 ± 1.35	-0.9 ± 2.29	0.388
Fibrinogen (mg/dL)	-15.69 ± 16.19	1.5 ± 29.3	0.405
Lactate Dehydrogenase (U/L)	-18.06 ± 12.69	-36.2 ± 17.2	0.213
Creatinine (mg/dL)	-2.35 ± 2.46	-6.3 ± 26.9	0.400
Alanine Aminotransferase (U/L)	1.38 ± 4.34	-5.1 ± 36.7	0.721
Aspartate Aminotransferase (U/L)	-9.45 ± 7.00	-9.8 ± 16.3	0.510
Total Bilirubin (mg/dL)	-15.85 ± 34.97	-45.0 ± 13.6	0.108
Alkaline Phosphatase (U/L)	-3.36 ± 2.10	-2.5 ± 12.44	0.7989

Basic Science, Clinical & Translational Research

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Validating a Predictive Model for Abdominal Exploration after Blunt Abdominal Trauma

Background: There are no clear indications for abdominal exploration in children who sustain blunt abdominal trauma (BAT) other than the presence of free intraperitoneal air on imaging. We hypothesized that clinical and imaging factors could be used to build a model to predict the need for abdominal surgery in children with BAT. We aimed to validate a predictive model designed for this purpose.

Methods: A retrospective chart review of pediatric patients under 18 years old from our institution's pediatric trauma database who experienced BAT between 2011 to 2019 was performed. Patients with an abdominal/pelvic computed tomography (CT) scan without free intraperitoneal air were included. Subjects were required to have at least one of the following inclusion criteria: abdominal wall bruising, abdominal pain/tenderness, thoracolumbar fracture, presence of free fluid, and presence of solid organ injury. Pelvic fracture was also included in the current study. Statistical analyses were performed with Fisher's exact test.

Results: Two hundred nineteen patients met all inclusion criteria; 26 (12%) underwent abdominal exploration. The need for surgical management was significantly associated with the presence of free fluid (p = 0.002) and thoracolumbar fracture (p = 0.001). Abdominal wall bruising, abdominal pain/tenderness, solid organ injury, and pelvic fracture were not significantly associated with the need for surgery. Patients with BAT due to motor vehicle collision were isolated as a subgroup; 12 of 63 (19%) underwent abdominal exploration. Within this group, surgical intervention was significantly associated with free fluid (p = 0.001) and thoracolumbar fracture (p = 0.011). A predictive model incorporating the 6 predictive factors had an area under the receiver operating characteristic curve of 0.75.

Conclusions: The presence of free abdominal fluid on CT and thoracolumbar fracture may be predictive factors in determining the need for abdominal exploration in cases of BAT when there is no clear imaging indication for surgery. Further studies adding patients from other institutions' databases are needed to determine which variables are important in validating a model to predict the need for abdominal exploration after BAT.

Basic Science, Clinical & Translational Research

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Clinical correlation of patients with myelodysplastic syndrome observed to have a transcriptionally aberrant mesenchymal stem and progenitor cell subpopulation

Myelodysplastic syndrome (MDS) is a heterogenous disease that is phenotypically characterized by ineffective hematopoiesis with cytopenia, dysplastic bone marrow, and a variable risk for evolution to acute myeloid leukemia. MDS has a poor prognosis, with 5-year overall survival rates less than 50%. Currently, there are only three FDA approved treatments for MDS and there have been no new therapies approved within the past decade. Furthermore, none of these current therapies target molecular features of the disease. Allogenic hematopoietic stem cell transplant remains the only curative treatment but remains a limited option as MDS is most prevalent among aged populations who more frequently have co-morbidities that make them ineligible to undergo a transplantation. More recent studies have identified mesenchymal stem and progenitor cells (MSPCs), which form a key component of the bone marrow microenvironment, as a potential agent in initiating and driving progression to MDS. Thus, studying the specific genomic and transcriptional changes within the MSPCs of MDS patients could identify unifying disease features which may be targeted for new therapeutics. Here we reviewed medical records of MDS patients who have had bone marrow biopsies and aspirates collected to provide clinical correlations to their genomic and transcriptional analysis. Data was collected on variables related to the clinical course of our population cohort including their treatment course and complications, transfusional burden, revised international prognostic scoring system (IPSS-R) values, and overall survival (OS). Patients were split into dichotomous variables (e.g. high versus low transfusional burden) for analysis and our data explores the difference in survival outcomes between these groups.

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Early Completion of Medical Orders for Life-Sustaining Treatment (MOLST) is Associated with Improved End of Life Quality Metrics in Acute Myeloid Leukemia (AML) and Myelodysplastic Syndromes (MDS)

Purpose: End of life (EOL) care in patients with hematologic malignancies has been inadequately studied. Available data suggests that these patients are more likely to be hospitalized and receive chemotherapy at EOL, and are less likely to be enrolled in hospice relative to patients with solid tumors. The aim of this study was to identify potential barriers to high-quality EOL care for patients with acute myeloid leukemia (AML) and myelodysplastic syndromes (MDS).

Methods: We conducted a retrospective study of patients with AML (n = 238) or MDS (n = 120) who were evaluated at Wilmot Cancer Institute and died between January 1, 2014 and December 31, 2019. The EOL metrics collected are: 1) hospice enrollment, 2) palliative care referral, 3) MOLST form completion, 4) utilization of the emergency department, hospital, intensive care unit and life-sustaining treatments within the last 30 days of life, and 5) place of death.

Results: In multivariate analysis, early MOLST form completion (>30 days before death) was associated with lower risk of ICU admission [Odds Ratio (OR) 0.23, $p<0.01$], lower risk of life-sustaining treatments utilization (OR 0.21, $p<0.01$), and higher risk of death in the hospital (OR 5.26, $p<0.01$). This demonstrates the fact that majority of MOLST forms were completed close to EOL in the hospital.

Conclusions: Most patients completed MOLST forms and had palliative care referrals, but these occurred late in the disease course. Early MOLST form completion was associated with better EOL quality metrics. Interventions to promote timely completion for orders of life-sustaining treatment may improve EOL care among patients with hematologic malignancies.

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Feasibility of a Prospective Steroid Monitoring Program for Primary Brain Tumor Patients

Patients with primary or metastatic brain tumors are often prescribed corticosteroids for management of cerebral edema. While corticosteroids are effective at controlling edema and alleviating associated neurological symptoms, they have side effects that are common, often serious, and increase in likelihood with prolonged use or higher dosage. Given potential for steroid toxicity, there is significant interest in clinical management that reduces corticosteroid use. This study examines the feasibility of an intervention to systematically collect patient-reported steroid toxicities between office visits to improve early detection and management of toxicities, with potential benefits to patient quality of life, function and decreased hospital admissions. Patients aged 18 or older with primary brain tumors taking corticosteroids for at least two weeks or their caregivers are eligible for enrollment. Study participants receive weekly secure electronic questionnaires through MyChart (a secure patient health messaging portal) asking if they have experienced specific, non-emergent symptoms associated with steroid toxicity or changes in their ability to perform activities of daily living. Completed questionnaires are reviewed by the clinical team and interventions subsequent to reported steroid toxicities are documented. Questionnaires are administered for 12 weeks and target participant enrollment is 30. At study conclusion, participants and providers complete questionnaires aimed at assessing ease, utility and satisfaction of using the electronic monitoring program. Feasibility of the intervention is defined as a 70% questionnaire completion rate. Secondary outcomes include number of patients with a reduction in steroid dose, average change in steroid dose attributable to interventions and subject and provider satisfaction.

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Developing an In-Vitro Model of Radiation Dermatitis using IL-17-induced Keratinocyte Proliferation

Introduction: It has been shown that inflammatory signaling mediated by interleukin-17 plays a role in the pathogenesis of radiation dermatitis by inducing proliferation of keratinocytes in the area of radiation exposure (Liao et al., 2017). The goal of this project was to develop an in-vitro model of radiation dermatitis to test the efficacy of anti-IL-17 and anti-IL-17 receptor antibodies in preventing keratinocyte proliferation. Primary culture of mouse keratinocytes was conducted, and cells were stimulated with varying concentrations of IL-17. Outcome was measured on the basis of total cell count.
Methods: Adult C57BL/6 mice were sacrificed and keratinocytes were harvested from tail skins according to the protocol set out by Li et al. (Li et al, 2017). Skin cells were incubated for three days, with the medium (KC basal medium, Epilife) changed daily. On days 3-8, wells were treated with 20 or 0 (control) ng/ml of IL-17. Wells were trypsinized and cell counts were performed by hemocytometer on days 3-8.

Results: Cells treated with IL-17 had lower overall cell counts on 4 of 5 days. Cells treated with IL-17 also had 100% dead cells as calculated by hemocytometer on days 7 and 8, with control cells maintaining a lower percentage of dead cells throughout the experiment (60% at most). Visual observation prior to trypsinization confirmed widespread cell death, with control cells appearing healthy. We believe that 20 gn/ml of IL-17 was likely too high, potentially inducing apoptosis in keratinocytes. Future experiments will test lower concentrations of IL-17 (1, 2, and 10 ng/ml). In addition to cell count, expression of caspase 1 will be measured using qPCR to determine whether IL-17 induces apoptosis of keratinocytes at certain concentrations, as this may be a novel finding.

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Biomechanical correlates of tissue architecture in healthy and aneurysmal aortic tissue

Background: Thoracic (TAA) and abdominal (AAA) aortic aneurysms are a major source of morbidity and mortality, ranking as the 13th leading cause of death in the United States. The formation of these lesions involves a complex interplay of atherosclerosis, inflammation, and enzymatic degradation of connective tissue. Although the biomechanical properties of aneurysmal aortic tissue have been well-characterized, the relationship between the histopathological alterations of tissue architecture and concurrent biomechanical changes are still under investigation. To this end, we sought to investigate the relationship between objective measurements of the histological structure of healthy and aneurysmal aortic tissue and their measured biomechanical properties.
Methods: Aneurysmal aortic tissue was obtained during open surgical repair; healthy tissue was obtained from healthy age-matched cadavers. Tissue underwent uniaxial mechanical testing, using a physiologic prestress corresponding to 110 mmHg, followed by a sinusoidal ±5% strain at 1 Hz for 40 cycles. For histological analysis, tissue after mechanical testing was formalin fixed, paraffin embedded, sectioned, and stained with Verhoeff-Van Gieson. Slides were analyzed using CytoSpectre, an open-source Fourier-transform based program for assessing microscopy images. Averaged circular variances (a measure of structural anisotropy) were taken from both whole aortic walls and from isolated media.
Results: Average circular variance of the entire wall demonstrated a moderately strong correlation with Young's modulus (R^2= 0.5467), with a slightly stronger correlation for healthy than diseased tissue (R^2=0.692 vs. 0.6387). The circular variance of isolated media demonstrated a significantly lower correlation with Young's modulus (R^2=0.3014). Under high-strain, oscillatory conditions, represented by the dynamic modulus E*, AA, TA, and TAA tissue collectively showed a moderate correlation with whole-wall circular variance (R^2=0.2397), and a stronger correlation with isolated media (R^2=0.331), while neither the whole wall nor media of AAA tissue showed any correlation with E*.
Conclusion: Our results provide evidence that under conditions of low strain, the tensile properties of the aorta arise from the vascular wall in its entirety, while under high strain conditions approximating physiologic stresses, the architecture of the media provides a relatively greater contribution. Furthermore, we have demonstrated that AAA tissue, uniquely, demonstrates a lack of coherence between its biomechanical properties and histologic structure.

Basic Science, Clinical & Translational Research

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Monitoring for Fontan-Associated Liver Disease

Background and Purpose: Fontan-Associated Liver Disease (FALD) is a frequent and highly concerning long-term complication among patients with Fontan physiology. Fontan patients are predisposed to liver cirrhosis and hepatocellular carcinoma. It is thought that this occurs due to prolonged exposure to elevated central venous pressures, decreased cardiac output and possibly tissue hypoxia.[1] Liver dysfunction is significantly associated with increased risk of death, deterioration requiring a heart transplant or hepatocellular carcinoma.[2] Catching FALD in its early stages would facilitate clinical strategies to manage and preserve liver function, and enable more swift implementation of new innovations to treat FALD.[3] However, current data characterizing this complication and guidelines for liver monitoring in this population are very limited. Our research aims to identify biomarkers which may predict this concerning complication early in its course.

Methods: Comprehensive chart review of patients with Fontan physiology who are either (1) known to the pediatric cardiology service or (2) had a Fontan completed at URMC between July 1, 2001-June 30, 2018. From this group, most recent routinely collected complete blood count, comprehensive metabolic profile, liver panel, coagulation panel, gamma-glutamyl transferase (GGT), and NT-proBNP, as well as their most recent systolic function and alpha fetoprotein (AFP) tumor marker values are gathered. Detailed information is collected from their most recent cardiology other medical visit: medications, underlying congenital heart defect, type of Fontan, age at time of Fontan, smoking, alcohol and illicit drug

use history. We also review the reports of all abdominal CT, MRI, and ultrasound imaging available in e-Record. Finally, we also review all available liver biopsy reports.

Results: 71 Fontan patients are known to the pediatric cardiology service, while 125 patients were generated via surgical logs. This yielded approximately 175 non-duplicated records, of which approximately 129 had adequate longitudinal information for inclusion. For the 75 records which have been reviewed twice, a summary of their lab values demonstrates:

Comprehensive Metabolic Profile	Average	Standard Deviation	N
Na^+ (mmol/L)	139.4	2.8	69
K^+ (mmol/L)	4.3	0.3	66
Cl^- (mmol/L)	101	3.5	69
CO_2 (mmol/L)	24.5	3.2	69
Anion Gap	13.9	2.2	66
Blood Urea Nitrogen (mg/dL)	14.6	4.7	69
Creatinine (mg/dL)	0.9	0.2	69
GFR (Caucasian) (mL/min/1.73m^2)	102.6	25.1	56
GFR (Black) (mL/min/1.73m^2)	119	28.6	55
Glucose (mg/dL)	89.6	25.8	69
Calcium (mg/dL)	9.5	0.5	69
Total Protein (g/dL)	7.3	0.8	65
Albumin (g/dL)	4.6	0.6	65

Liver Profile	Average	Standard Deviation	N
Alkaline phosphatase	109.5	62.7	69
Alanine transaminase	32.5	12.9	69
Aspartate Aminotransferase	32.6	9.8	66
Total Bilirubin	1.1	1.1	69

Hematology	Average	Standard Deviation	N
White Blood Cells (Thou/uL)	5.8	1.8	73
RBC (MIL/uL)	5.2	0.6	73
Hemoglobin (g/dL)	15.6	1.8	72
Hematocrit (%)	47	5.1	74
Mean Corpusular Volume (fL)	90.2	6.8	73
Red Cell Distribution Width (%)	14.3	3	73
Mean Corpusular Hemoglobin (pg/cell)	30.1	2.7	70
Mean Corpusular Hemoglobin Concentration (g/dL)	33.3	1.1	70
Platelet Count (thou/uL)	189.5	72.9	73
Neutrophils # (K/uL)	3.8	1.5	59

Lymphocytes # (K/uL)	1.3	0.6	63
Monocytes # (K/uL)	0.6	0.2	63
Eosinophils # (K/uL)	0.2	0.2	63
Basophils # (K/uL)	0	0.1	63
IMM Granulocytes #	0	0.1	57
Nucl RBCs # (K/uL)	0	0	57
Segmented Neutrophil (%)	64.9	9.2	63
Lymphocyte (%)	21.5	8.1	63
Monocyte (%)	9.6	2.4	63
Eosinophil (%)	3	2.2	63
Basophil (%)	0.7	0.4	63
IMM Granulocytes (%)	0.3	0.2	55
Nucleated Red Blood Cells (%)	0	0	54

	Average	**Standard Deviation**	**N**
Alpha-fetoprotein (AFP) Tumor Marker (IU/mL)	3.1	2	57

Conclusions: Our preliminary findings suggest that some values, with greater variances, may better predict FALD and lead to earlier treatment. Specifically, alkaline phosphatase, alanine transaminase, platelet count, glomerular filtration rate, and alpha fetoprotein tumor marker values may play key roles in detecting FALD. Analysis of the imaging and liver biopsy data in conjunction with longitudinal laboratory data will reveal which studies are instrumental in the early identification of FALD.

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Basic Science, Clinical & Translational Research

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Patellofemoral Pain Syndrome is a diagnosis of exclusion for pain relating to the anterior patellar area caused by improper patellar tracking, overuse, or focal injury. PFPS has a prevalence of 25% and affects 1.5-7.3% of all patients seeking medical care. Although this is a common issue patients present with there is no tool to assess the predictive value of injury and patient characteristics on response to physical therapy and prescribed home therapeutic exercise in relation to anterior knee pain and function. The mainstay of treatment is exercise therapy for postero-lateral hip muscles along with unweighted and weighted knee exercises. While these have been shown to be effective observations about patient characteristics and physician preference in prescribing supervised or unsupervised physical therapy may help inform treatment. In this study a survey was created to analyze physician tendencies and preferences in treatment prescription for patients presenting with PFPS, with attention paid to age, BMI, current exercise practice, and previous experience with physical therapy. The study is currently on going and data collection and analysis has not been completed. However, there are small studies coming out that show grouping patients based on characteristics found on physical exam into one of 3 categories (strong, weak and tight, weak and pronated) and targeting exercise therapy has led to benefit in treatment resistant cases. More study needs to be done in these areas to come to a definitive conclusion.

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Assessment of Standard of Care Antibiotic Therapies to Eradicate *Staphylococcus aureus* Occupying the Osteocytic-Canalicular Network of Cortical Bone in a Transtibial Implant Model of Osteomyelitis

INTRODUCTION: The susceptibility of *S. aureus* residing within the osteocyte-lacuno canalicular network (OLCN) to standard of care therapies remains unclear. To test this, we evaluated the ability of antibiotic therapy to eradicate *S. aureus* within the OLCN in an established murine model of chronic osteomyelitis (OM).

METHODS: Animal studies were performed on IACUC-approved protocols. We utilized an established murine model of OM that mimics clinical antibiotic therapy.(1) Briefly, the tibias of eight-week old, female BALB/c mice are exposed. A L-shaped stainless-steel pin, which has been soaked for 20 minutes in an overnight culture of bioluminescent (BLI) *S. aureus*, is inserted in the mid-diaphysis of the tibia. From day seven to fourteen post-infection surgery, mice are administered systemic antibiotic therapy and then harvested for bacterial counts and transmission
electron microscopy (TEM) imaging. BLI is measured over the 14-day time course to measure bacterial proliferation in vivo.

RESULTS: Unexpectedly, antibiotic treatment showed no significant effect versus the placebo on reducing MSSA or MRSA growth in vivo via BLI or CFU counts on the tissues and implants 14 days post-infection. TEM studies are in progress.
DISCUSSION: Antibiotics were not effective in reducing bacterial load, likely because the bacteria within the OLCN were in a privileged environment. TEM analysis of these bacteria will demonstrate the morphological effects of the antibiotics on the bacteria.

CLINICAL SIGNIFICANCE: These results provide new insights into the pathogenicity of *S. aureus* OM and suggest new paradigms for the development of more effective means of treatment.

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Basic Science, Clinical & Translational Research

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NYC Health and Hospitals "Level-Loading" Transfer Campaign During the COVID-19 Pandemic

New York City was one of the major epicenters for COVID-19 cases during during the 2020 pandemic. Recognizing the population density and the unequal distribution of COVID-19 cases in New York City, NYC Health + Hospitals initiated a bulk patient transfer campaign to "level-load" the demand for limited inpatient beds across the system's 11 acute care hospitals. While the data from hospital operations shows that this process was crucial in preventing overcrowding, patient outcome data has yet to be studied. This retrospective cohort study focused on 30 day period from March 30, 2020 to April 28, 2020 to analyze 48 hour, 7 day, and 30 day mortality rates in patients who were a part of the "level-loading" initiative. This study includes both COVID-19 positive and negative patients. Each participant included in the study will given a propensity score that is generated from demographic, clinical, and operational characteristics including: age group, sex, preferred language (English, Spanish, other), COVID-19 status, sending facility, oxygen requirements, comorbidities, high-risk biomarker levels (e.g., ddimer, CRP, ferritin), inpatient occupancy of sending facility at time of admission, and ED census of sending facility at time of admission. These propensity scores will be matched and compared between patients who are were transferred during the 30-day time period and those who were not transferred. Differences in study outcomes (48-hour, 7-day, and 30-day mortality) will be assessed using univariate tests, as well as through additional risk adjustment using multivariable analysis. Mortality will also be assessed using Cox proportional hazard ratios.

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An Opt-In Program to Minimize the Use of Post-Operative Prescription Opioids (Narcotics) for Patients with Breast or Skin Cancer

Purpose: Over-prescription of post-operative opioids is a significant concern for patients undergoing surgery and poses a risk of opioid misuse and overdose to patients and their communities. This study was designed to examine the effects of a formalized opt-in opioid prescription program on minimizing unnecessary post-operative opioid use by patients with breast or skin cancer undergoing specific types of surgical procedures. The opt-in program utilizes non-opioid medication as the default method of post-operative pain control and empowerment of patients to decide the need for opioid pain medication.

Methods: This study involves three cohort groups consisting of breast cancer patients undergoing partial mastectomy (PM)/lumpectomy and skin cancer patients undergoing wide local excision (WLE) with or without sentinel lymph node biopsy (SLNB) at our institution: 1) Control Group (CTL), a retrospective cohort from between June 2015 and December 2018 that serves as the historical control in terms of opioid prescribing; 2) Transition Group (TG) from between January 2019 and May 2020 during which gradual efforts in clinical practice were made to replace post-operative opioids with non-opioid medications such as acetaminophen and NSAIDs; and 3) Formalized Protocol Group (FP), a prospective cohort beginning in July 2020 representing patients enrolled in the formalized opt-in opioid prescription program. Patient demographics and pre-operative characteristics, operative and perioperative data, and post-operative outcomes including pain assessment and the prescription and use of opioid medication are currently being collected via medical record review. Based on the results of ongoing data collection, a preliminary descriptive statistical analysis was performed involving samples of the two retrospective cohorts in order to visualize the pattern of patient characteristics and post-operative opioid prescribing.

Results: Preliminary data were analyzed for 26 CTL patients from 2018 and 29 TG patients from 2019. In CTL, eight patients (30.8%) underwent PM and 18 patients (69.2%) underwent WLE of skin; on the other hand, all 29 patients in TG underwent WLE of skin. There were no significant differences between the two cohorts in risk factors for increased opioid use such as history of chronic pain, co-existing psychiatric illness (depression, anxiety, or both), and diagnosis of substance abuse. In terms of primary endpoints, 21 patients (80.8%) from CTL were prescribed opioids at discharge as opposed to 15 patients (51.7%) from TG; one patient from TG requested opioid medication after discharge while no patients from CTL made such requests. (Due to the heterogeneous patient population of these preliminary samples and small sample sizes, comparative statistical analyses will be performed in the future as the database grows.)

