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SUMMER RESEARCH

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Composition and lysis of retrieved embolic material retrieved from patients experiencing acute ischemic stroke secondary to large vessel occlusion

Acute ischemic stroke (AIS) is a significant public health issue with a myriad of etiologies. First-line recanalization of occluded arteries often relies on intravenous thrombolysis with recombinant tissue plasminogen activator (r-tPA), but both r-tPA eligibility criteria and reperfusion rates are often limited. Trans-arterial mechanical thrombectomy is a surgical procedure designed to restore blood flow in stroke patients with large vessel occlusion (LVO) and has an extended eligibility window relative to r-tPA. However, approximately 20% of occlusions are not successfully opened and half of patients with a good angiographic outcome experience a poor clinical outcome. While it is known that fibrin, chromatin from neutrophil extracellular traps (NETs), and platelet linkages via Von Willebrand Factor (VWF) are important structural components of AIS emboli, a better understanding of AIS clot composition and pathology is essential to developing more effective therapeutic interventions. As RBC-rich clots more often appear with a hyperdense middle cerebral artery sign (HMCAS) than fibrin-rich clots, in this study we will stratify retrieved emboli on the basis of HMCAS at intake and

subsequently compare their composition, structure, and ease of lysis. In order to compare composition and structure between clots with and without HMCAS, we first will use histological and immunohistochemical stains to calculate the abundance of fibrin, platelets, RBCs, VWF, and citrullinated DNA (NETs) in sections of retrieved emboli, as well as evaluate their organization and distribution on cross sections. We will subsequently use mass spectrometry to compare the largely understudied proteomic fingerprints of retrieved clots with and without HMCAS. Finally, we will conduct *in vitro* assays to evaluate lysis of retrieved clots in solutions containing combinations of the current standard-of-care, r-tPA, (b) DNase I to cleave NETs, and (c) the endogenous enzyme ADAMTS13 to cleave VWF. Over 30 samples have been gathered and are currently being stored at -80°C. While data collection for staining and *in vitro* lysis is ongoing, an initial trial for mass clot spectrometry has demonstrated that over a thousand distinct protein signatures may be reliably identified. While data collection is ongoing, we hope for our proposed research to help connect the biochemistry of clot composition with the practical considerations of stroke intervention, and inform the standard of care in the treatment and management of AIS.

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Testing a Volume Sweep Imaging (VSI) Ultrasound Protocol for Breast Imaging for Diagnostic Breast Imaging of Palpable Masses

Background- Billions of people in the developing world lack access to high-quality, management changing and life-saving diagnostic imaging causing undue morbidity and mortality. Ultrasound is safe, low-cost and a high-quality imaging modality that is capable of closing this divide. However, the lack of trained sonographers is the main limitation faced by many developing countries as training is costly and may take years. Volume sweep imaging (VSI) may be used to circumvent the lack of trained sonographers. VSI employs imaging sweeps to cover the target region or organ using only external body landmarks. Most importantly, VSI requires no knowledge of internal anatomy and may be performed by an ultrasound naïve, non-medical lay-person after hours to days of training.

Objective- To test the efficacy of a VSI protocol for palpable breast pathology that can be performed by novices with minimal training. Pathology included benign and malignant palpable findings.

Methods- The study population was drawn from patients undergoing ultrasound and/or biopsy for a palpable breast finding at University of Rochester Medical Center. Following enrollment, subjects in each group were scanned by a study member using the VSI breast protocol. Blinded readers then reviewed these images and offered diagnoses. Subsequently, these interpretations were compared to standard of care (SOC) ultrasound previously obtained.

Results- While data collection and analysis are still ongoing, of the 128 scans performed thus far, 120 (93.75%) masses visualized on SOC ultrasound were visualized with the VSI protocol. Additionally, of 30 masses thus far analyzed, 29 (96.67%) were independently given the same BI-RADS score using VSI vs SOC ultrasound. Additionally, clinicians scoring those 30 masses reported being "confident" in their findings 90% of the time and "intermediately confident" 10% of the time. Therefore, the initial data is promising and shows that the VSI protocol is capable of detecting and grading breast masses with an efficacy similar to that