Conclusions: Preliminary data show that the clinical efforts made towards replacing post-operative opioids with non-opioid pain medications in TG appear to have reduced opioid prescribing with minimal changes in patients' perceived need for opioids after discharge in comparison with CTL—though more data are needed to elucidate the relationship. Such a finding supports that a formalized opt-in opioid prescription program may be effective in further reducing unnecessary post-operative opioid prescribing and use while achieving sufficient pain control in patients undergoing PM or WLE of skin for breast or skin cancer.

Emmeline Wheaton, 2023

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Analysis of Participant Characteristics for Baby AMOR

The Baby AMOR study is a randomized controlled trial run through Brigham and Women's Hospital exploring Newborn Behavioral Observation (NBO) based intervention to improve the health and well-being of late preterm infants and their mothers. NBO is a Brazelton- NBAS-based structured collaborative observation of newborn behavior with the goal of attuning parents to their newborn's strengths and challenges within the developmental tasks of self-regulation. The aims of this study are to examine the effects of NBO intervention on mental health and psychological well-being of first-time mothers with a late-preterm infant and to examine the effects of the NBO intervention on the quality of mother-infant interaction and maternal engagement in positive infant health care practices. In an effort to ensure that the randomized experimental and control groups are comparable, we conducted an analysis of participant characteristics in the ongoing recruitment efforts. These characteristics included mother's age and race, family income, obstetric or birth complications, infant gestational age, infant birth weight, post-natal time spent in the hospital, and department of discharge. The characteristics of each group were compared to each other and to overarching goals of ideal participation with similar demographics to the NICU population. Overall, the experimental and control groups are currently appropriately balanced in the participant characteristics analyzed, however the racial breakdown of participants is not currently equivalent to that of the NICU population as a whole. Further recruitment efforts should continue with these characteristics in mind with especially focused effort aimed towards recruitment of families of color.

Basic Science, Clinical & Translational Research

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Understanding the Prevalence of Loneliness and Social isolation in Minority Communities with Chronic Medical Conditions

Loneliness and social isolation affects up to a third of the US population aged over 45 years, but its potential as a public health risk factor has not been extensively studied. Furthermore, there is a paucity of data regarding this phenomena's relation to chronic illness, particularly among the African-American and Latinx communities. 1 bilingual (English and Spanish) focus group of varied ages and nine telephone interviews of African-American participants were analyzed with the software Dedoose by identifying descriptive codes and recurrent themes. The framework used to classify these codes derives from Sonderby's integrative approach to loneliness.[1] Two-thirds of those interviewed indicated that loneliness impacted health and those same individuals also indicated in a separate question that social isolation impacted health. Separation from family arose as a prominent theme among the Spanish-speaking focus group whereas close friends was a much more important feature in avoiding loneliness and social isolation. It should be noted that loneliness and social isolation in individuals with chronic disease is compounded by the COVID-19 pandemic, especially given that the pandemic disproportionately affects communities of color. Despite a limited sample size, loneliness and social isolation played an important role in one's belief in managing their health and their quality of life for most participants.

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Basic Science, Clinical & Translational Research

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Did human evolution in skin of color enhance the TEWL barrier?

Purpose: United States will soon be a nation of color; however, much of our knowledge of normal skin disease, and treatment thereof is based on white skin. We and others have attempted to elucidate any potential differences and advantages / disadvantages in skin function that have emerged during homo sapiens evolution post major migration from Eastern Africa. We investigated differences in one stratum corneum function by examining transepidermal water loss (TEWL) measurements in skin of color compared to Caucasian skin. TEWL, a measure of insensible water loss through stratum corneum, plays a major role in human survival.

Materials and Methods: A comprehensive literature search was conducted to procure relevant papers that measured baseline TEWL in skin of color and Caucasian skin. These references were reviewed, and relevant publications were procured. Only data regarding basal TEWL was reviewed and presented. *Results:* The data shows wide contradiction in results for all skin of color groups and white skin and, therefore, no conclusion can be made based. Specific notable results include that TEWL varies within overarching racial categories studies use, such between specific Asian sub-populations. In addition, when describing overall TEWL, Indians tend to have the highest TEWL while Caucasians have the lowest TEWL.

Conclusion: We suggest this variation may be due to experimental confounding variables that impact TEWL quantification, such as anatomic site and sample size- subject to further analysis

and focus. It is important we gain more clarity; it may give more insight into other evolutionary changes and is clinically relevant.

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Role of Cyclophilin D in Degenerative Disc Disease

Objective: To determine whether Cyclophilin D plays a role in degenerative disc disease (DDD) through analysis of mice that have undergone tail compression surgery.

Background: Degenerative disc disease (DDD) is a major burden to society. Chronic neck and back pain are associated with significant disability claims.[1] In 2005, an estimated $86 billion was spent in the United States for the management of neck and back problems.[2] An estimated 80% of the population will be affected with back pain at a certain point and 10% may become chronically disabled.[3] DDD has been attributed to a multitude of factors including environment, atherosclerosis, genetics, nicotine use, obesity, occupation and low vitamin D levels.[4,5] Clinically, the management of axial neck and back pain is with physical therapy and non-steroidal anti-inflammatory medications. Psychological factors can affect outcomes following surgery for neck or back pain and proper patient selection is critical if surgery is pursued.[6] In this pilot study, we wanted to see if Cyclophilin D played a role in the catabolic process associated with DDD.

Cyclophilin D is a protein that plays a vital role in mitochondrial dysfunction, it can bind to the adenine nucleotide translocase in the inner mitochondrial membrane and the voltage-dependent anion channel in the outer mitochondrial membrane to trigger the opening of the Mitochondrial Permeability Transition Pore (mPTP). mPTP is a non-selective pore that allows for

the transport of any solute small enough to fit in the pore. This leads to osmotic swelling and disrupts the mitochondrial membrane potential. Increased expression of CypD is seen in many neurodegenerative diseases such as Alzheimer Disease, Parkinson Disease and Huntington Disease.[7] Research performed here at URMC has shown that CypD knockout mice were observed to have increase resistance against age-associated bone loss and cartilage degeneration.[8] Our goal was to determine whether CypD plays a role in the degenerative process in the intervertebral disc (IVD) using a mouse DDD model, tail compression surgery. CypD knockout (CypD-/-) mice and NIM811 (CypD inhibitor) were used to define CypD's role in DDD.

Methods:

9 Mice total underwent tail compression surgery

- 2 CypD -/- (Male)
- 3 CypD -/- (Female)
- 2 C57BL/6J (Male) + treated w/ NIM 811 (CypD Inhibitor)
- 2 C57BL/6J (Female) + treated w/ vehicle (Control)

Timeline:

- Surgeries performed on June 15th, 2020; Tails harvested on July 17th, 2020

Treatment Protocol:

- C57BL/6J were treated with either vehicle or NIM811 (CypD Inhibitor) drug Mon-Wed-Fri over the course of 4 weeks

Staining:

- ABH/OG
- Safranin O
- Hematoxylin & Eosin (H&E) with DAB solution

Results:

ABH/OG Staining indicated morphological differences between CypD knockout mice and wildtype mice. The intervertebral disc (IVD) in CypD knockout mice exhibited increased disc integrity and less deterioration than wildtype mice. No significant morphological differences were seen in the NIM811 treatment group vs the vehicle group among wildtype mice.

Safranin O staining was inconclusive for proteoglycan difference among the groups of mice (wildtype groups vs wildtype w/ treatment groups vs knockout groups)

H&E w/ DAB Solution was the stain of choice after immunohistochemistry (IHC) was carried out on mice tail samples. The protein tested for was MMP13 (Matrix Metalloproteinase 13) which is known catabolic marker. Analysis with Image J software was performed to measure overall catabolic activity. After analysis, differences were seen but not significant enough to be noted. However, MMP13 staining revealed a trend that suggested directions for future studies. Higher density of MMP13 was seen in wildtype mice vs. CypD knockout mice. Due to the small sample size we had in this study and lack of significance in the MMP13 results, further studies will need to be performed to further elucidate the role of CypD in the catabolic process of DDD.

Conclusions: CypD plays a role in degenerative bone processes as indicated by ABH/OG staining methods and IHC. Further studies will be performed that will further elucidate the role of CypD in DDD.

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Predictors and correlates of existential quality of life of older cancer patients receiving palliative care

Enhancing the quality of life is one of the main goals of palliative care. Investigators have developed several measures of quality of life at the end of life to help achieve this goal. While the QUAL-E is one of the highest rated measures, research using this tool is limited. This study aims to advance to our understanding of the existential dimensions of quality of life at the end of life by describing the prevalence of existential quality of life, using the Preparation and Completion subscales of the QUAL-E, and its predictors and correlates. This study used data from a large multi-site study of older patients with cancer receiving palliative care. Bivariate correlations and associations among predictors and correlates and the QUAL-E subscales were examined. Hierarchical multiple regression examining independent association of predictors with QUAL-E was also conducted. The QUAL-E scores indicated overall moderate to high levels of quality of life at the end of life, although approximately one fifth of participants reported distress on some items in each subscale. In the multivariable models, age was associated with higher levels of preparation; terminal illness awareness was associated with lower levels of preparation; marital status was associated with the Completion subscale, with married or partnered patients reporting higher levels of completion; race was associated with both subscales, with non-white patients reporting higher levels of preparation and completion; and symptom burden was associated with lower levels of both preparation and completion. There was no association with gender, education, income, religion, religious characteristics, or time since diagnosis with either subscale. The Preparation and Completion subscales of the QUAL-E had a strong correlation with patient dignity.

Basic Science, Clinical & Translational Research

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Factors Associated with Follow-up Compliance for High Risk Patients in Population-Based Teleophthalmology Screening Program

Purpose: With the advent of telemedicine, ocular images can now be captured by technicians in primary care settings and then analyzed remotely by an eyecare professional. Tele-eye screens utilizing non-mydriatic fundus cameras have been shown to be comparable to the gold standard in-person dilated retinal exam in identifying diabetic ocular pathology. These store and forward screening programs are only effective, however, if patients with detected pathology follow-up with eyecare providers for further treatment. Follow-up rates after tele-eye screens remain low and research examining why is limited

Methods: We conducted a cross-sectional study of patients enrolled in a store and forward teleophthalmology program. A non-mydriatic fundus camera was used to evaluate patients (n=558) for retinopathy and other ocular pathology, and those with vision threatening pathology were recommended to follow-up within 3 months. A χ^2 test was done to assess factors associated with follow-up adherence (Table 1).

Results: 558 patients were screened between July 2018 and December 2019, improving the diabetic retinopathy screening rate from 36% to 51%. Of the 188 that were scheduled to follow-up in 3 months, 131 attended (adherent) and 57 did not (non-adherent). Chi-square analysis found a difference in health insurance between adherent and non-adherent groups (p=.0093). Patients in a government payor system were more likely to be non-adherent while Medicare/Medicaid patients were more likely to be adherent.

Conclusion: Insurance status is a known indicator of health outcomes. While access to screening may be improved with telemedicine, non-adherence to follow-up remains low and may be rooted in perceptions of health coverage.

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Linking ROCovery Fitness to Primary Care: Development of "ROCovery Wellness #GetBusyLearning" for Participants at ROCovery Fitness

Introduction

Since 2008, preventing chronic disease, such as cardiovascular disease, and "promoting mental health and preventing substance abuse" have been public health priorities across New York as a part of the Prevention Agenda set by the New York State Department of Health.[1,2] It is well documented that long-term substance abuse can lead to significant cardiovascular health problems.[3,4,5,6,7,8] These public health priority areas are paramount to primary care physicians. The same principles that make family physicians well positioned to care for those with chronic conditions like cardiovascular disease, also make family physicians poised to lead on the long-term management of care for patients with substance use disorders (SUDs).[9] Family doctors often know their patients and their environments well and have established long-term relationships. This established trust is advantageous for effective screening and when a patient begins to show signs of a substance use disorder. Family medicine physician's ability to provide longitudinal, community-based care for diseases that require frequent and long-term attention is ideal for chronic disease and substance use disorder management. But what about those patients who have not connected with the health care system, perhaps because of their substance use disorder? Reaching these patients has been historically challenging for primary care physicians and requires creativity.

There is an opportunity for family medicine physicians to take a community health approach and form a cross-sectional partnership with a community organization that already has the trust of individuals with a history of substance use disorders in promoting health and recovery. The method is rooted in the same reasoning behind incorporating a community health worker, a trusted member of a community, on clinical care teams.[10,11,12,13] Community-based participatory research offers an opportunity to generate health-promoting programs that are well positioned for ready adoption by communities, particularly those which distrust the healthcare system.[14,15]

To date there has been little published on how to design and develop health promotion programs using the principles of community-based participatory research, particularly targeting populations with substance use disorder. The evidence is also limited when it comes to methods of empirically evaluating interventions and health promotion programs within populations with substance use disorder. The gap in the existing knowledge that we aim to address is how to develop such an intervention with a community partner organization that fulfills the principles of community-based participatory research.

An example from Rochester, New York

An example of this type of health intervention where family medicine goes *to* the community partner is being carried out in Rochester, New York. Highland Family Medicine, an integrated primary care safety-net clinic part of the University of Rochester in Rochester, NY has partnered with ROCovery Fitness, a community based not-for-profit Recovery Community Organization focused on promoting recovery and sober living through fitness and community for people with and at risk for substance use disorders. Consistent with the principles of community-based participatory research, the idea for this research project came from ROCovery Fitness members who wanted to learn more about healthy living and asked for that type of programming.

The idea of promoting recovery and sober living through fitness and community is well supported in the literature. Research has shown that increased levels of moderate-effort physical activity facilitate alcohol recovery and promote mental and physical health.[16] Exercise and physical activity present an important antidote by providing health benefits in the same areas worsened by substance abuse. Moreover, simultaneous group-based intervention efforts further enhance the positive effects of exercise on alcohol use.[17, 18] This provides a unique window of opportunity for health education, promotion, and disease prevention.[19]

Family physicians are a natural connection to these types of preventive medicine initiatives.[20] However, it is established that patients with substance use disorders experience significant stigma that can prevent them from accessing evidence-based care or treatment.[21,22] It is estimated by the nonprofit Center on Addiction that only 10% of those with a substance use disorder receive treatment, and fewer still receive screening and early intervention.[23]

The partnership between ROCovery Fitness and Highland Family Medicine has the potential to create a health promotion program that has the approval of ROCovery Fitness, thus giving the program validity in the eyes of the organization's membership, and creating an opportunity for family medicine students and physicians to share the space with ROCovery Fitness members in a way that would otherwise not be possible. This allows the program to combine knowledge with action and achieve meaningful interactions that have the potential to rebuild trust and reduce stigma related to substance use disorder. Another potential outcome would also be to improve the health and primary care seeking behaviors of ROCovery Fitness members, and therefore indirectly improve health outcomes and eliminate health disparities.

Development of the program

Step 1: Partner Engagement

A partnership between ROCovery Fitness and Highland Family Medicine organically evolved with time and flexibility on the behalf of the family medicine team. The family physician researcher regularly attended task force meetings where multiple community agencies come together to discuss their projects and priorities, and learned about ROCovery Fitness and offered help with one of their needs in a way that was considered non-traditional. By being willing to be flexible and meet the community agency's needs, the medical team broke down the traditional healthcare/ community agency barrier and was able to share a mutual goal with the community partner. Partnership on subsequent projects, including ROCovery Wellness, was a natural progression. Research team members for this project were identified and included Outreach Engagement Specialists from ROCovery Fitness, ROCovery Fitness leadership, the Highland Family Medicine physician and liaison for ROCovery Fitness, and two medical students.

Step 2: Project Design & Implementation

Identified research agenda including topics, questions, and process to achieve project goal through brainstorming sessions as a research team. Focused on sustainability, fostering the unique aspects of the ROCovery Fitness community, capacity building among all partners, and co-learning. Completed University's IRB approval process.

Step 3: Data Collection

Data gathered via:

A) Initial survey to ROCovery Fitness mailing listserv (n=138) that gathered qualitative and quantitative data regarding interest in a health promotion program, health topics of interest, and information about current primary care usage. Survey also recruited focus group participants. For this study, 87% of survey respondents stated that they would attend a monthly health promotion workshop series. 38% of survey respondents said "yes" and 33% said "maybe, need more information" to participating in a focus group, and provided their contact information to be contacted further.

B) Five 1.5-hour focus groups conducted over secured Zoom meetings due to COVID-19. Focus groups were with participants recruited from the initial survey who indicated interest in participating and underwent an approved survey-based consent process (n=16). Focus groups were facilitated by medical students and Outreach Engagement Specialists from ROCovery Fitness. Groups used a focus group interview guide and had 1-5 participants and were audio and video recorded, and then transcribed.

There was a small incentive for participating in the survey and/or focus groups. Winners would receive a piece of ROCovery Fitness gear that was purchased from the community organization using grant funding.

The following steps were part of an iterative process that included ongoing evaluation of the developing program.

Step 4: Data Analysis

Two members of the research team used grounded theory to identify categories and codes as they emerge from analysis of the focus group transcripts. Each transcript was coded twice, once by one research team member alone, and the second time in collaboration with another

research team member. This data was combined with the survey data.
Step 5: Create Program outline Research team used the combined analyzed data to determine the ten workshop topics and create an outline of each session that included goals, learning and skill-based objectives, and activities.
Step 6: Report results Program outline was sent to Outreach Engagement Specialists, ROCovery Fitness leadership, and focus group participants with a follow-up survey asking for feedback. **Step 7: Feedback Collection and Implementation** Feedback was incorporated to develop a final draft of the program outline.
Step 8: Develop curriculum and accompanying participant workbook Curriculum was designed using materials closely adapted from the CDC Diabetes Prevention Program, Wilmot Center Institute Promote Health, Prevent Cancer program, Healthy Living Program curricula designed by the Center for Community Health and Prevention at the University of Rochester, and other widely accessible health promotion, education, and healthy living programs through the Office of Disease Prevention and Health Promotion of the U.S. Department of Health and Human Services. Future evaluative methods will include material adapted from the Center for Self Determination Theory and will be applied for the first time to measure changes in autonomy and competency related to primary health care seeking behavior and general health behavior changes.
Step 9: Financial support and program longevity Financial support for community-based programs addressing chronic conditions is an important consideration. The development of this program was supported through an annual summer fellowship program through the Center for Community Health and Prevention at the University of Rochester. The current program is housed by ROCovery Fitness using their space for free and run on a completely volunteer basis by medical students and family medicine residents. Due to the COVID-19 pandemic, the program will be entirely virtual. In this format, the program has no direct costs. A small amount of funding was secured through grants and the University of Rochester Medical School Office of Medical Student Inclusion and Enrichment Programs. This funding will go towards supporting the program's longevity and incentivizing participation in the program.

Pilot Program and next phase of research study

The community-based participatory research approach led to the design of a health promotion program at ROCovery Fitness. Focus group data stressed that the importance of keeping an active theme for the program given that ROCovery Fitness's community is attracted to their programming due to the active nature. This meant that the program ought to include an opportunity for bi-directional learning and teaching through activities, storytelling, discussion, and sharing.

The topics of the workshops in the program come from the ROCovery Fitness community and include addressing the stigma surrounding medicine and addiction, promoting patient activation and self-advocacy, using health resources, teaching about healthy living guidelines related to goal setting, nutrition, sexual health, dental care, physical activity, and preventive health services, and much more. 100% of follow-up survey respondents (n=14) stated

that the program outline seemed "consistent with what we talked about during your focus group" and gave an overall rating of 4.7/5 on satisfaction with the draft of the program outline and 4.5/5 on "how excited they are to participate in the ROCovery Wellness program as it is right now."

Most importantly, because the program was created by and comes from the ROCovery Fitness community, it creates an opportunity to rebuild a relationship and trust between ROCovery Fitness members and involved family physicians, residents, and medical students, that opens the door to preventive medicine. One of the most prevailing barriers to accessing primary care services for individuals with a substance use disorders is the stigma around addiction in medicine.[24,25,26,27,28,29] By involving medical students, this new type of collaboration and interaction additionally provides an opportunity to train future health providers to better understand, recognize, care for, and treat those with substance use disorders. Contact-based education can decrease stigma by providing an opportunity for interpersonal contact between people with substance use disorders and future medical providers, to positively shape the next generation, The program creates an experiential component to supplement the current medical school curricular instruction efforts to train future health providers to better treat substance use disorders and innovatively think about chronic disease management and preventive medicine. Future plans include evaluating whether participating has a measurable impact on the health seeking behavior of ROCovery Fitness participants and understanding more about the healthcare attitudes of patients with substance use disorders. Additionally, we plan to evaluate whether participation has a measurable impact on the attitudes surrounding patients with substance use disorders of involved medical students.

Conclusion

Cardiovascular disease prevention efforts traditionally focused on individualized counseling with patients on risk management and treatment. More recently efforts have focused on primary prevention, incorporated motivational interviewing, group visits, an emphasis on physical activity and a systemic/ family orientation. The majority of these initiatives are based in the clinic. The cardiovascular disease preventive interventions that happen external to the clinic are largely led by community organizations, such as those designed by the CDC. "Self-management and education" are listed as one of the CDC's "Best Practices for Cardiovascular Disease Prevention Programs,".[30,31] An innovative way to address this strategy in family medicine would be through the development of health promotion programs that strengthen community organization-clinical partnerships, such as we have outlined.

The CDC's recommended programs generally have little physician involvement when run in the community and are harder to access by populations who are not seeking formal preventive programming. Nevertheless, there are two strong reasons to be creative in medicine today: the high rates of physician burnout, and the COVID-19 pandemic. Increasing a physician's involvement in their community allows them to make a positive difference in spaces other than the clinic where they experience a loss of autonomy, powerlessness, and frustration leading to their burnout.[32] By incorporating new ways of promoting health and increasing involvement with community organizations, a family physician can experience new ways of improving the health of their community and patients, thereby improving their overall satisfaction and preventing burnout.

Additionally, the COVID-19 pandemic has forced medical professionals to be creative. We must approach things in a new way and try out new means of connecting with our patients and providing health education and skills to individuals. The pandemic has been a tremendous opportunity to change the way we have always done things in Family Medicine and cardiovascular health promotion more generally. It is our hope that by sharing the design and implementation of the ROCovery Wellness program, and the value of using a community-based participatory research methodology, we can encourage other family medicine physicians and practices to use a community health approach when designing health interventions and seek out similar partnerships for all areas of preventive medicine. These types of partnerships create a new opportunity for healthcare providers to reach the population that faces the most barriers to accessing primary health care services. Importantly, this partnership also creates an opportunity for family medicine providers to support and amplify the organization's efforts in promoting the well-being of the community.

Author bios:

Valentina Sedlacek, BA, is a second-year medical student at the University of Rochester School of Medicine and Dentistry in Rochester, NY. In addition to research, she is actively involved in UR Well, the student-run free clinic network for the city of Rochester, and UR Street Outreach, a student leader for the Family Medicine and Addiction Medicine Interest Groups, and a founding member of the URMC Medicine in Motion chapter.

Dr. Holly Russell, MD MS, is an Assistant Professor of Family Medicine. She is Board Certified in Family Medicine and Addiction Medicine and is the founder and director of the Addiction Medicine program at Highland Family Medicine. Dr. Russell is the Medical Director of Clinical and Community Programs at the Center for Community Health and Prevention and the Assistant Director for the Primary Care Clerkship at the University of Rochester School of Medicine and Dentistry.

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Basic Science, Clinical & Translational Research

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Gonadal Vein Embolization for Pelvic Congestion Syndrome: A Review of Reported Techniques

Pelvic congestion syndrome (PCS) is a poorly understood condition characterized by chronic pelvic pain (CPP) and pelvic vein varicosities. Diagnostic criteria are variable, making incidence and prevalence estimations inconsistent, and complicating attempts to compare intervention outcomes. Etiology of PCS involves insufficiency and dilation of gonadal and internal iliac veins, triggered by a variety of hormonal and anatomical factors. Multiparous premenopausal women are most commonly affected, likely due to pregnancy-induced pelvic vein dilation, and to the vasodilating effects of estrogen and progesterone. Males can also have pelvic congestion syndrome, but present differently – usually with infertility and testicular varicoceles, with or without associated pain. A variety of imaging modulates can be used to identify characteristic pelvic venous changes, which includes dilation, congestion, and tortuosity. However, thresholds for diagnosis are not uniformly established. Additionally, sensitivity is poor – these venous changes are also seen in asymptomatic presentations. Treatment of PCS most commonly involves medical hormonal therapy followed by invasive treatment if necessary. Endovascular embolization of the gonadal veins and/or internal iliac veins has been demonstrated to be more efficacious than surgical options (laparoscopic ligation/excision, and hysterectomy with salpingo-oopherectomy). However, comparison between embolization techniques is quite limited. These techniques include the use of coils, glue, vascular plugs, sclerosants, or some combination of these modalities. The purpose of this paper is to systematically review the methods and equipment used to perform embolization for Pelvic Congestion Syndrome. Initial analyses have found no statistical differences in clinical success, pain improvement, or complication rate. Embolization with metal coils is more expensive than with sclerosants or vascular plugs on average. However, studies are notably limited in both quantity and quality.

Basic Science, Clinical & Translational Research

Strauss, Brittany E. - 2023

Preceptor
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Validation of 3D Printed Templates for Physician Modified Endografts

Physician modified endografts (PMEGs) describe abdominal or thoracic stent grafts that are modified by the addition of fenestrations and branches by a vascular surgeon. Interest has risen concerning the reliability of the physician created fenestrations compared to 3D printed aortic models. Previous research determined significant differences in interobserver measurements compared to that of the 3D printed aortic model. The purpose of the study is to first validate the printing reliability of three different resins using 3D printed template locations produced by the Form 3 3D Printer. Patient CT scans were extracted and converted to STL files using Portal. STL files were uploaded to Meshmixer software to collect measurements such as diameter, clock position, and distances of fenestrations from anatomically relevant landmarks. Documented measurements were then applied to the CAD template within OnShape to form a model representative of the patient's anatomy. The CAD model was then uploaded to Preform for the printing process. Models were printed using the FormLabs Form 3 biocompatible 3D printer A batch of prints consisting of five models (PMEG_A – PMEG_E) was printed using BioMed Amber, BioMed Clear, and Dental Resin. Printed fenestration locations were measured and compared to the ideal calculated locations. Measurements were graphed based on the average distance from calculated fenestration and standard deviation of models by resin material, printing order of fenestration, and fenestration location. Variance was observed within each of the three categories and the data still remained within acceptable clinical tolerance.

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Clinical Utilization of Species-Specific Immunoassays for Identification of *S. aureus* and *Streptococcus agalactiae* in Orthopaedic Infections

Staphylococcus aureus and *Streptococcus agalactiae* (Group B Streptococcus, GBS) are common causes of deep musculoskeletal infections (MSKI) and result in significant patient morbidity and cost to the healthcare system. One of the major challenges with MSKI is the lack of faithful diagnostics to correctly identify the primary pathogen, as standard culture based assays are prone to false positives in the case of polymicrobial infections, and false negatives due to limitations in sample acquisition and antibiotic use prior to presentation. To improve upon our current diagnostic methods for MSKI, we developed a multiplex immunoassay for antigen specific IgGs in serum (Luminex), and medium enriched for newly synthesized anti-*S. aureus* and GBS antibodies (MENSA) generated from cultured peripheral blood mononuclear cells (PBMCs) of orthopaedic infection patients undergoing surgical treatment. Samples were obtained from 110 MSKI patients: 80 diabetic foot ulcer, 21 periprosthetic joint infection, 5 septic arthritis, 2 spine, 1 hand , and 1 fracture related infection (FRI). Anti-*S. aureus* and anti-GBS antibody titers were compared to culture results to assess their concordance in identifying the pathogens. Immunoassay, particularly MENSA, showed high diagnostic potential for monomicrobial *S. aureus* and GBS orthopaedic infections (AUC > 0.95). MENSA also demonstrated diagnostic

potential for GBS polymicrobial orthopaedic infection and for GBS DFU (AUC > 0.83 for both). Serum showed high diagnostic potential for *S. aureus* PJI (AUC > 0.95). Taken together, these findings support the development of species-specific immunoassays for the identification of causal pathogens in active MSKI, especially in conjunction with standard culture.

Susa, Stephen

Preceptor
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Thromboelastography in the Prediction of Delayed Cerebral Ischemia after Aneurysmal Subarachnoid Hemorrhage

Introduction
Aneurysmal subarachnoid hemorrhage (aSAH) is an infrequent but devastating pathology with high rates of mortality and morbidity. Survivors of aSAH often experience profound disability despite treatment and are rarely able to return to an independent life. One of the key drivers of disability in aSAH is an enigmatic disease process known as delayed cerebral ischemia (DCI). In DCI, patients develop progressive diffuse ischemia in the 3-14 days following an aneurysm rupture. The etiology of DCI is controversial and likely multifactorial, but is theorized to involve altered coagulability.

Coagulability after aneurysm rupture is poorly understood, in part due to the imperfect methods available to assay coagulability in the critical care setting, such as PT/PTT. Thromboelastography (TEG) is a more thorough laboratory analysis of coagulability that uses a rotating pin in a tube of whole blood to measure the strength of the clot as it develops and as it breaks down. Since the breakdown of clots is relevant to the pathophysiology of DCI, we theorized that TEG parameters indicating hypercoagulability and impaired clot breakdown would correlate to the development of DCI and poor functional outcome after aSAH.

Method
We are conducting a prospective study of patients with modified Fisher grade 4 aSAH. Upon entry into the study, patients receive an additional coagulation panel including a TEG on post-bleed-day (PBD) 1 and 7. TEG parameters such as R time and maximum amplitude are recorded, as are certain features of the patient's clinical course. Subjects receive follow-up calls at 1, 3, and 6 months after discharge to screen for DCI and functional status.

Results
We have thus far recruited six qualifying patients. Two out of our six subjects did not survive long enough to receive their PBD 7 TEG or be assessed for DCI. Due to this small sample size and high attrition among subjects, we have not yet achieved sufficient power to perform statistically meaningful analysis of TEG parameters.

Discussion

The role of hypercoagulability in DCI after aSAH remains poorly characterized, in part because it is a rare and deadly pathology. Aneurysm rupture is an uncommon event, and only a few each month can be expected to present to any one center. Additionally, the only patients who qualify for our study are those with high-grade SAH with intraventricular extension, and this is a high mortality cohort.

Conclusion

Due to limitations in our statistical power, we need to recruit more subjects to draw meaningful results. With the addition of more centers to this study, we expect recruitment to accelerate. We hope to meet our pre-determined power goal of 20 patients within a year. This research is important to continue because there are very few effective therapeutics for DCI, and a better understanding of its pathophysiology will allow therapy to more accurately target the root causes of the disease.

Basic Science, Clinical & Translational Research

Talukdar, Zain

Cynthia Rand, MD, MPG
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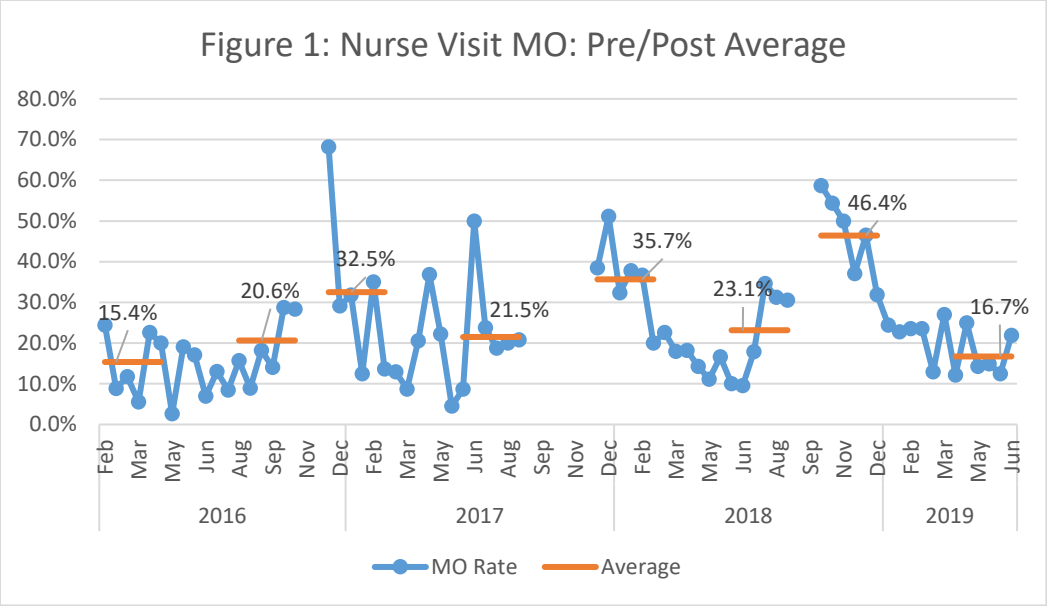
Using Standing Orders to Improve HPV Vaccination Rates at Nursing Visits

Background: Human papillomavirus (HPV) causes an estimated 34,800 new cancers in the US each year, most of which are preventable. A safe and effective 9-valent HPV vaccine targets HPV types that cause 92% of HPV-attributable cancers, but US vaccine uptake has been suboptimal; the 2018 National Immunization Survey found only 51.1% of adolescents are up-to-date on HPV vaccine. Adolescent vaccines are traditionally administered at preventive visits. Nurse-only visits provide an additional opportunity to vaccinate for HPV.

Objective: This goal of this study is to assess whether participation in a QI learning collaborative helped to reduce missed opportunities (MO) for HPV vaccination at nurse-only visits.

Methods: This study involved four cohorts of a 9-month QI collaborative carried out between 2016-2019 in multiple states. Each cohort performed a pre-project phase for baseline survey and data collection, and an intervention phase during which sites received monthly trainings via webinar, implemented monthly Plan-Do-Study-Act (PDSA) cycles, and completed chart reviews. The primary measure for this analysis was MOs for HPV vaccination at nurse-only visits. PDSA cycle responses and webinars were reviewed and categorized into themes.

Results: Multiple practices participated in the four cohorts. The first cohort showing no improvement, second cohort showing variability in rates, and the third and fourth cohorts showing dramatic decline in MOs for HPV vaccine at nurse-only visits.



Conclusion: Vaccinating at nurse-only visits may provide an efficient alternative method to increase HPV vaccination rates nationwide.

Basic Science, Clinical & Translational Research

Courtney Vidovich, Class of 2023

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Preceptor
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Anesthetic Considerations for Minimally Invasive, Off-Pump, HeartMate III Implantation

Background

Although left ventricular assist device (LVAD) therapy has been established as the standard of care for select patients with advance heart failure, surgical techniques and perioperative anesthesia management have been evolving. LVAD implant techniques have shifted away from full sternotomies towards sternal sparing approaches. Our institute has described the safety and value of minimally invasive implantation with the increasingly utilized Heartmate III (HM3). More recently, small studies have found benefit to using an off-pump approach. This case series evaluates off-pump minimally invasive HM3 implantations alongside a detailed protocol for perioperative anesthesia management.

Methods

This case series retrospectively analyzed eight consecutive patients who underwent off-pump HM3 implantation via bilateral mini thoracotomies by the same surgeon and cardiac anesthesiologist pair at the University of Rochester Medical Center from June 2019 to July 2020.

Results

Eight patients were analyzed, 88% were men with a mean age of 55.0 ±13.0 years. Median time to extubation was 19.7 hours with a median ICU length of stay of 6.5 days. 50% of patients required blood transfusions during the first 24 hours post-operation (post-op). 63% of patients were free from all post-op complications. Zero patients required a right ventricular assist device. The mean hospital stay was 26.3±11.3 days with an 88% survival to discharge.

Conclusions

In this single-center study, we have demonstrated the feasibility and benefits of preforming anesthesia for LVAD implantation via complete sternal sparing techniques without the use of cardiopulmonary bypass. We included our perioperative anesthesia protocol for LVAD specific enhanced recovery after surgery.

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Cutaneous B Cell Gene Signature in Discoid Lupus Erythematosus

Discoid lupus erythematosus (DLE) is a debilitating autoimmune skin disorder that causes a disfiguring, painful rash. Type 1 interferon (IFN) is known to play a role in DLE, and plasmacytoid dendritic cells (pDCs) are thought to be the main producers of IFN. There is evidence suggesting that B cells (which can produce IFN) also play a role in DLE pathophysiology, but less is known about the mechanism by which this occurs. We hypothesized that cutaneous B cells play a larger role than pDCs in IFN production and thus DLE pathophysiology. To evaluate this hypothesis, gene expression analysis using the Nanostring nCounter assay was performed on 9 DLE skin biopsies and 3 healthy controls. We found an upregulated B cell gene signature in diseased samples compared to healthy samples. Specifically, there were upregulated genes for B cells, B cell receptor signaling (BCR), B cell activating factor (BAFF) signaling, and B cell-related chemokines. Levels of IFN production were also elevated as expected. Genes related to pDCs were also upregulated. There was no correlation between levels of B cell gene expression and levels of pDC gene expression. However, no correlation was found between interferon-related genes and either B cell or pDC genes. Thus, we were unable to determine whether B cells or pDCs were the major contributors of IFN. However, the data do inform future directions of study to better understand DLE pathophysiology, including: a better understanding of B cell migration into the skin, the role of plasma cells, and the general role of B cells in DLE.

Community Health Research

Brodka, Ian
Jeoung, Sarah

Preceptor
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Street Outreach Site Management and Assessment throughout Rochester

When proposing the idea before the COVID pandemic hit the US, we wanted to expand the Street Outreach program in order to reach out to more members of the homeless population. Previously, the program went to 4 sites: Peace Village (an outdoor encampment), House of Mercy (HoM), REACH (only open during winter months), and Mental Health Association (MHA). However, because of the pandemic, we unfortunately were limited in our options for expansion. House of Mercy started a program at two hotels (The Radisson and The Rodeway) to house those with severe comorbidities that decrease chances of survival if infected with COVID. We added the hotels to the Friday rounds. While out on rounds, we recorded how many people we interacted with and the types of services and supplies handed out while trying to rebuild the program's relationship with the community after being inactive for 4 months. From July 17 to September 9, we interacted with a total of 256 individuals across the 4 locations, with 31 individuals seen at the hotels. Averaging the interactions across the number of visits to each location, the hotels had the second fewest interactions per visit at 3.88, while MHA had the fewest at 3.50 and HoM had the most at 12.25. The primary service rendered at the hotels was measuring blood pressures and distributing reference cards for various medical and social services in the City of Rochester at 2.50 blood pressures taken per visit and 0.63 reference cards distributed per visit. Within these categories across the other 3 locations, the blood pressure occurrence was the lowest per visit of any site, with the highest rate seen at HoM at 6.38, and reference card distributions were second fewest at 0.63 per visit, with Peace Village having the fewest at 0.05 per visit and HoM having the most at 2.13 per visit. This data suggests that the services provided by the Street Outreach program are still needed in areas not currently visited by the program and there is room to grow the program further. With this in mind, however, the data above would show that any new sites would likely see less services provided per visit than our existing locations during the COVID-19 pandemic. This can further guide the program to establish more efficient sites to interact with the homeless and disenfranchised populations of Rochester we seek to help through the Street Outreach program.

Community Health Research

Fuentes, Shane

Preceptor
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Emergency Food Distribution Data Analysis

The COVID-19 Pandemic led to an increase in food insecurity nationwide.[1] Foodlink implemented Emergency Food Distributions in an effort to alleviate food insecurity in Monroe County. Individuals pre-registered for food distributions in advance and were assigned distribution locations and dates to attend. From April 8th to July 30th, 13,212 pick ups occurred by pre-registered individuals throughout fifty discrete distributions. 9,787 different people in Monroe County were responsible for 13,057 of the pick ups by pre-registered individuals. 2,085 of these pre-registered individuals attended at least two distributions. The other 155 picks ups were by individuals living outside of Monroe County or were misreported zip codes. In addition, 1,586 walk-ins attended distributions. At least 1,210 of the walk-ins were Monroe County residents. The fourteen zip codes with the greatest attendance were all City of Rochester zip codes. Zip codes 14621 and 14609 had the greatest attendance at the food distributions, with 1,330 and 1,055 pre-registered individuals attending food distributions, respectively.

Overview:

The COVID-19 pandemic of 2020 led to an increase in unemployment and poverty around the United States, exacerbating food insecurity.[1] Foodlink, a regional food hub and food bank serving many counties in Western New York, implemented Emergency Food Distributions in an effort to alleviate food insecurity in Monroe County. The distributions were in phases, which were characterized by the amount of food given to each person and the volume of recipients. Individuals were able to register for food distributions in advance by calling 2-1-1 and providing the following information: name, address and number of people living in their home. In Phases 2 and 3, one registrant was considered one household, independent of the number of people living in their home. In later phases, seven or fewer people living in a home was considered "one household," eight to fourteen individuals was considered "two households," and so on. In some phases, individuals who did not pre-register, "walk-ins," were able to receive food.

During Phases 2 through 7, at least 13,212 pick ups occurred by individuals who were pre-registered. 9,787 different people in Monroe County were responsible for 13,057 of the pick

ups by pre-registered individuals. The other 155 picks ups were by individuals living outside of Monroe County or were misreported zip codes. In addition, 1,586 walk-ins attended distributions. At least 1,210 of the walk-ins were Monroe County residents.

Individuals from at least 40 of the 42 zip codes that constitute Monroe County accessed at least one distribution. The fourteen zip codes with the greatest attendance were all City of Rochester zip codes. 14621 and 14609 had the greatest attendance at the food distributions, with 1,330 and 1,055 individuals attending food distributions, respectively. The following report summarizes data collected from individuals who registered and/or attended the Phase 2 through Phase 7 Emergency Food Distributions.

Phase 2 (4/8/2020-4/18/2020):

Phase 2 attendees received one 30-50 lbs box of shelf-stable food pantry items and extra produce, typically oranges, per household. In this phase, pre-registration was strongly enforced.

Phase 3 (4/22/2020-5/2/2020):

Phase 3 attendees received one 30-50 lbs box of shelf-stable food pantry items and extra produce, typically oranges, per household. In this phase, Emergency Food Distribution organizers noticed a large number of individuals pre-registering, but not attending the event.

Phase 4 (5/12/2020-5/21/2020):

Phase 4 attendees received Nourish NY products, delivered from farmers, and additional non-perishable items. Nourish NY typically provided apples, cabbage, and milk. In phase 4, attendees were given two boxes per household. In addition, care managers picking up for clients were allowed to pick up for up to three households.

Phase 5 (6/2/2020-6/13/2020):

Phase 5 attendees received three boxes of Nourish NY products per household-- one box of dairy, one box of meat, and one box of produce. In this phase, sites were chosen to be set for the same repeating schedule for the remainder of the summer.

Phase 6 (6/16/2020-6/30/2020):

Phase 6 attendees received the three Nourish NY boxes per household, in addition to a box of non-perishable food items. The non-perishable boxes were provided in an effort to distribute the food stored in Manitou during Foodlink's transition from Manitou to Jefferson.

Phase 7 (7/1/2020-7/30/2020):

Phase 7 attendees received three Nourish NY boxes per household, in addition to any produce provided by Foodlink.

Distribution Locations:

There were 50 distributions from Phase 2 though Phase 7. These distributions occurred at 15 different locations: Boys and Girls Club, Brockport Middle School, Bull's Head Plaza, East Rochester Municipal Building, Foodlink Headquarters, Gates Town Hall, Greece Central School, Henrietta Department of Recreation, Irondequoit DPW, Mt. Olivet Baptist Church, Port of Rochester, Public Market, St. Ambrose Church, Trillium Health, and Wilson Magnet School.

Distribution Totals for Individuals who Pre-Registered:

The following data analysis is of individuals from Monroe County who **pre-registered and attended** Foodlink's Emergency Food Distributions. **Table 1** shows the number of individuals who attended the food distributions between Phase 2 and Phase 7.

Number of Distributions Attended	Number of People
1	7702
2	1424
3	398
4	140
5	64
6	35
7	12
8	4
9	3
10 or more	5

Table 1: The number of people who attended multiple distributions

13,212 different pick ups occurred by individuals who were pre-registered. Registration was not limited to individuals from Monroe County. 9,787 different people in Monroe County were responsible for 13,057 of the pick ups by registered individuals. 2,085 individuals attended at least two distributions. 123 pre-registered individuals attended at least five distributions.

Table 2 shows the number of individuals from Monroe County who picked up one time and the number of individuals who made multiple pick ups in Phase 2 through Phase 7 sorted by zip code.

Location	Zip code	One Time Pick Ups	Multiple Pick Ups
Rochester	14621	1074	256
Rochester	14609	864	191
Rochester	14605	488	106
Rochester	14611	482	135
Rochester	14606	432	121
Rochester	14616	365	135
Rochester	14612	357	135
Rochester	14613	344	71
Rochester	14619	327	87
Rochester	14608	313	71
Rochester	14615	310	89
Rochester	14626	259	77
Rochester	14623	214	72
Rochester	14624	213	66
Irondequoit	14617	185	87
Rochester	14620	172	37
East Rochester	14445	170	34
Webster	14580	141	54
Irondequoit	14622	129	48
West Henrietta	14586	102	30
Brockport	14420	102	9
Rochester	14607	91	23
Henrietta	14467	75	18
Fairport	14450	66	14
Rochester	14604	51	16
Rochester	14610	46	13
Hilton	14468	46	15
Spencerport	14559	37	8
Hamlin	14464	35	1
Rochester	14625	31	8
Brighton	14618	31	10
Pittsford	14534	30	10
Penfield	14526	28	9
North Chili	14514	28	13
Churchville	14428	28	7
Scottsville	14546	18	3
Rush	14543	8	2
Honeoye Falls	14472	6	1
Rochester	14614	4	2

Rochester	14627	0	1
Mumford	14511	0	0
Mendon	14506	0	0

Table 2: Monroe County Pick Up Data by Zip Code

As seen in **Table 2**, zip codes 14621 (Rochester) and 14609 (Rochester) had the greatest attendance at the food distributions, with 1,330 and 1,055 individuals attending food distributions, respectively. In addition, the fourteen zip codes with the greatest attendance were all City of Rochester zip codes.

Location	Zip Code	Registration	Pick up	No pick up	Show rate
Brighton	14618	64	55	9	85.93
Brockport	14420	150	122	28	81.33
Churchville	14428	65	50	15	76.92
East	14445	332	207	125	62.35
Fairport	14450	136	96	40	70.59
Hamlin	14464	46	39	7	84.78
Henrietta	14467	150	125	25	83.33
Hilton	14468	101	80	21	79.21
Honeoye	14472	10	10	0	100
Irondequoit	14622	318	245	73	77.04
Irondequoit	14617	486	387	99	79.63
Mendon	14506	0	0	0	N/A
Mumford	14511	0	0	0	N/A
North Chili	14514	68	49	19	72.06
Penfield	14526	67	56	11	83.58
Pittsford	14534	67	53	14	79.10
Rochester	14623	465	380	85	81.72
Rochester	14624	475	377	98	79.37
Rochester	14625	60	48	12	80
Rochester	14626	605	461	144	76.20
Rochester	14627	1	1	0	100
Rochester	14619	743	555	188	74.70
Rochester	14620	356	266	90	74.72
Rochester	14621	2329	1727	602	74.15
Rochester	14604	114	91	23	79.82
Rochester	14605	1009	745	264	73.84
Rochester	14606	985	712	273	72.28
Rochester	14607	190	132	58	69.47
Rochester	14608	669	482	187	72.05
Rochester	14609	1790	1336	454	74.64
Rochester	14610	104	80	24	76.92
Rochester	14611	1145	817	328	71.35
Rochester	14612	924	677	247	73.27
Rochester	14613	767	535	232	69.75
Rochester	14614	8	7	1	87.5
Rochester	14615	715	535	180	74.83
Rochester	14616	901	705	196	78.25
Rush	14543	16	12	4	75
Scottsville	14546	33	25	8	75.76
Spencerport	14559	68	53	15	77.94
Webster	14580	352	278	74	78.98
West	14586	215	172	43	80

Table 3: Percent show rate by zip code

Table 3 shows the number of times individuals from each zip code registered for food distributions, the number of times individuals who pre-registered picked up from the food distributions by zip code, and the percent show rate by zip code. Percent show rate was calculated by comparing the number of individuals who registered from the zip code compared to the number who actually attended the food distribution. Zip codes 14621 and 14609, the two zip codes with the greatest attendance at Foodlink's food distributions, had show rates of 74.15% and 74.64%, respectively. East Rochester (zip code 14445) had the lowest show rate at 62.35%.

Distribution Totals for Walk-ins:

Many individuals attended Foodlink's Emergency Food Distributions without pre-registering. These individuals are referred to as "walk-ins." Walk-ins were asked to provide their zip code, name, and family size. Many times, this information was missed or not provided. **Table 4** shows the number of walk-ins from Monroe County by zip code.

Location	Zip Code	Number of Walk-ins
Brighton	14618	2

Brockport	14420	14
Churchville	14428	4
East Rochester	14445	17
Fairport	14450	4
Hamlin	14464	0
Henrietta	14467	14
Hilton	14468	5
Honeoye Falls	14472	2
Irondequoit	14622	19
Irondequoit	14617	19
Mendon	14506	0
Mumford	14511	0
North Chili	14514	1
Penfield	14526	2
Pittsford	14534	5
Rochester	14623	66
Rochester	14624	39
Rochester	14625	1
Rochester	14626	29
Rochester	14627	0
Rochester	14619	85
Rochester	14620	23
Rochester	14621	117
Rochester	14604	12
Rochester	14605	67
Rochester	14606	64
Rochester	14607	22
Rochester	14608	64
Rochester	14609	102
Rochester	14610	5
Rochester	14611	165
Rochester	14612	66
Rochester	14613	51
Rochester	14614	2
Rochester	14615	41
Rochester	14616	34
Rush	14543	1
Scottsville	14546	1
Spencerport	14559	1
Webster	14580	21
West Henrietta	14586	23

Table 4: Monroe County Walk-ins by Zip Code

Phase 2 through Phase 7 provided 1,586 walk-ins with food. Of these walk-ins, at least 1,210 were from Monroe County. The 376 other walk-ins were either from outside of Monroe County or did not provide their zip code.

Limitations of Data:

Each distribution had its own registration sheet. Therefore, we cross-referenced reference sheets by name and address. The data was subject to input errors at registration. Data was self-reported by food distributions attendees. Attendees would call 211 ahead of time and tell the phone operator their information. The operator would then type in the information into the spreadsheets. It is likely that data was inconsistently added in or that misspellings occurred. For example, it is possible that some operators used "street" when reporting an address, while others used "st." In addition, it is likely that names and street names were inconsistently spelled from registration to registration.

In order to create a data sheet that did not contain duplicate individuals, addresses were altered in order to attempt to standardize abbreviations. For example, "st" was programmed to be changed to "street" and "dr" was turned to "drive." Our analysis does not account for misspellings of an individual's name or street address. For example, "Lucy Rodriguez who lives at 1 Elm Street" would be considered a different person than "Lucy Rodrigues who lives at 1 Elm Street," even though they are likely the same person.

Next Steps:

The next steps include analyzing the social determinants of health present in the most frequently participating areas.

Citations:

1- Wolfson, J. A., & Leung, C. W. (2020). Food Insecurity and COVID-19: Disparities in Early Effects for US Adults. *Nutrients, 12*(6), 1648. doi:10.3390/nu12061648

led to an increase in food insecurity nationwide.[1] Foodlink implemented Emergency Food Distributions in an effort to alleviate food insecurity in Monroe County. Individuals pre-registered for food distributions in advance and were assigned distribution locations and dates to attend. From April 8th to July 30th, 13,212 pick ups occurred by individuals who were pre-registered over fifty discrete distributions. 9,787 different people in Monroe County were responsible for 13,057 of the pick ups by registered individuals. The other 155 picks ups were by individuals living outside of Monroe county or were misreported zip codes. In addition, 1,586 Walk-ins attended distributions. At least 1,210 of the walk-ins were Monroe County residents. The 14 zip codes with the greatest attendance were all City of Rochester Zip Codes. 14621 and 14609 had the greatest attendance at the food distributions, with 1330 and 1055 individuals attending food distributions, respectively.

Overview:

The COVID-19 pandemic of 2020 led to an increase in unemployment and poverty around the United States, exacerbating food insecurity.[1] Foodlink, a regional food hub and food bank serving many counties in Western New York, implemented Emergency Food Distributions in an effort to alleviate food insecurity in Monroe County. The distributions were in phases, which were characterized by the amount of food given to each person and the volume of recipients. Individuals were able to register for food distributions in advance by calling 2-1-1 and providing the following information: name, address and number of people living in their home. In Phases 2 and 3, one registrant was considered one household. In later phases, seven or fewer people living in their home was considered "one household," eight to fourteen individuals was considered "two households," and so on. In some phases, individuals who did not pre-register, "walk-ins," were able to receive food.

During Phases 2 through 7, at least 13,212 pick ups occurred by individuals who were pre-registered. **9,787 different people in Monroe County** were responsible for 13,057 of the pick ups by registered individuals. The other 155 picks ups were by individuals living outside of Monroe county or were misreported zip codes. In addition, 1,586 Walk-ins attended distributions. At least 1,210 of the walk-ins were Monroe County residents.

Of the 42 zip codes that constitute Monroe County, individuals from at least 40 different zip codes accessed the services. The 14 zip codes with the greatest attendance were all City of Rochester Zip Codes. 14621 and 14609 had the greatest attendance at the food distributions, with 1330 and 1055 individuals attending food distributions, respectively. The following report summarizes data collected from individuals who registered and/or attended the Phase 2 through Phase 7 Emergency Food Distributions.

Phase 2 (4/8/2020-4/18/2020):

Phase 2 attendees received one 30-50 lbs box of shelf-stable food pantry items and extra produce, typically oranges, per household. In this phase, pre-registration was strongly enforced.

Phase 3 (4/22/2020-5/2/2020):

Phase 3 attendees received one 30-50 lbs box of shelf-stable food pantry items and extra produce, typically oranges, per household. In this phase, Emergency Food Distribution organizers noticed a large number of individuals pre-registering, but not attending the event.

Phase 4 (5/12/2020-5/21/2020):

Phase 4 attendees received Nourish NY products, delivered from farmers, and additional non-perishable items. Nourish NY typically provided apples, cabbage, and milk. In phase 4, attendees were given two boxes per household. In addition, care managers picking up for clients were allowed to pick up for up to three households.

Phase 5 (6/2/2020-6/13/2020):

Phase 5 attendees received three boxes of Nourish NY products per household-- one box of dairy, one box of meat, and one box of produce. In this phase, sites were chosen to be set for the same repeating schedule for the remainder of the summer.

Phase 6 (6/16/2020-6/30/2020):

Phase 6 attendees received the three Nourish NY boxes per household, in addition to a box of non-perishable food items. The non-perishable boxes were provided in an effort to distribute the food stored in Manitou during Foodlink's transition from Manitou to Jefferson.

Phase 7 (7/1/2020-7/30/2020):

Phase 7 attendees received three Nourish NY boxes per household, in addition to any produce provided by Foodlink.

Distribution Locations:

There were 50 distributions from Phase 2 though Phase 7. These distributions occurred at 15 different locations: Boys and Girls Club, Brockport Middle School, Bull's Head Plaza, East Rochester Municipal Building, Foodlink Headquarters, Gates Town Hall, Greece Central School, Henrietta Department of Recreation, Irondequoit DPW, Mt. Olivet Baptist Church, Port of Rochester, Public Market, St. Ambrose Church, Trillium Health, and Wilson Magnet School.

Distribution Totals for individuals who Pre-Registered:

The following data analysis is of individuals from Monroe County who **pre-registered and attended** Foodlink's Emergency Food Distributions. **Table 1** shows the number of individuals who attended the food distributions between Phase 2 and Phase 7.

Number of Distributions Attended	Number of People
1	7702
2	1424
3	398
4	140
5	64

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7	12
8	4
9	3
10 or more	5

Table 1: The number of people who attended multiple distributions

13,212 different pick ups occurred by individuals who were pre-registered. Registration was not limited to individuals from Monroe County. 9,787 different people in Monroe County were responsible for 13,057 of the pick ups by registered individuals.

Table 2 shows the number of individuals from Monroe County who picked up one time and the number of individuals who made multiple pick ups in Phase 2 through Phase 7 sorted by zip code.

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Rochester	14616	365	135
Rochester	14612	357	135
Rochester	14613	344	71
Rochester	14619	327	87
Rochester	14608	313	71
Rochester	14615	310	89
Rochester	14626	259	77
Rochester	14623	214	72
Rochester	14624	213	66
Irondequoit	14617	185	87
Rochester	14620	172	37
East Rochester	14445	170	34
Webster	14580	141	54
Irondequoit	14622	129	48
West Henrietta	14586	102	30
Brockport	14420	102	9
Rochester	14607	91	23
Henrietta	14467	75	18
Fairport	14450	66	14

Rochester	14604	51	16
Rochester	14610	46	13
Hilton	14468	46	15
Spencerport	14559	37	8
Hamlin	14464	35	1
Rochester	14625	31	8
Brighton	14618	31	10
Pittsford	14534	30	10
Penfield	14526	28	9
North Chili	14514	28	13
Churchville	14428	28	7
Scottsville	14546	18	3
Rush	14543	8	2
Honeoye Falls	14472	6	1
Rochester	14614	4	2
Rochester	14627	0	1
Mumford	14511	0	0
Mendon	14506	0	0

Table 2: Monroe County Pick Up Data by Zip Code

As seen in **Table 2**, zip codes 14621 (Rochester) and 14609 (Rochester) had the greatest attendance at the food distributions, with 1330 and 1055 individuals attending food distributions, respectively. In addition, the 14 zip codes with the greatest attendance were all City of Rochester Zip Codes.

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Hamlin	14464	46	39	7	84.78
Henrietta	14467	150	125	25	83.33
Hilton	14468	101	80	21	79.21
Honeoye	14472	10	10	0	100
Irondequoit	14622	318	245	73	77.04
Irondequoit	14617	486	387	99	79.63
Mendon	14506	0	0	0	N/A
Mumford	14511	0	0	0	N/A
North Chili	14514	68	49	19	72.06
Penfield	14526	67	56	11	83.58
Pittsford	14534	67	53	14	79.10
Rochester	14623	465	380	85	81.72
Rochester	14624	475	377	98	79.37
Rochester	14625	60	48	12	80

Rochester	14626	605	461	144	76.20
Rochester	14627	1	1	0	100
Rochester	14619	743	555	188	74.70
Rochester	14620	356	266	90	74.72
Rochester	14621	2329	1727	602	74.15
Rochester	14604	114	91	23	79.82
Rochester	14605	1009	745	264	73.84
Rochester	14606	985	712	273	72.28
Rochester	14607	190	132	58	69.47
Rochester	14608	669	482	187	72.05
Rochester	14609	1790	1336	454	74.64
Rochester	14610	104	80	24	76.92
Rochester	14611	1145	817	328	71.35
Rochester	14612	924	677	247	73.27
Rochester	14613	767	535	232	69.75
Rochester	14614	8	7	1	87.5
Rochester	14615	715	535	180	74.83
Rochester	14616	901	705	196	78.25
Rush	14543	16	12	4	75
Scottsville	14546	33	25	8	75.76
Spencerport	14559	68	53	15	77.94
Webster	14580	352	278	74	78.98
West	14586	215	172	43	80

Table 3: Percent show rate by zip code

Table 3 shows the number of times individuals from each zip code registered for food distributions and the number of times individuals who pre-registered picked up from the food distributions by zip code, and the percent show rate by zip code. Percent show rate is calculated by comparing the number of individuals who registered from the zip code compared to the number who actually attended the food distribution. 14621 and 14609, the two zip codes with the greatest attendance at Foodlink's food distributions, had show rates of 74.15% and 74.64%, respectively.

Distribution Totals for Walk-ins:

Many individuals attended Foodlink's Emergency Food Distributions without pre-registering. The individuals are referred to as "Walk-ins." Walk-ins were asked to provide their zip code, name, and family size. Many times, this information was missed or not provided. **Table 4** shows the number of walk-ins from Monroe County by zip code.

Location	Zip Code	Number of Walk-ins
Brighton	14618	2
Brockport	14420	14

Churchville	14428	4
East Rochester	14445	17
Fairport	14450	4
Hamlin	14464	0
Henrietta	14467	14
Hilton	14468	5
Honeoye Falls	14472	2
Irondequoit	14622	19
Irondequoit	14617	19
Mendon	14506	0
Mumford	14511	0
North Chili	14514	1
Penfield	14526	2
Pittsford	14534	5
Rochester	14623	66
Rochester	14624	39
Rochester	14625	1
Rochester	14626	29
Rochester	14627	0
Rochester	14619	85
Rochester	14620	23
Rochester	14621	117
Rochester	14604	12
Rochester	14605	67
Rochester	14606	64
Rochester	14607	22
Rochester	14608	64
Rochester	14609	102
Rochester	14610	5
Rochester	14611	165
Rochester	14612	66
Rochester	14613	51
Rochester	14614	2
Rochester	14615	41
Rochester	14616	34
Rush	14543	1
Scottsville	14546	1
Spencerport	14559	1
Webster	14580	21
West Henrietta	14586	23

Table 4: Monroe County Walk-ins by Zip Code

Phase 2 through Phase 7 provided 1,586 walk-ins with food. Of these walk-ins, at least 1,210 were from Monroe County. The 376 other walk-ins were either from outside of Monroe County or did not provide their zip code.

Limitations of Data:

Each distribution had its own registration sheet. Therefore, we cross-referenced reference sheets by name and address. The data was subject to input errors at registration. Data was self-reported by food distributions attendees. Attendees would call 211 ahead of time and tell the phone operator their information. The operator would then type in the information into the spreadsheets. It is likely that data was inconsistently added in or that misspellings occurred. For example, it is possible that some operators used "street" when reporting an address, while others used "st." In addition, it is likely that names and street names were inconsistently spelled from registration to registration.

In order to create a data sheet that did not contain duplicate individuals, addresses were altered in order to attempt to standardize abbreviations. For example, "st" was programmed to be changed to "street" and "dr" was turned to "drive." Our analysis does not account for misspellings of an individual's name or street address. For example, "Lucy Rodriguez who lives at 1 St. Elm Street" would be considered a different person than "Lucy Rodrigues who lives at 1 St. Elm Street," even though they are likely the same person.

Next Steps:

The next steps include analyzing the social determinants of health present in the most frequently participating areas.

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Christopher Keenan, Ryan Bodkin, Beau Abar

Analysis of Economic and Insurance Factors on Emergency Department Visits

Report Abstract:

Emergency department (ED) rates are increasing across the country, and many are growing crowded. The increases in ED visits occur at much higher rates in lower in lower-income than in more affluent areas. To better elucidate and validate this effect in a smaller region, emergency department visits from 2008-2017 at University ty of Rochester's teaching hospitals emergency departments were compared with economic indicators. The study found that ED visit growth at Strong Memorial Hospital and Highland Hospital is greater than the national average. Visits from low-income areas are increasing at twice the rate of higher-income regions. Growth in ED visits is significantly correlated with an increase in the percentage of visits covered by public insurance. Median income and unemployment rates are not significantly associated with changes in ED visits. The reason for these relationships is not entirely apparent and warrants further research into access to primary care resources and healthcare access more broadly.

Introduction

The number of ED visits per year has been steadily rising nationwide and is outstripping population growth.[1] From 2006- 2014, the number of ED visits increased by 14.8% (sources differ, with some estimating as high as 24.7% from 2008-2016), where the population only grew by 6.9%.[2] Between 1995 to 2016, the number of ED visits nationally per 1000 people increased from 360 to 441 from while the total number of ED's decreased.[3] In New York State, ED visits per 1000 people have increased by about 10% from 1999-2017.[4] Interestingly, this growth in ED use has not been evenly distributed across socioeconomic factors. From 2006-2014 ED visits from people from counties with the lowest quartile of income increased 23% while visits for people from the more affluent counties experienced only a 1% change.[1] This trend is particularly problematic as ED visits can be more expensive than primary care visits.[5,6] The reason for this difference has not been studied, and Rochester's economic history presents an opportunity to examine this effect locally.

Rochester has been subjected to economic fluctuations over the last decade: 42% of manufacturing jobs disappeared between 2000-2011 with the decline of Eastman Kodak. The effects of the 2009 recession can still be felt.[7] New York State has a median household income of $32,347, far less than the national average of $57,652.[8] Currently, 33.1% of Rochester's residents live in poverty, which is up from 23.4% in 2000, with a slight majority of Rochester children living in poverty.[9] The unemployment rate has changed from 9% in 2010 to under 4% currently, and the general population has decreased slightly.[10,11] The local economic contraction can be compared to ED visits numbers to see the local effect of increasing poverty on ED use, specifically in Strong Memorial Hospital and Highland Hospital, two large teaching hospitals located in Rochester, NY.

Several economic indicators are examined to try to understand any potential connection between patient finances and ED use. These factors are average income, unemployment rate, insurance status, and income classification by the Federal Financial Institutions Council. This

economic data is analyzed against historical visit data in Strong Memorial Hospital and Highland Hospital to provide insight into the local economic effects on ED visits.

Methods

Visit Data

The ED visit numbers were abstracted from Strong Memorial Hospital (SMH) Emergency Department and Highland Hospital (HH), located in Rochester, NY. All patient encounters from both ED's from 2008 - 2017 were included in the study. Visit data was extracted from the EHR records of each hospital. In total, 984,428 visits were examined from SMH, and 386,939 visits were examined from HH. These visits were extracted from hospital records by David J Pinto, senior clinical research informatics at the University of Rochester. Each visit was recorded with the date, census tract, and insurance provider. Identifying patient details, such as the name of the patient or reason for the visit, was not recorded.

There was a total of 140 unique insurance providers. These providers were then divided broadly into two categories, Private and Public. For this study, public insurance was defined to be Medicare, Medicaid, and the NY Essential Plans. All other insurance providers and visits were considered to be public. This includes visits where no insurance was recorded.

Census Tract Data

FFEIC estimates the yearly average income and population for every census tract and records the census tract's income classification based on internal definitions. FFEIC records its income definitions as the following: "If the Median Family Income % is < 50%, then the Income Level is Low. If the Median Family Income % is >= 50% and < 80% then the Income Level is Moderate. If the Median Family Income % is >= 80% and < 120% then the Income Level is Middle. If the Median Family Income % is > =120%, then the Income Level is Upper."[12] These estimates were extracted for every year between 2008-2017 and every census tract in Monroe County.

Data Comparison and Analysis

A census tracts average income per year and the average number of visits per year were analyzed in linear regression for 2008-1017. Each census tracts percent public insurance coverage (calculated as the number of public insurance visits/number of total insurance visits) was analyzed against total visits monthly from 2008-2017. Only statistically significant results ($p < 0.05$) are considered. Additionally, the growth of total visits, public visits, and how the growth in visits was divided across Low, Moderate, Middle, and Upper-income census tracts was examined. This was done by organizing each census tract into its respective classification, calculating the number of visits per year from each tract, measuring yearly changes in visit data, and comparing visit information with population information from each census tract.

Results

General Trends

The first and most obvious trend was a significant increase in ER visits from 2008-2017. During this period, the number of annual visits to Strong Memorial Hospital (SMH) increased from 86,212 to 113,646, while visits increased from 18,527 to 34,103 at Highland Hospital (HH) during the same period. This is a total change of 32% or an annual change of 3% for SMH and an 84% change at HH. (Fig 1.) This is significantly larger than the rate of growth seen for ED visits nationwide.[13] Total ED visits in the US increased (according to the ACEP estimates) by 24.7% from 2008 to 2016, with a 6.9% increase in population during a similar period. While one year is missing from these national estimates, it is clear that ED visit growth at SMH and HH is far eclipsing the national estimates for ED growth.

Year	SMH	HH
2008	86,212	18,527
2009	89,044	20.634
2010	89,804	21,959
2011	90,175	24,429
2012	96,722	27,014
2013	98,386	27,234
2014	101,272	30,276
2015	105,231	31,134
2016	113,936	33,553
2017	113,646	34,103

Fig.1. Table showing the year and total visits to SMH and HH

Notably, the population of Rochester is little changed during the period examined. Rochester's population has only increased by a little more than 1% from 2007 to 2019 ten-year period. Notably, the average age of Rochester citizens has not changed during this period and is significantly under the national average. Given these data, Rochester's rapid ED visit growth is alarming. To perhaps elucidate some of the mechanisms for this growth or characterize it better, several financial factors were examined. Economic status, median income levels, unemployment levels, and insurance status were analyzed at the census tract level in Monroe County. Monroe County was the only county examined in this study as it accounted for 70% of all the visits to SMH and HH ED from 2008-20017, and the next most represented county covered only 4% of the visits.

Economic Status

Examining the visits by economic status (as defined by FFEIC) reveals several clear patterns. Census Tracts were divided into Low, Moderate, Middle, or Upper income as determined by FFEIC. For each census tract, the yearly ED visit growth, total ED visit growth from 2008-2014, average visits per month, average Census Tract population, and visits per population ratios were calculated. (Fig 2.) At SMH, Low Income Census Tracts (LICT) had nearly double the total visit growth of the other three census tract classifications *and* had the largest number of visits per month. Importantly, LICT's had the smallest average population of the categories, possessing less than half the average population of Middle Income Census Tracts (MICT) or Upper Income Census Tracts (UICT). This is important to note that despite the small population in LICT's, they accounted for many more total visits, meaning people living in LICT's visit the Ed at much greater rates than people from other census tracts. If each visit to the ED from LICT's was a

unique person, more than ¼ of the total census tract population went to the ED every month. It is almost certainly not the case that each visit was a unique patient, but the

enormous disparity is still apparent.

Interestingly, all census tracts but LICT demonstrated total ED visit growth similar to the national estimate of 24.7%. This suggests that forces driving abnormal growth in ED visits amongst the most impoverished census tracts in Rochester are not seen in the census tracts following the national average. LICT's saw nearly double the national average growth over the period examined and is the driver for the above-average ED visit growth at SMH generally, despite their comparatively low populations.[14] Additionally, the average visits per month decreased with increasing economic status as determined by FFEIC. It is clear from this analysis that LICT's account for a disproportionately large amount of the ED visits SMH and are the major drivers of the above-average of the ED visit growth in Rochester.

Economic Status	Yearly Growth in ED Visits (SMH)	Total Visit Growth (SMH)	Average Visits Per Month (2017, SMH)	Average Population (Per Census Tract) (2017)	Visits/Population Ratio (SMH)
Low	5%	46.58%	577.52	2,216.68	.26
Moderate	3%	23.46%	519.71	3,344.68	.16
Middle	3%	21.77%	335.66	4,526.79	.07
Upper	3%	26.94%	323.07	4,990.79	.06

Fig.2. Table showing the average yearly growth in ED visits at SMH, the total ED visit growth from 2008-2017, the average number of visits per month (in 2017) the average census tract population (in 2017), and the Visits/Population ratio (calculated as the average visits per month / the average census tract population).

Very similar general trends were seen at HH, as were seen at SMH, with some differences of scale. While HH showed much higher yearly growth than SMH, this is primarily due to a much smaller original number of visits. This smaller visit size had other calculation effects, such as the smaller number of visits in the Visits to Person ratio being diminished. Despite this, the same broader trends are apparent with LICT's accounting for the most considerable growth and had the highest Visits/Population ratio. Moderate Income Census Tracts (MOICT) had the largest average number of visits at HH. (Sup. Figure 1)

Insurance Trends

In all census tracts, the percentage of visits covered by public insurance universally increased for the period examined. SMH census tracts saw public insurance visits increase by 60% from 2008-2017, while private insurance visits increased by 12%. (Sup Fig 2) A slight majority of all visits in 2017 were covered by public insurance, up from 40% in 2008. To examine the effect of changes in insurance coverage on total ED visits changes, the percentage of public ED visits per month was analyzed in a linear regression against the total visits per month from 2008-2017. These two factors were very positively correlated (R^2 of .73, P value <.05). (Fig 3.) suggesting that an increase in public insurance coverage has a significant effect on the number of SMH visits.

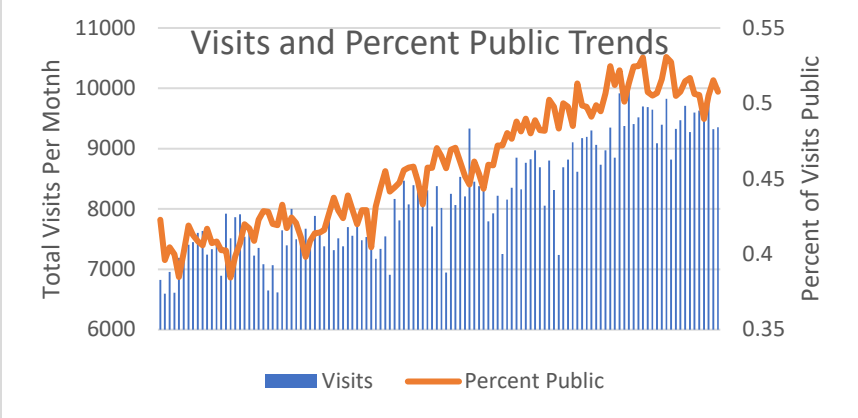
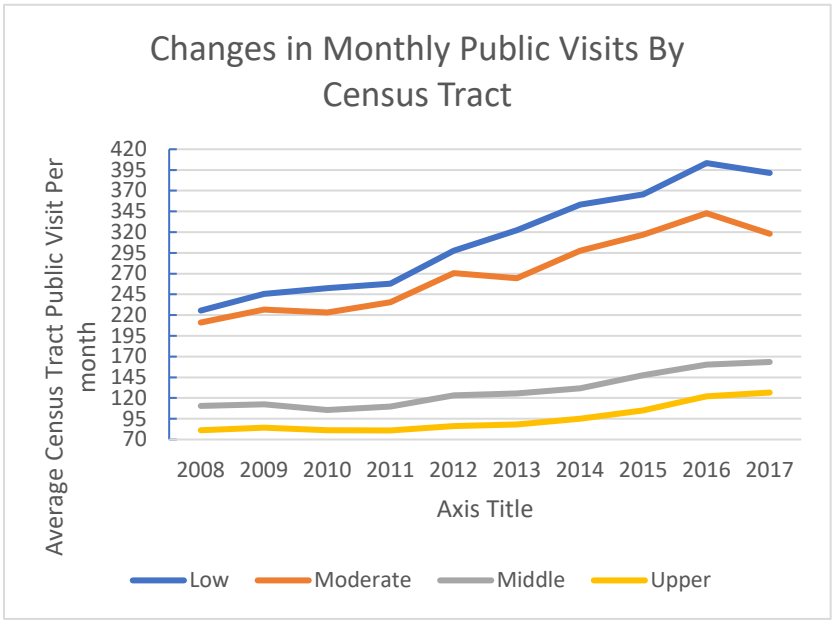


Fig.3. Graph depicting change in total visits to SMH from 2008-2017 (bars) and change in percentage of visits covered by public insurance (line).

This increase in public coverage, and subsequently in visits, was not observed equally across all census tracts. Public visits increased quicker and represented a larger portion of monthly visits in LICT and MOICT than in MICT and UICT (Figs 4 & 5). LICT and UICT had 10% increase in private insurance during this period, and MOICT and MICT had mild decreases in private insurance visits. LICT and MOICT, as of 2017, had strong majorities of their visits covered by public insurance. This suggests that it increases public visits by people in LICT's and



Economic Status	Growth Of Public Visits	% Public (2017)
Low	74%	68%
Moderate	51%	61%
Middle	48%	49%
Upper	56%	39%

Fig.4. (Left) Graph of total public visits per month by census tract economic classification from 2008-2017

Fig.5. (Above) Table showing total growth in public visits in census tracts from 2008-2017 and the percent of visits covered by public insurance in 2017

MOICT's specifically that are driving increasing ED visits in Rochester. MICT's and UICT, which also saw significant growth in public visit coverage, had comparatively fewer monthly public visits and still covered a majority of their visits with private insurance.

Unemployment Levels

To further elucidate the cause of increased ED visits, the relationship between unemployment and Ed visits was examined. Unemployment data is not available at the census tract level. So, Rochester's unemployment rate was generally analyzed in a linear regression against all visits to SMH from 2008-2017 yearly. While unemployment levels were mildly correlated (R^2 .43, P <.05) with ER visit growth, this modest effect disappeared when examined in a multivariate regression with % of public insurance. (Fig 6) This suggests that employment, as a single variable, does not have a substantial effect on an individual's likelihood to visit the emergency department that is unexplained by another variable. Despite this negligible effect, the recent spike in unemployment due to Covid-19 may impact ED visits due to insurance status changes and changes in economic status.

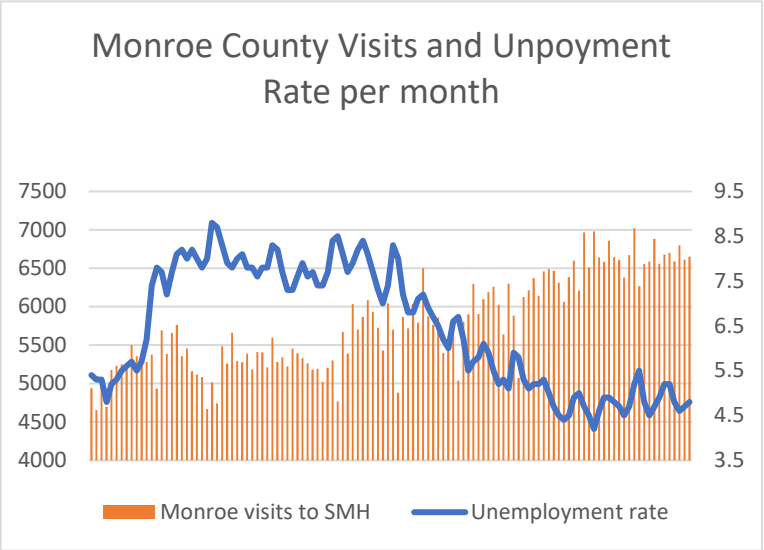


Fig.6. Total visits from Monroe county to SMH (bars) graphed with Rochester unemployment rate from 2008-2017

Average Income

To further understand the effect of economics on ED visits, median income was collected and analyzed in a linear regression against all visits from that census tract from 2008-2017 yearly. One hundred seventy-two census tracts had data available from 2008-2017 for analysis. After analyzing all 172 tracts, it became clear there was no general correlation between the change of a census tracts income and its ED visits. The majority of census tracts did not have any significant correlation between average income and ED visits at SMH or HH.

A small number of census tracts had a strong (R < -.60), and statistically significant, negative correlation between average income and ED visits, and a similar number had a strong, statistically significant, positive correlation (R >.60). The average Ed visit growth in these census tracts was comparable to the average Ed visit growth in Rochester. Given the small number of these correlations and the roughly equal number of positive and negative correlations, it is likely that these correlations are spurious. ED visits increased universally across all census tracts and seems to have largely done so independent of yearly changes in income. Areas that saw

significant income increases will have a spurious positive correlation, and the inverse is true for areas with a significant decrease in income. (Fig 7 & 8)

Negative Correlation Characteristic	Value
# of Low Census Tracts	9
# of Moderate Census Tracts	5
# of Middle Census Tracts	5
# of Upper Census Tracts	0
Average Correlation	.71%
Average Yearly ER Visit Growth	5%

Positive Correlation Characteristic	
# of Low Census Tracts	7
# of Moderate Census Tracts	2
# of Middle Census Tracts	7
# of Upper Census Tracts	5
Average Correlation	.76
Average Yearly Growth	3%

Fig.7 (Left) Select characteristics of census tracts with a strongly negative correlation between median income and ED visits.

Fig.8. (Right) Select characteristics of census tracts with a strongly positive correlation between median income and ED visits.

Conclusion/Disscussion

The general finding of the analysis corroborates the national studies that patients from lower-income areas are increasing their ED usage more than more affluent census tracts. The most apparent patterns in the analysis, that lower-income census tracts have had a much greater increase than more affluent census tracts and that increases in public insurance in these areas are strongly correlated with increased ED visits, suggest that perhaps an increase in healthcare availability in the poorest areas of Rochester are fueling the rapid growth in ED visits. Increases in public coverage facilitating healthcare availability for the previously disenfranchised and precipitating increased use of healthcare facilities is to be expected; the question remains why the increased use of healthcare facilities is so much more dramatic in Rochester than in the nation at large.

One potential explanation is that Monroe county citizens in LICT's and MOICT's have less access to primary care resources than people in equivalent census tracts across the nation. If access to primary care resources is limited in these lower-income counties, one would expect an increase in public coverage to increase ED visits. This resource is available to all Rochester citizens. To test this explanation, a study examining the primary care provider coverage of Rochester LICT's and MOICT's and other factors such as access to pharmacies, physical and occupational therapies, and mental health services. More research is needed to answer these questions adequately.

It is important to note that while a census tracts broad economic classification had a large effect on Ed visits, year-to-year changes in income had little correlation to ED visits. This suggests that relatively minor fluctuations in a census tract's yearly income had little effect on ED visits. For example, the average annual income of a LICT may change from $23,000 to

$25,000 in a year, but the area is still classified as a LICT and subject to essentially the same challenges as the year prior. Further research may be needed to examine any possible effects of significant income changes on a census tracts ED visit, such that a LICT was to be reclassified as a MOICT, or vice versa.

Ultimately, ED's are becoming fuller across the country and in Rochester's teaching hospitals. While the exact mechanism for this nationwide increase, and the much faster local increase, is not entirely understood, it is clear that the significant growth in visits is due to the poorest segments of our society and is facilitated, in part, by public insurance options. Baring increases in access to primary care, particularly in less affluent areas, ED's will have to continue to prepare for overcrowding as ED visit numbers continue to rise for the foreseeable future.

Supplemental Figures

Economic Status	Yearly Growth in ED Visits (HH	Total Visit Growth (HH)	Average Visits Per Month (2017, HH)	Average Population (Per Census Tract) (2017)	Visits/ Population Ratio (HH)
Low	**12%**	**124%**	**223.8**	**2,216.68**	**0.10**
Moderate	**12%**	**115%**	**249.4**	**3,344.68**	**0.07**
Middle	**8%**	**78%**	**159.5**	**4,526.79**	**0.04**
Upper	**9%**	**89%**	**194**	**4,990.79**	**0.04**

Sup.Fig.1. (Above) Table showing the average yearly growth in ED visits at HH, the total ED visit growth from 2008-2017, the average number of visits per month (in 2017) the average census tract population (in 2017), and the Visits/Population ratio (calculated as the average visits per month / the average census tract population).

Year	Total Public Insurance Visits	% Growth Public	Total Private Visits	% Growth Private
2008	35708		50504	
2009	37650	5%	51394	2%
2010	37510	0%	52294	2%
2011	38791	3%	51384	-2%
2012	43852	13%	52870	3%
2013	45275	3%	53111	0%
2014	49853	10%	51419	-3%
2015	52291	5%	52940	3%
2016	58211	11%	55725	5%
2017	56953	-2%	56693	2%
	Total Growth	Average Yearly Growth	Total Growth	Average Yearly Growth
	59%	5%	12%	1%

Sup.Fig.2 (Left)Table showing the total public and private insurance vists by year. A yearly growth in both private and public insurance is given along with total growth in each category from 2008-2017

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Community Health Research

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Network Analysis Approaches to the Personal Social Networks of Patients with Severe Illness: A Scoping Review

Background

A social network approach to studying health and illness has deepened our understanding of the ways personal social networks play a role in keeping patients healthy, and supporting them when they're ill. Social network analysis allows for evaluation of the structure and dynamics of social relationships of patients. Quantitative and qualitative approaches to network analysis of patients' social networks can provide insights that could not be gained by assessing individual-level assessments of social support.

Aims and objectives

To describe what is known about the structure and dynamics of personal social networks of patients with severe illness through a network analysis approach.

Design

A scoping review. Scoping reviews are an increasingly popular strategy for reviewing a large body of research and synthesizing what is known about a topic. They aim to map the existing literature in a field in terms of the characteristics of the primary studies. Scoping reviews can be helpful when a topic is complex, heterogeneous, or has not yet been reviewed extensively, and they can help define gaps for future studies.

Methods

A systematic literature review was conducted in June and July 2020. The initial search strategy yielded 1748 records in MEDLINE and EMBASE, after removing duplicates. The references were imported into COVIDENCE for further screening. Screening based on inclusion and exclusion criteria yielded 84 studies, and abstracts were tagged based on methodology, type of disease or illness, and whose social network was considered. The process was repeated a second time with an updated search strategy, ultimately yielding a total of 78 studies for extraction. The studies eligible for inclusion are studies that use a network analysis approach to assess personal social networks of patients with severe illness. We excluded network studies of contagious diseases and psychiatric conditions, as they would involve different social dynamics.

We will review the full-texts of included studies, and will extract data about the composition of networks, characteristics of individuals included in personal networks, and the position of health care professionals.

Relevance to clinical practice

The personal social networks of patients with severe illness have the power to shape outcomes and experiences of illness and disease. Clinicians would be wise to deepen their understanding of the impact of patient personal social networks on the interventions they offer, and partner with patients and their networks towards an end of high quality, patient-centered care. The exercise of developing personal maps will also potentially help patients reflect on their active and potential support networks and optimize them to their needs.

Community Health Research

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UR Well 2020 Summer Internship Clinic Development Projects

In January 2020, St. Joseph's Neighborhood Center overhauled their electronic medical record, leaving any previous guides obsolete. Two new guides were created to allow students to properly use Greenway Intergy & Greenway Intergy EHR, up to par with standards at St. Joseph's, totaling to 77 pages. A working triage and patient flow protocol was also created to maintain safety upon reopening of UR Well clinics, incorporating regulations set out by URSMD, St. Joseph's, and the CDC.

We created a scheduling system for St. Luke's and Asbury, allowing patients to schedule their own appointments online. This ensures that patients will be seen immediately when they arrive at the clinic, and allows us to ensure social distancing.

While our clinics frequently treat spanish speaking patients, we did not have a system for providing these patients with medial interpreting services. We created a program which will allow medical students to receive professional training and become medical interpreters for the clinics.

We created a resource guide for patients who express food, housing, utility assistance, and mental health needs, but may not have time or do not want to meet with the social work student. Additionally, we created an updated list of primary care practices accepting new patients to help patients establish long term care.

According to the Monroe County Heroin Task Force, the UR Well clinics are located in high overdose areas. Therefore, we created a UR Well Narcan distribution program, which will increase naloxone's presence within Rochester, hopefully preventing fatal opioid overdoses.

Community Health Research

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Substance Use and Mental Health Outcomes in WORTH Transitions

Introduction:

WORTH (Women on the Road to Health) Transitions is a program designed to decrease HIV risk behaviors, substance use, and mental health symptoms which are elevated among women recently released from incarceration. The purpose of this project is to examine the impact of the program on substance use and mental health.

Methods:

Two evidence based approaches were combined to examine WORTH Transitions. WORTH is CDC-recommended and grounded in cognitive behavioral therapy and trauma responsive strategies. It is person and electronically-delivered. The Transitions Clinic Network consists of 38 culturally responsive primary care clinics with peer Community Health Workers providing interpersonal support and system navigation, as well as specifically trained medical providers. There were 110 participants in the Rochester, NY site and 98 at the New Haven, CT site. Participants' data were gathered from screening, baseline, and 6-month follow-up visits with measures obtained via interviews for self-reported substance use, HIV risk associated behaviors, along with depression, suicidality, and PTSD symptoms.

Results:

The outcomes of the program demonstrate an overall decrease in substance use, substance use related disruptive activities, and mental health symptoms among program participants.

Discussion:

Participants of WORTH Transitions benefited by showing a decrease in their overall substance use and mental health symptoms.

Limitations:

This early analysis does not control for age, race, and socioeconomic status, test statistical significance, or include multivariate analyses.

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Descriptive Retrospective Study on the Opioid Burden and Naloxone Distribution in Monroe County, New York

Background
Despite being a focus of the Monroe County Department of Public Health, the opioid crisis continues to rise, ranking in the top quartile for overdose related deaths in the state in 2019. This study aimed to identify when and where to effectively raise awareness of Naloxone and its proper use by temporally and geospatially describing the opioid burden, naloxone administration, and naloxone accessibility in Monroe County.

Methods
This is a retrospective descriptive study analyzing publicly accessible data from the New York State and Monroe County Public Health Department spanning January 2017 to June 2019, as well as The Point- a syringe and naloxone locator.

Results
Overall burden was highest during the summer seasons (July-September). Geographically, opioid burden was highest outside of downtown Rochester and the ratio of naloxone distribution sites to opioid burden was lowest in zip codes of southern Monroe County. Emergency department (ED) visits represented the largest proportion of opioid burden (65.8%), compared to opioid fatalities and opioid related hospitalizations, which corresponded to a strong positive correlation between opioid deaths and EMS naloxone administration (r=0.93).

Conclusions
Our research suggests that opioid interventions may be most impactful during the summer seasons and in locations where the naloxone accessibility to opioid burden ratio is lowest. Further, a high ED burden could be seen as an event where improvements to long term safe opioid use or barriers to quitting can be addressed. It is essential to continue developing descriptive and quantitative research to most effectively support the opioid crisis.

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Assessing disparities in COVID-19 knowledge, beliefs, social practices, risk behaviors, and protective factors during the COVID-19 pandemic

APOS Abstract

INTRODUCTION/PURPOSE: The novel coronavirus (COVID-19) pandemic has revealed deeply entrenched health disparities among underrepresented minorities (URM). The purpose of this study is to understand the practices and behaviors during the COVID-19 pandemic among URMs.

METHODS: An exploratory study was conducted in which a quantitative survey was administered to assess participants' COVID-19 practices and behaviors.

RESULTS: Participants' (n=137) mean age was 42.7 (SD 15.3) and most were Black/AA (66.4%), female (61.3%), heterosexual (76.6%), and had health insurance (80.3%). Less Black/AA participants reported practicing social distancing (44.4% vs 78.3% and 58.8%, respectively, $p<0.001$) compared to Latinos and Whites. Compared to Black/AA and Whites, Latinos were more likely to not have people visit their home (75% vs 51.9% and 58.8%, respectively, $p<0.000$). There were no differences across race/ethnicity in washing hands or mask wearing. LGBTQ+ participants were less likely to follow all COVID-19 guidelines ($p<0.05$) compared to heterosexual participants. Compared to before the pandemic, more Black/AA participants reported using more marijuana (14.8% vs 1.1% and 5.9%, respectively, $p<001$) and consuming more alcohol (37.0% vs 5.4% and 5.9%, respectively, $p<001$) than Latinos and Whites. More Latinos reported participating in more religious activities (33.7% vs 18.5% and 5.9%, respectively, $p=0.016$) and worrying more about obtaining food (43.5% vs 25.9% and 11.8%, respectively, $p=0.084$) compared to Black/AA and Whites. There were no differences in risk behaviors between LGBTQ+ and heterosexual participants.

CONCLUSIONS & IMPLICATIONS: Black/AA and LGBTQ+ participants were less likely to follow COVID-19 guidelines compared to their Latino, White and Heterosexual counterparts, respectively. Black/AA participants and Latinos reported more risk behaviors compared to Whites. These results may aid in the development of culturally appropriate interventions for controlling the spread of the disease and can inform efforts to control cancer.

International Medicine Research

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Cross-Cultural Comparison of Pregnant Women's Healthcare Seeking Behaviors and Experiences during the Coronavirus (COVID-19) Pandemic in Ghana and the United States

Background:

As public health systems divert resources towards staving off the coronavirus (COVID-19) pandemic, women's health services may become less prioritized. In this study, we conducted qualitative interviews with pregnant women in Ghana and the United States (US) to understand their most salient concerns during a pandemic that has transcended nations.

Methods:

Adapting to the virtual nature of the pandemic, we used social media platforms Facebook and WhatsApp to recruit, consent, and enroll women. Interviews were completed via Zoom or WhatsApp using semi-structured interview guides, then transcribed, analyzed, and coded for recurring themes. All study materials and processes were approved by the University of Rochester Research Subjects Review Board.

Results:

Thirty-three pregnant women (16 Ghanaian, 17 American) aged 24-40 years participated in the study. Five major themes emerged: i) Apprehension about antenatal care (ANC) services; ii) Disruptions to planned healthcare provider usage; iii) Changes in social support; iv) Scarce acknowledgement of emotional and mental health throughout pregnancy; v) "Silver linings" in the midst of a pandemic.

Conclusion:

As part of the response to a global pandemic, specific policies and resources for telehealth, intrapartum, and postpartum support should be implemented to address long-term health repercussions facing pregnant women.

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Longitudinal Cognitive Outcomes in Children with Human Immunodeficiency Virus in Zambia

Objective: To identify predictors of cognitive outcomes in children with Human Immunodeficiency Virus **(**HIV) followed in the HIV-Associated Neurocognitive Disorders in Zambia (HANDZ) study.

Background: Multiple prior studies have shown that children with HIV demonstrate delayed development and impaired cognition compared to uninfected children. However, there are limited data on longitudinal cognitive outcomes in children with HIV, especially in Sub-Saharan Africa.

Methods: We conducted a prospective cohort study of 208 perinatally-infected children with HIV ages 8-17 and 208 HIV-exposed uninfected (HEU) controls to assess long-term cognitive function. All participants were followed for 2 years with repeated measures collected every 3 months. Cognition was assessed with comprehensive computerized testing using a custom NIH Toolbox cognition battery to measure processing speed, executive function, attention, memory, and auditory learning. Cognitive tests were combined to generate a summary cognition score. Initial models included both HIV+ and HEU participants, followed by separate models for HIV+ participants to assess the contribution of HIV-specific variables. The relative contribution of health-related variables, nutritional status, HIV disease severity, and socioeconomic status to

baseline and longitudinal cognitive outcomes was explored using bivariable and multivariable regression models and group based trajectory modeling.

Results: In the bivariable analysis, HIV was strongly associated with poorer cognition at baseline (β-13.7, 95% CI -20.5 to -6.8, p<0.001). In the HIV specific model, the strongest predictors of cognitive function included socioeconomic status (β 3.0, 95% CI 0.98-5.0, p=0.004), WHO Stage (β -11.4, 95% CI -22.2 to -.057, p=0.04), and self-reported poor health (β -18.8, 95% CI -37.7 to .02, p=0.05). Group based trajectory modeling identified three groups. HIV+ status predicted membership in the lowest performing cognitive trajectory (OR 2.3, p=0.006). In the HIV specific model predicting trajectory membership, the strongest predictors included socioeconomic status, self-reported poor health, and WHO Stage.

Conclusion: Children with HIV are at risk of poor cognitive outcomes. Interventions to improve cognitive function in children with HIV are necessary and could target risk factors for poor outcomes including poverty and late initiation of antiretroviral therapy.

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Review of Tube Thoracostomy Seal Management

BACKGROUND: Tube thoracostomy is an emergency intervention often used for pneumothorax whereby an exogenous drainage tube is placed through a surgical incision into the pleural space. Such tubes are externally sealed either by placing them in an exogenous underwater collector or by applying active negative suction; there are currently no uniform standards guiding this decision. Whether suction or simple underwater seal is more beneficial for patient outcomes is a matter of significant interest and may influence widespread adoption a clinically advantageous policy.

METHODS: An extensive review of literature focusing on seal management to inform future studies was conducted via query of the PubMed database.

RESULTS: 19 Randomized Controlled Trials (RCTs), 4 retrospective chart reviews, 6 meta-analyses, and 14 review articles were collected and analyzed for methodology, findings, and relevance to potential future trials.

DISCUSSION: The RCTs and retrospective studies focused mainly on a population of patients undergoing pulmonary resection surgery, and generally favored water seal or found no difference between the two. Most studies were marred by small sample sizes, important differences in experimental protocol, and differences in evaluation of outcomes. There were only three randomized controlled trials focusing exclusively on traumatic pneumothorax. Two were in favor of suction and one found no difference. These studies were similarly limited by sample size, variation in injury and protocol, and ultimately different environmental circumstances from American hospitals. No high-quality, large-scale studies have been conducted for spontaneous pneumothorax management. Overall the evidence remains sparse and would be well-suited to high-quality study.

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Longitudinal Analysis of Depression in Children and Adolescents with HIV in Zambia

Objective: To identify risk factors for depression in children and adolescents with HIV.

Background: Depression, one of the most common co-morbidities of HIV, is two to three times more prevalent among the HIV-positive population than the uninfected controls. Even though Sub-Saharan African countries have the largest global burden of HIV, 89% of the studies published about depression and HIV were conducted in Western countries on adults. There has been minimal investigation into longitudinal relationships of depression in children living with HIV in Sub-Saharan Africa.

Methods: The HANDZ study is a prospective longitudinal cohort study including 208 perinatally-infected children with HIV taking antiretroviral therapy (ART) and 208 HIV-exposed uninfected (HEU) children who were 8-17 years old. Depressive symptoms were assessed using self-report and parent-report of the NIH Toolbox Sadness module. Risk factors for depression were evaluated using univariable and multivariable regression models. Group based trajectory modeling was used to identify subgroups of participants who followed similar trajectories over time.

Results: Multivariable regression models for depression at the baseline visit found that for both the HIV+ and HEU groups the strongest risk factors for depression included HIV (β coefficient=5.64, 95% CI 3.31-7.97, p=0.000), self-reported poor health (β coefficient= 7.03, CI=2.73, 11.3, p=0.001), and stressful life event index (β coefficient =2.04, 95% CI 1.26-2.81, p=0.000). Group-based trajectory modeling identified three groups: a group with minimal depressive symptoms that remained stable over time, a group with high levels of depressive symptoms at baseline that improved over time, and a group with high levels of depressive symptoms at baseline that remained high over two years of follow up. The risk factors for belonging to the two group with high levels of depressive symptoms included HIV (OR=2.97, CI= 1.83- 4.82, p=0.000), stressful life event index (OR=1.58, CI 1.35- 1.84, p=0.000), and subject age (OR=1.13, CI=1.03-1.24, and p=0.011). For participants with HIV in the higher depression groups the risk factors included stressful life event index (OR=1.87, CI=1.40- 2.52, p= 0.000), times hospitalized (OR=1.42, 1.07- 1.89, and p= 0.014), CD4 percent (OR=0.951, CI = -.908- .997, and p=0.036), low current CD4 (OR=0.114, CI= 0.009- 1.42, p= 0.091), and Worst WHO stage (OR=0.801, CI=0.573- 1.12, p= 1.94).

Conclusion: Our study shows that HIV is significantly associated with depression. In HIV-infected subjects, our multivariable analysis finds that the number of times hospitalized and stressful life events are the two strongest predictors of depression.

Year-Out Research

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Didesmethylrocaglamide (DDR) and Rocaglamide (ROC)'s Effects on Liposarcoma and Leiomyosarcoma Cells

Dr. Chang's lab has shown in recently published papers that two natural eIF4a inhibitors, DDR (didesmethyl rocaglamide) and ROC (rocaglamide), effectively induce cell cycle arrest at the G2/M phase and apoptosis in MPNST (malignant peripheral nerve sheath tumor) as well as osteosarcoma, Ewing sarcoma and rhabdomyosarcoma. These drugs have good oral bioavailability as well as have minimal side effects. This project was to extend these findings to adult sarcomas, such as adult liposarcoma and leimyosarcoma. Liposarcoma (LPS 863) cells were treated with one and two IC50 concentration of both drugs for three days, harvested and probed for Western blotting for overexpressed proteins in these sarcomas. Liposarcoma cells treated with ROC and DDR showed lower levels of total Akt, total ERK and phospho ERK. The Akt and ERK pathways are overexpressed in many types of cancers and participate in increased cell proliferation. There were increased levels of caspase 3 and PARP (poly ADP ribose), apoptosis markers, with increased ROC and DDR. The IC50 values for DDR and ROC were determined with fluorometric assays using a Resazurin compound. The IC50 value for DDR in LPS 863 cells was around 6-8 nM, around 25nM for ROC in LEIO 196A cells and around 6nM for DDR in LEIO 196A cells. For ROC in LPS 863 cells, it is approximately 50 nM. The IC50 values are low which would be beneficial in achieving therapeutic range in patients. Collectively, these results showed that ROC and DDR can be viable drugs for adult liposarcoma and leiomyosarcoma.

Basic Science, Clinical & Translational Research

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Longitudinal "Real-World" Changes in Skin Microbial Ecology in Atopic Dermatitis Patients Before and After Treatment

Atopic dermatitis (AD) is a skin disease characterized by increased *Staphylococcus aureus* (SA) colonization. Previous studies have found that SA increases disease severity and is inversely associated with the skin commensal *Cutibacterium acnes* (CA). This year, we initiated a longitudinal, pragmatic trial investigating this relationship further. We hypothesize that CA, which can generate antimicrobial peptides and fermentation products, inhibits SA, and that reduced CA and/or antimicrobial products may contribute to SA overgrowth in AD. We are enrolling subjects 13-65 years old with moderate-to-severe AD (n = 30) and age- and gender-matched controls with psoriasis (PS, n = 30), or no atopic disease (NA, n = 30). At subjects' regularly scheduled Dermatology visits for 3 years, we assess skin disease severity, collect lesional and non-lesional skin swabs, and measure skin barrier function. Swabs are cultured for SA and *Staphylococcus* species using CHROMagar *Staphylococcus*. CA is cultured anaerobically. SA and CA are confirmed using PCR of Protein A (*spa*) and CA recombinase A (*recA*), respectively. We enrolled 17 subjects this year. In AD (n = 11), increased disease severity was generally associated with greater SA abundance (R = 0.36) and reduced CA (R = -0.11). Three subjects had follow-up visits, but no consistent trends in SA and CA were identified. These trends may become clearer as more data is gathered. We will also assess whether CA inhibits SA growth *in vitro*, and how this data compares between AD, PS, and NA. This study will provide insights into host-microbe relationships in inflammatory diseases.

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Evaluation of Nerve Regeneration in "Super-Healing" Mice

Background

Twenty million Americans suffer from peripheral nerve injury, costing the United States an estimated 150 billion health-care dollars annually. Traditional approaches that seek to improve regenerative outcomes following nerve injury have largely focused on manipulating the environment or upregulating stimulatory factors to promote axonal growth. Murphy Roths Large (MRL) mice, nicknamed the "Super-healing" mice, have been extensively studied and demonstrate little or no evidence of scar formation during wound or tendon healing. The purpose of this study is to examine whether this attribute transfers to the peripheral nervous system and if the strain exhibits superior axonal regeneration.

Methods

Two strains of mice were compared: C57BL/6J and MRL/MpJ. In both groups, six-week old male mice were used (n=48). The right sciatic nerve was transected and immediately repaired using two epineural 10-0 nylon sutures. Animals were functionally assessed using walking track analysis at post-operative weeks (POW) 1, 3, 6, and 9. At each endpoint, mice were sacrificed and the sciatic nerves were harvested. Sections were analyzed using light microscopy and transmission electron microscopy to provide axonal counts distal to the neurorrhaphy.

Results

The walking track analyses were used to calculate the sciatic functional index (SFI) scores. The MRL/MpJ mice were found to have superior functional outcomes at POW 1 and 3 ($p = 0.0036$

and 0.0443, respectively). Although the MRL/MpJ mice had better SFI scores at POW 6 and 9, the data lacked statistical significance ($p = 0.6285$ and 0.2772, respectively). Surprisingly, at POW 3 and 6 the C57BL/6J mice were found to have more axons distal to the repair ($p = 0.0012$ and <0.001, respectively). There was no statistically significant difference in axon counts found at POW 1 and 9 ($p = 0.86$ and 0.81, respectively).

Conclusions

The results of this study indicate that the "Super-healing" mice recover function more expediently than the control mice. Interestingly, our data shows that they do so with fewer axons distal to the nerve repair. This may seem counterintuitive; however, we suspect that this can be explained in terms of quality versus quantity. The C57BL/6J mice sprout multiple axons in a growth cone post-injury in an effort to reinnervate the targeted muscle. We believe the MRL/MpJ mice have a more efficient regeneration process likely related to less scar formation. This study lays the foundation for future research identifying the cell lines or signaling pathways that may be responsible for this improved peripheral nerve healing.

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Brace Yourself: The emotional burden of a chronic neurological illness diagnosis on neurologists and their patients

OBJECTIVE
Receiving a new diagnosis of a chronic neurological illness is an emotionally difficult and life-changing experience for patients. It can also be emotionally fraught for providers. Our study aims to explore the shared emotional burden of neurology patients and neurologists in the setting of a chronic neurological illness diagnosis.
METHODS
This is a qualitative descriptive study of a cohort of patients with either Amyotrophic Lateral Sclerosis, Multiple Sclerosis, or Parkinson Disease, and a cohort of neurologists who treat these patients. Semi-structured interviews were used to examine participants' experiences of delivering/receiving a diagnosis of a chronic neurological illness. Interviews were analyzed using grounded theory methods to identify emergent patterns and themes in the data.
RESULTS
These interviews reveal 1) patients appreciate the opportunity to express and discuss their emotions during office visits, 2) for physicians, the emotional burden manifests in suppressed feelings of grief, frustration, guilt, and inadequacy, 3) many patients empathize with the challenges of the physician role, and 4) both patients and physicians acknowledge that there are inadequate resources and insufficient time during visits to address the emotional aspects of this conversation.
CONCLUSIONS
The experience of receiving as well as delivering a diagnosis of a chronic neurological illness carries a tremendous emotional burden on both patients and their physicians. Having the space and adequate time during visits to acknowledge this burden has the potential of improving patient outcomes and their quality of life as well as increasing neurologists' career satisfaction and reducing burnout.

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A Multidisciplinary Approach to Digital Data Gathering for Standardization of Ankyloglossia

Ankyloglossia, more commonly known as tongue-tie, is a congenital abnormality characterized by an abnormally short, thickened, or tight lingual frenulum. There is no consistently used set of criteria to define ankyloglossia, though the resulting restriction of tongue mobility has been associated with difficulties breastfeeding, speech impediments, mechanical problems related to oral clearance, abnormal dentition, and social challenges. Nevertheless, the medical community continues to disagree about appropriate diagnosis and management of ankyloglossia during breastfeeding. Treatment choices during this time occur across diverse medical settings: in the hospital after delivery, in the Neonatal Intensive Care Unit, or during outpatient care at a Pediatrics, Otolaryngology or Lactation Medicine practice. This very diversity can contribute to disrupted care through differing opinions and management practices. Starting in January 2019, the divisions of Pediatric Otolaryngology, Lactation Medicine, and Neonatology at the University of Rochester Medical Center agreed upon a standardized approach to such management and created a documentation infrastructure to ensure appropriate clinical care and report on outcomes. We discuss how the standards were created and implemented using this Electronic Medical Record interface. Initial results were abstracted and demonstrate agreement in management and correlation of tongue function scores and measurements with breastfeeding outcomes across all three settings, indicating the success of the creation of the multidisciplinary standard. Combining data from all three clinical settings reiterated the known benefit of the procedure, including a significant decrease in maternal nipple pain, increase in HATLFF (tongue functionality) score, and increase in weight. A novel definition of "successful" frenotomy was employed, utilizing either maternal pain or improvement in infant weight, resulting in age-dependent benefit.

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Prolactin and the Injured Brain: A Longitudinal Diffusion Tensor Imaging Case Study

Introduction

Prolactin (PRL), a hormone secreted by the pituitary gland has demonstrated promise as a neuroprotective agent – influencing the generation of oligodendrocyte precursor cells in animal models. We tested this by longitudinally studying a rare patient (AA) with downward herniation of the optic chiasm from treatment of a PRL-secreting pituitary tumor using a combination of diffusion tensor imaging (DTI), standard automated perimetry, and optical coherence tomography (EDI-OCT). We find that serum PRL levels rapidly alter properties of diffusion in injured white matter tracts by demonstrating increased radial (RD) and mean (MD) diffusivities, along with reduced fractional anisotropy (FA) and visual function following a transient decrease in serum PRL. Our results demonstrate in-vivo, the sensitivity of diffusion MRI to detect rapid and functionally significant microstructural changes in injured white matter tracts secondary to alterations in serum hormone levels.

Methods

AA is a 36-year-old woman who presented nine years after initial diagnosis and medical treatment of a PRL-secreting macroadenoma with progressive bilateral visual field defects. She was diagnosed with empty sella syndrome and instructed to stop Cabergoline, a dopamine agonist. Research testing was conducted in tandem with her routine clinical evaluations over one year and EDI-OCT and DTI data were obtained at three time points. A sample of healthy controls (n=5) underwent a complementary battery of clinical and neuroimaging tests at a single time point.

MRI Acquisition and Analysis: Scanning was done at the University of Rochester on a 3T Siemens MAGNETOM Prisma scanner with a 64-channel head coil. T1 weighted images were acquired first with a MPRAGE pulse sequence (TR=2530 ms, TE=3.44 ms, flip angle=71°, FOV=256×256 mm^2, matrix=256×256, resolution=1×1×1 mm^3, 192 sagittal slices). Diffusion MRI data were acquired using a single shot echo planar sequence (65 diffusion directions, echo spacing=0.66ms, EPI factor=172, b=0, 1000, 3000 s/mm^2, 96 slices, resolution=1.5×1.5×1.5 mm^3, 68 non-diffusion weighted vols). Three non-diffusion weighted volumes were collected at the same resolution with reversed phase encode blips to estimate the susceptibility-induced off-resonance field as implemented in FSL (Andersson,

Skare, Ashburner 2003; Andersson and Sotiropoulos 2016; Woolrich 2009). Probabilistic tractography of the optic tracts was performed on the b=1000 volumes (Hernandez et al. 2013; Hernandez et al. 2019).

Formal Ophthalmologic Testing: All participants completed Humphrey perimetry (24-2) and EDI-OCT to measure ganglion cell complex (GCC) and retinal nerve fiber layer thickness.

Laboratory evaluation: Blood samples were obtained from all participants to measure serum PRL levels.

Results

DTI Results: Shortly after ceasing Cabergoline, AA's diffusion metrics in the optic tracts appear similar in center and spread (Fig. 2) to the controls. With decreasing levels of PRL, presumed to be related to the use of Cabergoline during the patient's second visit, there is a statistically significant decrease in FA and a corresponding increase in RD and MD compared with the control population (all $p<0.001$), returning to normal values after withholding Cabergoline. AA also experiences a transient reduction in visual ability (mean deviation) during her second visit that improves with increasing serum PRL.

Relationship between DTI and retinal thickness: RD and MD are inversely associated with GCC thickness for all subjects, shown by significant Spearman rank correlations (both $p<0.05$), whereas FA shows a positive but non-significant trend ($p=0.14$).

Conclusions

Our findings reveal a rapid diffusion MRI response in the optic tracts to changes in circulating levels of PRL that has implications for visual function and recovery. The inverse relationships between PRL and both measures of diffusion and visual function provide support for a neuroprotective role of PRL in the injured brain.

Captions:

Figure 1. Clinical T1 weighted MRI scan with contrast demonstrating patient AA's pituitary macroadenoma prior to (left), and after initiation of treatment with Cabergoline (middle), with progressive herniation of the optic chiasm into an empty sella (right).

Figure 2. Distribution of DTI diffusion metrics for the optic tracts of AA at three time points and control group (n=5). AA scan 1 was done after initial cabergoline hold (high PRL), AA scan 2 was done after brief re-initiation of cabergoline (normal PRL), and AA scan 3 was done 5 months after final termination of cabergoline treatment (high PRL). Diffusion metrics include axial diffusivity (AD), fractional anisotropy (FA), mean diffusivity (MD), and radial diffusivity (RD).

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Basic Science, Clinical & Translational Research

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Building a High-Dose-Rate Prostate Brachytherapy Program With Real-Time Ultrasound-Based Planning: Initial Safety, Quality, and Outcome Results

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Objectives: Growing evidence supports the efficacy and safety of high-dose-rate (HDR) brachytherapy as a boost or monotherapy in prostate cancer treatment. We initiated a new HDR prostate brachytherapy practice in April 2014. In this study, we report the learning experiences, short-term safety, quality, and outcome.

Design: From April 2014 to December 2017, 164 men were treated with HDR brachytherapy with curative intent. Twenty-eight men (17.1%) underwent HDR brachytherapy as monotherapy, receiving 25 to 27 Gy in 2 fractions. Men treated with HDR brachytherapy as a boost received 19 to 21 Gy in 2 fractions. Fifty-two men (31.7%) had high-risk disease. HDR procedure times, dosimetry, and response were recorded and analyzed. Genitourinary (GU) and gastrointestinal (GI) toxicities were recorded according to the toxicity criteria of the Radiation Therapy Oncology Group.

Results: Mean HDR procedure times decreased yearly from 179 minutes in 2014 to 115 minutes in 2017. Median follow-up was 18.6 months (range, 3-55 months). At last review, 79% of patients reported returning to baseline GU status, and 100% of patients noted no change in GI status from their baseline. Four patients experienced acute urinary retention. Treatment planning target volume (PTV) was defined as prostate with margins. The estimated 3-year overall survival was 98.7% (95% confidence interval, 91.4%-99.8%), and disease-free survival was 96.2% (95% confidence interval, 89.5%-98.7%).

Conclusion: The low incidence of GU and GI complications in our cohort demonstrates that a HDR brachytherapy program can be successfully developed as a treatment option for patients with localized prostate cancer.

Basic Science, Clinical & Translational Research

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Investigating the use of the Emergency Department (ED) by Adult, Deaf American Sign Language (ASL) Users

It has widely been reported among culturally Deaf patients worldwide that they experience significant barriers to accessible healthcare. These barriers often include challenges with patient-provider communication, trust, and lack of health knowledge. Over time, it can lead to reduced continuity of care and increased utilization of the ED, increasing the burden on the healthcare system. Our study hopes to expand upon our understanding of Deaf ASL users' utilization of the ED.

Given the social and cultural factors discussed above, we hypothesized that ED visits overall among Deaf ASL users have lower medical acuity than among English speaking hearing individuals, potentially attributed to lower access to primary care and lower understanding of the health system among Deaf ASL users. To examine these ideas, we used a case-control study design to investigate if and how adult Deaf ASL users who visit the ED (cases) differ from adult English speakers who visit the ED (controls). Using E-Record, we gathered descriptive information on the ED visit (acuity, procedures, labs ordered, etc.). We also collected data on characteristics that may influence ED treatment to facilitate interpretation. In an extension of our primarily cross-sectional methodology, we gathered select prospective information in the 6 months following the index ED visit for evaluation of readmittance outcomes. Our analysis of this pilot data will help direct future research questions and interventions in the ED to support the Deaf community.

Basic Science, Clinical & Translational Research

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Follicular Trochanters: a potential mechanism for stem cell depletion in scarring alopecia

Background
The follicular bulge is a stem cell niche where the outer root sheath (ORS) abuts the arrector pili muscle insertion site in both murine and human hair follicles. Prior studies have recognized an uncommon structure termed the "follicular trochanter" which was described as an epithelial protrusion of the outer root sheath in anagen follicles. It has been shown that these structures prominently express keratin 15, a stem cell marker. We sought to determine if trochanters embedded in the fibrotic stroma contribute to follicular scarring in cicatricial alopecias.

Methods
We retrospectively evaluated ten random cases of central centrifugal cicatricial alopecia (CCCA), lichen planopilaris (LPP) and discoid lupus erythematous (DLE). After confirmation of the diagnosis on H&E-stained slides, recut slides from the formalin-fixed, paraffin-embedded blocks underwent anti-keratin 15 (K15) immunofluorescence staining.

Results

Overall, 10/30 scarring alopecia cases had K15-positive trochanters. They were most frequent in CCCA (60% of cases) as compared to DLE and LPP (20% each). The total number of trochanters per follicle was greater in CCCA than in DLE and LPP ($P<0.05$). In addition, there was a greater number of K15 stem cells found in the trochanters of CCCA compared to DLE and LPP ($P<0.05$).

Conclusions

Our immunofluorescence studies for keratin 15 staining show that fibrosis-associated trochanters are comprised of hair follicle stem cells. Overall, these findings provide insights into the pathomechanism of CCCA. These fibrotic trochanters appear to be a stem cell niche that may be separated from the follicle by the perifollicular fibrosis associated with scarring alopecia.

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Prevalence of Antenatal Depression Among Women Hospitalized During Pregnancy for Obstetric

Introduction: 700,000 women are treated with hospitalization for antenatal complications in the US annually. Prolonged hospitalization is shown to increase rates of depression. The objective of this systematic review was to evaluate the prevalence of depression among antenatal inpatients.

Methods: We conducted a systematic review of PubMed, Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Medline through March 2020. Studies and abstracts included if subjects were hospitalized on antepartum unit for any length of stay (LOS) at any gestational age (GA) for medical or obstetric complications and completed the Edinburgh Postnatal Depression Scale (EPDS). Primary outcome measure was frequency of elevated EPDS.

Results: Of 7,474 studies reviewed***,*** 14 met criteria for inclusion. Of 1438 total subjects, a positive EPDS screen was present in 34.9% and mean EPDS score was 9.1 (SD 6.7). Threshold for a positive EPDS screen varied between studies from 9-13, and was most commonly defined as ≥10 (n=6) however 5 trialists defined it as ≥13. Composite average subject age was 31.7 years (SD 2.4). Subjects were majority Caucasian (45.3%), multiparous (59.6%), married (76.4%), unemployed (56.5%), and 61.9% had ≥ high school educational attainment. Indications for antepartum admission were preterm labor (45.6%), fetal growth restriction (25.3%), and preterm prelabor rupture of membranes (12.1%).

Conclusion: The literature suggests more than one in three women hospitalized during pregnancy for obstetric complications will have an elevated EPDS indicative of possible diagnosis of depression. This is twice the reported baseline prevalence of depression in the general obstetric population (12-18%).

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Poverty and Risk of Cleft Lip and Palate: An Analysis of United States Birth Data

Purpose: The relationship between poverty and incidence of cleft lip/palate remains unclear. We investigate the association between socioeconomic status (SES) and cleft lip with/without cleft palate (CLP) and cleft palate only (CPO) in the U.S. after controlling for demographic and environmental risk factors.
Methods: The U.S. 2016 and 2017 Natality Data were utilized (n=7,820,866). Births with missing data or simultaneous diagnoses of both CLP and CPO were excluded. Proxies for SES included maternal education, use of WIC, and payment source for delivery. Multiple logistic regression controlled for household demographics, prenatal care, maternal health, and infant characteristics.
Results: Of 6,251,308 live births included, 2,984 (0.05%) had CLP and 1,180 (0.02%) had CPO. Maternal education of bachelor's degree or higher was protective against CLP (AOR=0.73 [0.63, 0.85]; p<0.001). Receiving WIC was associated with CPO (AOR=1.25 [1.08, 1.46]; p=0.003). Delayed prenatal care until second or third trimester – compared with first trimester – was associated with CLP (AOR=1.14 [1.04, 1.26], AOR=1.23 [1.03, 1.47]; p=0.004 and 0.023, respectively). Male sex, first-trimester tobacco smoking, and maternal gestational diabetes were also associated with CLP (AORs=1.60 [1.48, 1.72], 1.01 [1.00, 1.03], 1.19 [1.03, 1.39]; p<0.05). Female sex, pre-pregnancy tobacco smoking, and maternal infections during pregnancy were associated with CPO (AORs=0.74 [0.66, 0.83], 1.02 [1.00, 1.03], 1.60 [1.16, 2.21]; p<0.05).
Conclusions: Increased incidence of orofacial clefts was associated with indicators of lower SES, with different indicators associated with different cleft phenotypes. Notably, early prenatal care was protective against the development of CLP. Our model also confirmed known risk factors for CLP and CPO.

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TNF-α plays a critical role in cigarette smoke-induced epithelial-mesenchymal transition of retinal pigment epithelial cells in proliferative vitreoretinopathy

Purpose
Proliferative vitreoretinopathy (PVR) is characterized by the growth and contraction of cellular membranes within the vitreous cavity and both surfaces of the retina. Two pathologic processes implicated in PVR are epithelial-mesenchymal transition (EMT) of retinal pigment epithelial cells (RPE) and inflammation. Cigarette smoke has been associated with higher rates of PVR and is the only modifiable risk factor, although the mechanism is currently unclear. The purpose of this study was to investigate the role of EMT and inflammation pathways in RPE cells exposed to cigarette smoke *in vitro* and in a mouse model of PVR.
Methods
Human ARPE-19 cells were treated with varying concentrations of cigarette smoke extract (CSE) ranging from 0% to 1%. Cells were harvested after 4 and 24hrs and analyzed by quantitative PCR (qPCR) and Western blotting for known markers of EMT and inflammation. All experiments were replicated 2-3 times, with similar findings. For in vivo studies, we intravitreously injected ARPE-19 cells exposed to 0% and 0.5% CSE and PVR development was monitored over time by optical imaging (n=17). T test and Chi-Squared analyses were performed for *in vitro* and *in vivo*, respectively.
Results
ARPE-19 cells treated with 0.5% CSE for 4h showed significant increase in expression of the inflammation marker TNF-α and early EMT marker, Snail, expression by qPCR analysis (9-fold; $p<0.01$ and 4-fold; $p<0.01$, respectively). By 24h, both TNF-α and downstream inflammatory marker IL-8 were significantly upregulated (7-fold; $p<0.05$ and 9–fold; $p<0.01$ respectively), and Snail was significantly increased (50-fold; $p<0.01$). Western blot analysis was consistent with qPCR results, showing elevated EMT markers, Snail and α-SMA, in the 0.5% CSE treated cells (7-fold and 5-fold, respectively) by 24 hours.
In our in vivo studies, 7/8 mice that received an injection with CSE-exposed RPE cells developed Grade 5 PVR or worse at 3 weeks, compared to control mice (2/9 mice) ($p<0.05$).
Conclusion
We demonstrate that RPE cells exposed to CSE exhibit an acute upregulation of the inflammatory marker TNF-α as well as subsequent activation of pro-inflammatory cytokines and

early EMT markers, suggesting that TNF-α may play a crucial role in cigarette smoke-induced EMT of RPE cells in PVR.

Basic Science, Clinical & Translational Research

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Preceptor
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Evaluating the Factors Associated with Diabetes-Related Emergency Department Visits at Strong Memorial Hospital between 2013 and 2017

Ambulatory care sensitive conditions (ACSCs) are defined as conditions for which good primary care would likely prevent hospitalization and reduce complications associated with the condition. Diabetes is considered an ambulatory care sensitive condition that is preventable or manageable with timely, appropriate primary care. Emergency department visits for ACSCs are indicators of decreased access to primary care services and can be used as a proxy for the quality of care received. Prior research has established that disparities based on race exist for ACSCs. This project will explore the relationship between diabetes-related ED visits, race, poverty, insurance status, and the number of primary care practices at the census tract level. A retrospective analysis of ED visits, related to patient's diabetes diagnosis, at Strong Memorial hospital from 2013-2017 was performed. The Office of Clinical Practice Assessment provided a database containing clinical and demographic information for all patients. Multivariate linear regression was used to model the prevalence of diabetes-associated ED visits at the census tract level as a function of the number of primary care practices, African American race, poverty, and insurance status. A total of 461,186 ED visits occurred at Strong Memorial hospital from 2013-2017. 3.156% were visits related to the patient's diabetes (N=14,554). African American race (t=3.222, p=.002) was found to be the only statistically significant predictor of the prevalence of diabetes ED visit by census tract. Future studies will look at other ACSCs, as well as aggregate data for several ACSCs to profile factors related to ED visits for ACSCs.

Community Health Research

Porterfield, Claire
Class of 2021

Preceptor (Fellowship Director)
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What is cytopathology?

Foreword: Unlike many students during year-out endeavors, I was not involved in research. Instead I essentially functioned as a pathology first-year resident, allowing a truly unique and incredible learning experience. To try to summarize what I learned and all the opportunities this year afforded me in a poster would not do any justice to the experience. Thus, I decided to highlight one of the many teaching endeavors I was able to embark on that really lends itself to this format.

Abstract: I realized through the course of my year in pathology that there were many things that pathologists understand, that clinical physicians likely do not. We often do not learn this information in medical school, but we are expected to effectively utilize these tests as physicians. One aspect of pathology where this was particularly dramatic was in cytopathology. Cytopathology, as compared to histopathology, is extremely sampling dependent, has very different sensitivity and specificity, and uses completely dissimilar criteria to make diagnoses. Most clinicians only think of the Pap Smear when they think of cytology (and they may not even recognize that classic example). In the age where EBUS (endobronchial ultrasound guided sampling of lung lesions) is becoming a commonplace workup for lung nodules, and especially given how many specialties interact with cytology (gynecologists and primary care routinely order Pap smears, otolaryngologists do fine needle aspirations of thyroid nodules, urologists send bladder washings, hospitalists collect ascites suspected to have a malignant cause, etc.), I really felt that highlighting this facet of pathology would be invaluable to many medical students.

During my year-out I was able to engage in teaching (a passion of mine) and spreading excitement and insider-knowledge of pathology in two main avenues – one was by being a co-leader of the pathology interest group (the other leader being Shanna Yang, the other year-out fellow) in which I was able to design a number of novel, interactive events to engage medical students in pathology; the other was by aiding Dr. Findeis-Hosey in designing a virtual course on

surgical pathology. One of the events Shanna and I had planned to do was a cytopathology event wherein students would learn about cytology and get to try their hand at FNA and slide-making. However, in the face of COVID, this in-person event was not able to happen. In place of this, I decided to create a virtual event wherein we shared a "What is Cytopathology" video (created with Camtasia, which CEL staff kindly taught me to use) and then had an interactive microscope session where we looked at real patient cytology samples. I hope that you enjoy this video, and also perhaps learn something about cytopathology yourself.

Anna Bowen, M.D. Candidate Class of 2021

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Fatherhood Experiences in Ghana

Fathers play a crucial role in the human development paradigm, yet the fatherhood experience is poorly understood globally. Though fathers' mental health and behaviors are known to impact child development and partner wellbeing, paternal stress and wellbeing are frequently overlooked. Sub-Saharan African fathers may have even greater stress than their Western counterparts and are under-represented in the literature. This mixed-methods study quantitatively assessed the impact of parenting stress on fathers' overall wellbeing in the West African country of Ghana; and qualitatively delved into the lived experiences of fathers in this low-resource setting. Paternal stress was evaluated using the Aggravation in Parenting Scale. Fathers' overall wellbeing was assessed with the Secure Flourishing Index. Four semi-structured focus group interviews were conducted in Ada, Kumasi, and Sunyani. Textual data from interviews were sorted using inductive coding and aggregated into overarching themes. Thirty-eight Ghanaian fathers ages 21-74 participated in the study. Multivariate linear regression showed that for every unit increase in parenting stress, fathers' overall wellbeing decreased by $R = 1.04$ ($p < 0.001$; 95% CI: -1.62, -0.45). Emergent themes relating to the stressors of fatherhood were sorted into three categories: financial (employment, healthcare, food,

education); social (norms and expectations); and psychological (mental work, discipline, relationships). An overarching theme of pride and joy in parenting permeated the interviews. This study found that Ghanaian fathers with higher parenting stress experience lower overall wellbeing. Sources of stress identified by Ghanaian fathers could guide interventions to bolster the wellbeing of not only fathers, but families overall.

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Clinical Outcomes of Individuals with COVID-19 and Tuberculosis Disease: a Living Systematic Review

Background: Comorbidities, such as chronic kidney disease, COPD, heart disease, and immunocompromising conditions, predispose people to severe COVID-19. TB, like COVID-19, is most often a pulmonary disease. The COVID-19 pandemic has severely disrupted TB services in myriad ways: closure, lockdowns, travel bans, overwhelmed health facilities, restricted export of TB drugs, etc. The effects of the shared pulmonary risk on outcomes of the two diseases is not known. And, evidence about the pandemic is rapidly emerging. We embarked on a living systematic review (LSR) to elucidate the consequences of COVID-19 on TB and of TB on COVID-19 outcomes.
Methods: The LSR protocol is registered in Prospero. We conducted an initial search of multiple pre-print and peer-reviewed databases using terms relating to COVID-19 and tuberculosis. We selected cohort and case control studies for extraction. The search will be repeated before the Union Conference and approximately semi-annually. The Newcastle-Ottawa scale is used to assess quality.
Results and Conclusion: We reviewed 1,720 records to identify 1,185 unique abstracts. Most were pre-prints. We extracted data from 12 studies from 13 countries comprising 29,535 people (mostly hospitalized) with COVID-19. 2,309 (7.82%) had current TB or history of TB. Links between TB and COVID frequency, severity, and mortality are explored. Five studies reported on mortality; one found a two-fold risk of death in COVID patients with TB. TB outcomes were not fully available in any studies, in light of short follow up (maximum of 3 months after COVID diagnosis).
The rapid influx of literature on TB and COVID-19 is mostly not yet peer-reviewed. It offers limited examination of the effect of TB on COVID-19 and even less on the effect of COVID-19 on TB treatment outcomes. Updates to this LSR will provide an emerging understanding of these overlapping respiratory pandemics.

Clinical Outcomes of Individuals with COVID-19 and Tuberculosis Disease: a Living Systematic Review

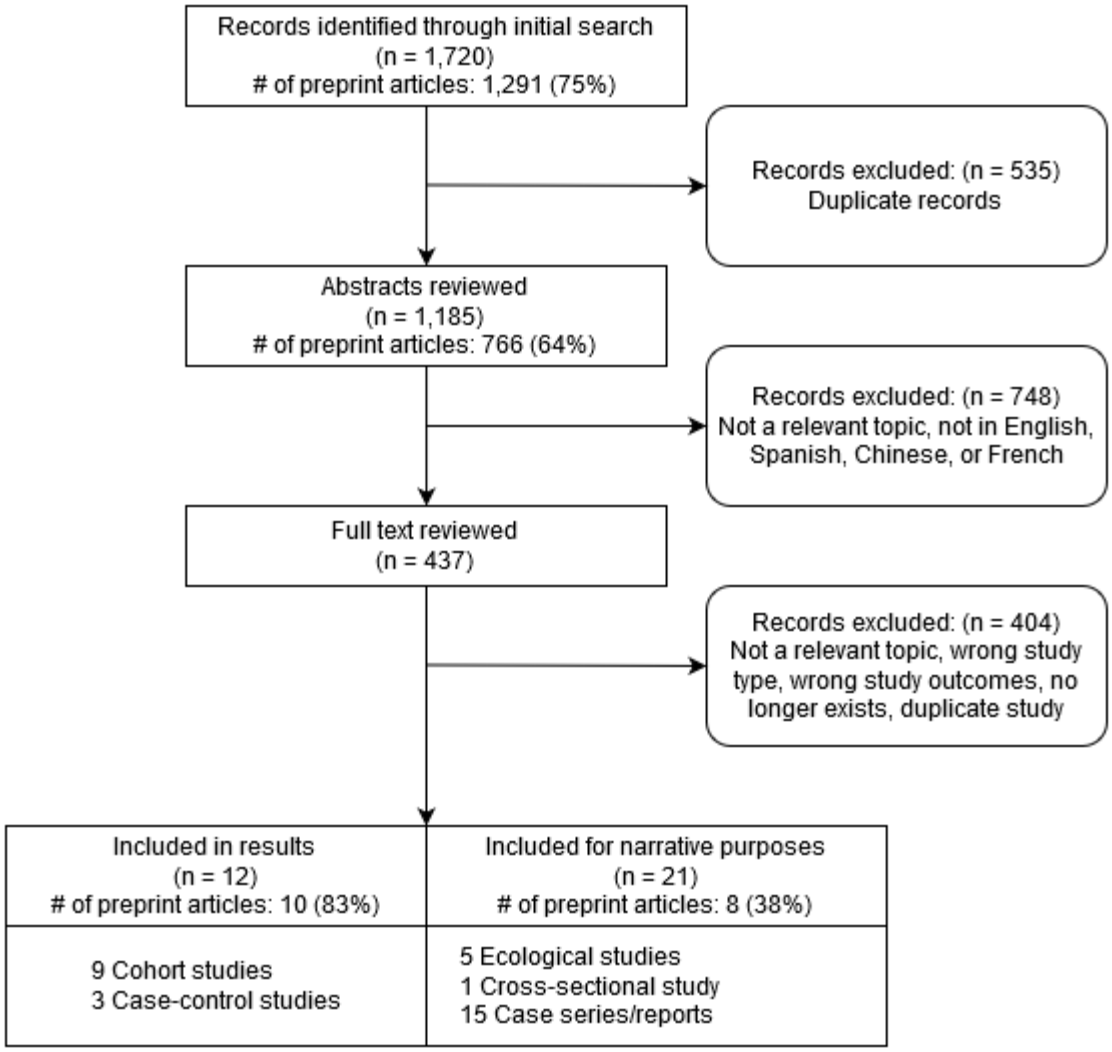

Figure 1. PRISMA flow diagram.

Woodcock, Michelle, Class of 2021

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It Takes a Village: How A Novel Prenatal Education Program Was Shaped By, and Shaped the Lives of, Women in Vanuatu

Introduction

Vanuatu is a Melanesian archipelago of over 80 islands inhabited by nearly 300,000 people (Central Intelligence Agency, n.d.). The healthcare system faces many challenges with a limited infrastructure and hard-to-reach communities. Recent strides have been made to improve maternal and child health. The majority of Ni-Van women now receive prenatal care and deliver in a skilled health facility (Vanuatu Ministry of Health, 2007). However, infants and mothers still die at higher levels than in the US and many of its neighboring countries, with 22 infant deaths per 1000 live births and 72 maternal deaths per 100,000 live births (UNICEF Data, n.d.; Central Intelligence Agency, n.d.).

Gaps in prenatal care could be contributing to persistent maternal and infant mortality. While most women have at least one prenatal checkup, 70% present to care late in pregnancy, and few fulfill the WHO recommendation of at least eight visits before delivery (Secretariat of the Pacific Community, 2014; World -Health Organization, 2016). Further, prenatal services are distributed unequally; women from rural areas and those without formal education receive the poorest care (Secretariat of the Pacific Community, 2014). Ninety percent of women report at least one problem accessing care; lack of available resources and providers, prohibitive cost, and lack of transportation were the most commonly cited barriers (Secretariat of the Pacific Community, 2014).

Community-based, group prenatal classes have been successfully implemented around the world. Centering Pregnancy is a prenatal care model that combines individual check-ups with group education. It has been shown to improve birth outcomes, breastfeeding rates, and social support for mothers across the United States and globe (Baldwin, 2006; Heredia-Pi et. al, 2018; Patil et al., 2017). Additionally, the Tapuaki Program is a group prenatal education curriculum adapted for island cultures that has improved health literacy and bridged social-cultural barriers for Pacific Island women in New Zealand and has since been modeled in Fiji and Samoa (Gentles, et al., 2016).

Studies have described how women of island nations see social connectedness and support as integral to their experience with healthcare (Hinton and Earnest, 2009; Hinton and Earnest, 2011). Yet to our knowledge, group prenatal models have not been previously attempted in Vanuatu. Community-based prenatal groups utilize relational ties and may reduce barriers to accessing care; this model could be beneficial to women in Vanuatu by increasing health knowledge, healthy behaviors, and vital support amongst women. The present study explores this assumption by evaluating a new prenatal education program established in one Ni-Vanuatu community in partnership with an existing health clinic.

A novel 11-session curriculum on prenatal care was developed, incorporating themes and formats similar to the Tapuaki and Centering Pregnancy models. The nine educational sessions were conducted in weekly three-hour classes in small group, activity-based formats to encourage participation by every class member. Lessons covered topics in pregnancy, labor and delivery, and newborn care as well as general wellness topics such as sexual health and stress management. The remaining two sessions were an enrollment day at the start of the program and a graduation celebration at the end, during which pre- and post-program evaluation interviews with class participants were conducted. For women who delivered during the class, additional home visits were made by staff to maintain relationship.

Class participants were primarily recruited from one village via face-to-face advertisement by a clinic partner who lived in that village. Focusing on a specific community was done to foster bonds amongst women that could be developed beyond the classroom in their neighborhoods and to provide transportation for them to the class meetings. Additional women were recruited via flyer posting and advertising at the local primary school and the study's partner clinic. Both pregnant and non-pregnant women were encouraged to join the class to support the communal view of childrearing and with the aim of helping women during future pregnancies. Two women training at the state hospital's prenatal clinic desired to get involved and also participated in the class.

Methods

Sixteen pregnant and non-pregnant women who attended the prenatal education class were interviewed for the study. At the first and final sessions of the course, class members were asked to participate in the pre- and post-program evaluation surveys. If they provided verbal informed consent, surveys were conducted verbally in groups of two to four women led by class staff members who were fluent in Vanuatu's native language, Bislama, and served as interpreters. Each participant was given a paper copy of the survey in Bislama. To accommodate those who were not literate, interpreters read each survey question aloud, clarified follow-up questions, and helped participants write down their answers. Written responses were later transferred into REDCap, an electronic HIPAA-compliant data collection website, for data storage.

During the interview process, participants did not answer every survey question, as some questions were specific to those who were pregnant and others to those who were not. The study was approved by the University of Rochester Research Subjects Review Board.

Instruments

Initial intake surveys were created to collect participants' basic socio-demographic information and obstetrical health histories. Novel pre- and post-program surveys were also created to evaluate changes in three areas: participants' health behaviors, psychosocial factors, and health knowledge. Most questions were written specifically for the class curriculum, but they did incorporate validated measures such as the Medical Outcomes Study-Social Support Survey (MOS-SSS) and questions on violence from the UNICEF Multiple Indicator Cluster Survey (Sherbourne and Stewart, 1991; Vanuatu Ministry of Health, 2007). The surveys were designed in English then translated into Vanuatu's native tongue, Bislama.

The health behavior section of the survey asked questions about women's actual or intended behaviors regarding recommended prenatal care and newborn care practices. The psychosocial section asked about women's level of social support and readiness for motherhood. A truncated version of the MOS-SSS was used to examine social support, using questions that the authors believed were most culturally relevant and included three modified questions to ask specifically about health-related support. The knowledge section was a 12-question true-false quiz asking women about pregnancy, labor and delivery, and postpartum health facts covered during the teaching sessions. Additional questions on violence and the perceived utility of the class were also asked.

Process evaluation included informal debrief sessions with teaching staff throughout the class and more formal focus groups with class members and staff at the program's end to identify strengths and areas of improvement. Field notes were also collected at each session to inform modifications to curriculum and class structure.

Data Analysis

Data from sixteen participants were analyzed using SPSS statistics software version 26.0. Because not all women attended every class session, not everyone completed both pre- and post-program surveys. Four participants completed the pre-program interview only, three completed the post-program interview only, and nine completed both. Three women attended less than half of the teaching sessions but were included analysis, as significant changes were found despite poor attendance.

Descriptive statistics were used to explore socio-demographic characteristics. Changes in pre- and post-program responses were compared using t-tests. Data from the nine women who completed both pre- and post-program interviews were used for paired t-tests while all 16 participants' data were included for independent t-tests. Sections with Likert scales were assessed by individual question or topic and as aggregate calculated scores. Process evaluation

responses were written down at the time of collection then combined to generate themes and specific points for modification.

Results

Demographics

Socio-demographic characteristics are reported in Table 1. Women were between the ages of 18 and 46 at the time of initial interview, with a mean age of 27 years. They completed an average of nine years of schooling, and 11 (73.3%) were able to read a written sentence aloud. Most women were in a relationship with or married to their baby's father. Half of women lived with their partner. Eleven (73.3%) women worked outside the home to provide for their families, mostly selling prepared food or produce from their gardens. Substance use was uncommon.

Ten (76.9%) had not belonged to a pregnancy group previously, citing they did not know of one that existed before (8, 80.0%), did not have enough time (1, 10.0%), or did not think they were worthwhile (1, 10.0%) as their reasons. The majority of women (10, 66.7%) were recruited face-to-face in their village by the clinic partner. Participants attended an average of five of the nine educational sessions. All but one thought men should participate in child rearing and household chores (15, 93.75%).

Obstetrical history

Table 2 outlines participants' obstetrical history. Overall, participants had had an average of 2.5 live births. Eleven were currently pregnant, two were not pregnant but still in childbearing years, and another two were finished with childbearing. Of the women who were pregnant, they were an average of five months along when interviewed for the first time, and the majority of pregnancies were planned. Four women were pregnant with their first child, two delivered before the end of the class, and one had a spontaneous abortion. All currently pregnant women received prenatal care at the state hospital and intended to have an average of 4.7 visits before delivery; five (62.5%) had their first checkup in their second trimester or later. When citing barriers they had previously experienced to receiving prenatal care; previously parous women noted the far distance (2, 40.0%), high cost (1, 20.0%), and lack of transportation (1, 20.0%) and lack of time (1, 20.0%) as challenges.

Pre-Program and Post-Program Evaluation

Health Behaviors

Changes in health behaviors are described in Table 3. At the start of the program, six pregnant women had received prenatal care already and three had not. Five were taking pregnancy-related medications, but none were fully compliant with their use. At the program's conclusion, all pregnant women had received care ($p=0.08$) and were taking more prenatal medications

regularly ($p<0.05$). Participants went from taking an average of only 1 of the four prenatal medication recommended by health providers to 2.75 by the end of the program ($p<0.05$).

Women were also asked about intended newborn care behaviors (Table 3). Most began with healthy intended breastfeeding practices, and these positive habits increased amongst the group post- program, particularly in plans to breastfeed for at least 12 months ($p<0.05$). There were also significant improvements in intended safe sleep behaviors for newborns between the start and end of the program in terms of sleep location and position ($p<0.05$).

Not all women initially planned to use contraception post-partum, but all women intended to do this when interviewed at the program's end. For those who initially did not want to use contraception, two (66.7%) cited their partners would not want them to use contraception, and one (33.3%) said she would use the lactational amenorrhea method to prevent pregnancy In pre-program interviews, most women planned to attend a post-partum visit and newborn checkup after delivery; there was not a significant change in these plans post-program.

Psychosocial Factors

Women were asked to rate the availability of different types of social support on a Likert scale using a truncated version of the validated MOS-SSS (Sherbourne and Stewart, 1991). Initial calculated scores were 41.72 and significantly improved to 55.51 by the end of the program ($p<0.05$). Significant changes were seen in the emotional and informational support category of the MOS-SSS as well as health-related support ($p<0.05$). Respondents made an average of four new friends from the class who they now viewed as support persons in their lives. Participants felt significantly more ready to manage a pregnancy after attending the class ($p<0.05$) and stable in their readiness for labor and delivery as well as caring for a newborn.

Health Knowledge

Women were evaluated on their health knowledge through a twelve-question true-false quiz. By the end of the class, overall scores marginally improved but not to a statistically significant level (Table 4). Most improved in prenatal and newborn care knowledge; labor and delivery knowledge scores marginally decreased.

Violence

Nine women (60%) were victims of intimate partner violence in the past year, averaging two kinds of violence out of the five options provided. Two women (14.3%) admitted to the threat of physical violence by their partners in the past year, three (21.4%) reported actual physical violence. Nine women (60.0%) had their partners insult them, three (21.4%) were humiliated in public by their partners, and one (7.1%) was prevented from leaving the house.

When asked if different scenarios justified their partner's violence, three women (23.1%) initially felt it was justified if they left the house without telling their partners, if they burned the food, or

if they were argumentative. Two (15.4%) felt violence was justified if they neglected the children or if they refused sex. These perceptions did not significantly change at the end of the class.

Utility of the class

When asked to reflect on their experiences in the class, women said the class was helpful in a variety of ways. All participants felt the class had improved their health behaviors, helped them feel more supported, and improved their knowledge; 11 of 12 participants (91.7%) gave these three areas the highest score on the Likert scale provided ("*helped a lot*").

Further, the benefits of class participation may have extended beyond class members to impact others. One reported, **"***I'm so thankful for this class. It helped me learn how to look out for my baby and prepare me to become a mother again. But it also gave me wisdom and knowledge so I could help other mothers in my community."* Another noted, *"I love this class. I married a guy in [Port Vila, the capital city], and I was by myself here. My mom was on our home island so she didn't teach me how to look out for my baby. This class has really helped me so I can teach my daughters and sons how to look out for their children. I am so thankful.*"

The two participants from the state prenatal clinic also found the class beneficial as a refresher course and provided a model to more effectively educate their patients. One said, *"This class helped me remember everything that I learned at the hospital that I had forgotten."* Another noted, *"I learned a lot and realized that it is important to talk in a way that women will understand. It reminded me that we shouldn't use big words that they don't understand but talk and explain in a way where they will understand what we are saying."*

Process Evaluation/Logistics

Field notes and informal debrief sessions with staff informed several logistical changes made throughout the class. To maintain class member engagement, a formal break time halfway through the class and more skits and small group work were added. Additionally, as not all women were comfortable with the written language, we modified teaching materials to be more picture-based rather than word-based. Further, despite global standards of healthy pregnancy habits and recommendations, we found certain recommendations were not practically attainable for many women in our class, such as recommending to eat more fresh produce and drink more water to women who were limited in these resources, or to attend more prenatal checkups which were often time- and cost-prohibitive. We also learned that other topics originally not included in the curriculum, such as warning against taking traditional island medicines to falsely induce labor and proper explanation of car safety, were important and were added in the second iteration of the class conducted several months later.

During the final session's focus groups, class participants suggested expansion of the program, targeting primarily first-time mothers and nurse midwives for education. They found lessons with hands-on participation to be the most memorable and enjoyable, such as pain-relieving stretching routines during pregnancy and comparing fetal growth to sizes of fruit, and they

recommended increasing these types of activities in the class. This feedback informed modification of curriculum during the second round of the class.

Discussion

The outcomes of piloting group prenatal education in Vanuatu are promising. Significant changes were evident in health behaviors and levels of social support. Women were previously inexperienced with prenatal groups, and they felt the positive impact of their involvement as seen in high ratings of class utility and in tangible actions advocating for themselves and others in their communities.

In terms of psychosocial impact, women felt significantly more supported at the end of the class. These improvements were seen even in those who attended few classes. Perhaps merely belonging to a group of women is in itself a supportive and an empowering experience. Future studies examining the lasting effects of this support and how community women's groups are impactful could help elucidate this.

Regarding health behaviors, many women began with good health habits for breastfeeding and checkups after delivery. Intended safe sleep practices significantly improved and were easily adoptable modifications to their current living arrangements. Other behaviors were not as greatly impacted, especially regarding prenatal care. All pregnant women went to the state hospital for care by the end of the class but presented late and had low numbers of intended visits during pregnancy. Through conversations with class participants, we learned that prenatal care was important to them but was not regularly accessible, as it was often a daylong process and cost prohibitive. The researchers hoped that partnering with an existing community clinic would increase the access of prenatal services at that clinic, but this did not happen. While the clinic was closer, cheaper, and quicker than the state hospital's prenatal services; it still required transport by car for many of the class participants, which in itself could have been limiting. A more formal combination of prenatal visits with the education course, as has been successful in the CenteringPregnancy model, could further reduce barriers and provide women with many of beneficial medical, educational, and social resources during pregnancy (Baldwin, 2006).

Health knowledge did not significantly change, which could be due to a variety of reasons. The true-false format in itself might not have been familiar to participants and could have been confusing when translated into the very literal language style of Vanuatu. Questions were written before the curriculum was finalized and thus might not have covered class topics proportionally. However, many of the questions in the health behavior section required attained knowledge to make informed choices, so improvements seen in behavior responses also may suggest improvements in the health knowledge of these women. For example, women reported taking more prenatal medications at the end of the class; this may in fact be an increase in pills taken regularly but could have also been an increase in knowledge and understanding of specific medications taken.

Some of the most striking and inspiring outcomes of the class were best captured in the study's qualitative data. Two women sought help from abusive or illegal actions of their partners through the local women's center, a resource shared during class sessions. Three led community education efforts to help spread awareness and prevention practices of COVID-19 when the pandemic began. One started a community-based women's support group for class alumni. We cannot claim causation between class involvement and these events; but if the prenatal education course even partially encouraged these types of behaviors and the shift in underlying attitudes that enabled them to happen, then this class is an important addition to the community for wide-reaching reasons.

The majority of women in our group had experienced at least one type of intimate partner violence in the past year and many people felt violence was justified in a variety of settings. These are not behaviors or attitudes that can change quickly or easily, but the fact that two women from our course sought help to get themselves and their children out of unsafe situations with their partners suggests that progress is being made. Continuing to discuss the experience of violence and resources available may be impactful to this community.

Strengths/Weaknesses

With a small sample and novel curricular and evaluation materials, there were several challenges and potential drawbacks to this study. The small sample size could have limited significant findings in several categories or skewed results in a misleading manner. However, the small sample size paralleled the small class size-; and given that this is an initial study of a pilot program, the researchers believe the small sample is justified. Further, many of the behavior questions addressed intended rather than actual behaviors. Given that not all women were pregnant and those who were pregnant did not have similar due dates, and to limit the chance of losing participants to follow-up, questions on intended behaviors were used.

Many strengths are also present. This study provides promising results of a novel prenatal education program that could be widely implemented in the nation in the future, for it requires few resources, costs little to run, and can be taught by non-healthcare professionals. This study examines the effects of the program from a variety of levels: knowledge base, behavior change, and psychosocial factors; incorporating the reality that health and childbearing are multi-faceted experiences. It also includes both pregnant and non-pregnant women, supporting Vanuatu's communal aspect of child-rearing and knowledge sharing.

Partnering with a local health clinic helped with the development of the course and measures, aided with recruitment of participants, and has paved the way for future community-based obstetrical services in that community. Similar programs should be conducted collaboratively with local providers to ensure relevance to the social and healthcare contexts, and with the feedback and input of women from the communities the classes are to benefit. In our pilot, the continuous process evaluation allowed for program modifications in real time and inspired

important logistical modifications that made the class more effective. Finally, the study adds to the limited data that exists on the Ni-Van people, especially at a regional level.

Conclusion

Perhaps the most encouraging conclusion of the present study is the realm of possibility that remains for group prenatal education in Vanuatu. As a novel, small-scale implementation of the program, the results of this study support the hypothesis that this course can be beneficial to women of this population. Future studies utilizing a larger sample size as well as longitudinal follow-up of participants to examine maintained changes in knowledge, support, actual behaviors, and health outcomes will better clarify the specific impacts of this program. Additionally, adding in prenatal care checks to the group education format could further provide women with the physical and relational care they need and effectively reduce many of the barriers to seeking healthcare during pregnancy. The program could also be expanded and implemented in other Ni-Van communities. This may be especially impactful in rural island communities that disproportionately receive fewer prenatal services and could benefit from easier access to important health information (Secretariat of the Pacific Community 2014). Implementing training on our curriculum in existing prenatal clinics could also be beneficial as a refresher course for staff, to equip them with skills to better foster educational conversations with their patients, and to increase the scope of the program's effects if clinic-based education classes result. Encouraging healthy pregnancies and newborn care through accessible education and support are important steps in empowering Ni-Van women and their nation.

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Appendix

Table 1: Socio-demographic characteristics of Ni-Vanuatu women attending the prenatal class

Participant Characteristics (n=15)[a]	**n (%)**
Age (mean= 26.8 years old; range=18-46)	
18-24	9 (60.0)
25-46	6 (40.0)
Education Level (mean= 9.3 years; range=4-16)	
Primary school or less	10 (66.7)
Secondary school	3 (20.0)
College	2 (13.3)
Relationship Status	
Married	7 (46.7)
In a relationship	7 (46.7)
Divorced	1 (6.7)
Household Members	
Partner	8 (53.3)
Children	10 (66.7)
Woman's Family	7 (46.7)
Partner's Family	7 (46.7)
Employment Status	
Works	11 (73.3)
Small commerce	7 (63.6)
Housework in another home	1 (9.1)

Work at a local business	1 (9.1)
Other	2 (18.2)
Does not work	4 (26.7)
Substance Use[b]	
In the Past Year (n=13)	5 (38.5)
In the Past Month	1 (6.7)
Literacy Level	
Reads part of a sentence	4 (26.7)
Reads entire sentence	11 (73.3)

[a]One participant's demographic survey was not collected at time of interview. N=15 unless otherwise noted.
[b] Regarding substance use, women were asked if they had used alcohol, tobacco, kava, or marijuana.

Table 2: Obstetrical characteristics of Ni-Vanuatu women attending the prenatal class

Obstetrical Characteristics[a]	**n (%)**
Childbearing Status	
Currently Pregnant	11 (73.3)
Still pregnant by end of class	8 (72.7)
Delivered by end of class	2 (18.2)
Spontaneous abortion	1 (9.1)
Not pregnant but still able to bear children	2 (13.3)
No longer able to bear children	2 (13.3)
Number of Children (mean=2.5 children; range=1-6)	
0	4 (26.7)
1	5 (33.3)
2-3	4 (26.7)
4+	2 (13.3)
Previous Pregnancy Loss	1 (6.7)
Pregnancy Status (n=11)	
Planned	7 (63.6)
Mistimed	2 (18.2)
Unplanned	1 (9.1)
Not sure	1 (9.1)
Pregnant with First Child (n=11)	4 (36.4)

[a] *N=15 unless otherwise noted.*

Table 3: Changes in actual or intended behaviors of Ni-Vanuatu women attending the prenatal class

Behaviors [a]	**Pre-Program n (%)**	**Post-Program n (%)**	**Difference (%)**
Received Prenatal Care if Pregnant	6/9 (66.7)	8/8 (100.0)	33.3%
Prenatal Medication Use if Pregnant			
Began taking medications	5/9 (55.6)	8/8 (100.0)	44.4%*
Taking medications every day	3/4 (75)	8/8 (100.0)	25.0%
Taking all recommended medications[b]	0/9 (0.0)	4/8 (50.0)	50.0%*
Intended Breastfeeding Habits			
Exclusive breastfeeding	10/12 (83.3)	11/12 (91.7)	8.4%
Early initiation	12/13 (92.3)	11/11 (100.0)	7.7%
Breastfeed for at least 12 months	8/13 (61.5)	8/8 (100.0)	38.5%*
Intended Newborn Safe Sleep Habits			
Sleep in own bed	2/13 (15.4)	9/12 (75.0)	59.6%**
Sleep on back	2/12 (16.7)	11/12 (91.7)	75.0%**
No soft objects in bed	0/13 (0)	3/12 (25.0)	25.0%
Intended Post-Partum Family Planning Use	10/13 (76.9)	12/12 (100.0)	23.1%
Pills	2 (20.0)	2 (16.7)	
Injection	2 (20.0)	8 (66.7)	
Implant	4 (40.0)	1 (8.3)	
Female sterilization	1 (10.0)	1 (8.3)	

Not sure	1 (10.0)	0 (0.0)	
Plan to Attend Postpartum Checkup	11/13 (84.6)	11/12 (91.7)	7.1%
Plan to Attend Newborn Checkup	12/13 (92.3)	11/12 (91.7)	-0.6%

[a] N=9 unless otherwise noted.
[b] Vanuatu's Ministry of Health recommends all pregnant women take four medications during pregnancy: iron supplements, folate supplements, anti-malarial medication, and antibiotics for empirical STI treatment.
** Denotes statistical significance with a p-value <0.05 for independent t-test.*
*** Denotes statistical significance with a p-value <0.05 for both independent and paired t-tests.*

Table 4: Changes in responses to a 12-question true-false quiz examining the knowledge of Ni-Vanuatu women attending the prenatal class

Questions About: [a]	**Pre-Program** **Mean correct (%)**	**Post-Program** **Mean correct (%)**	**Significance** **(% difference)**
Overall Health Knowledge	7.2/12 (59.6)	7.5/12 (63.2)	3.6%
Pregnancy	2.5/5 (49.2)	3.0/5 (60.0)	10.8%
Labor and delivery	1.9/3 (64.1)	1.4/3 (47.2)	-16.9%
Newborn care	2.8/4 (69.2)	3.2 (79.2)	9.9%

[a]*Missing responses and selecting "I don't know" were counted as incorrect when calculating scores.*

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Metastatic pheochromocytoma to the pancreas diagnosed by endoscopic ultrasound-guided fine needle aspiration: A case report and review of literature

Pancreatic pheochromocytomas are rare and typically diagnosed by local resection. We present the first reported case of metastatic pheochromocytoma to the pancreas diagnosed by endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) and cytology. A 67-year-old female presented with 2 to 3 months of abdominal pain. A CT scan showed a large mass in the head of the pancreas engulfing the superior mesentery artery and vein, along with a large mass in the left adrenal gland. An EUS-FNA was performed on the pancreatic mass with a 22-gauge needle, yielding an adequate sample. Papanicolaou stain, Diff-Quik, and cell block showed loosely cohesive clustered tumor cells and singly dispersed pleomorphic naked tumor nuclei with anisonucleosis and cytoplasmic vacuolization. Tumor cells stained positive for synaptophysin, chromogranin A, and CD56 and negative for CK AE1/3 and CK AE1/3-CAM5.2 cytokeratin cocktail. Because of cytokeratin negativity, diffusely positive neuroendocrine markers, and the presence of an adrenal mass, a metastatic malignant pheochromocytoma was suspected. Additional testing showed elevations in plasma metanephrines and normetanephrines, urine metanephrine-to-creatinine and normetanephrine-to-creatinine ratios, and serum chromogranin A. An iodine123-metaiodobenzylguanidine (MIBG) scan was obtained, which showed significantly increased MIBG uptake in the left adrenal lesion. A diagnosis of metastatic malignant pheochromocytoma was made. Surgical oncology was consulted, who recommended against resection of the adrenal mass in favor of outpatient management. Metastatic pheochromocytomas to the pancreas are rare tumors that may yield diagnostic material by EUS-FNA with a 22-gauge needle.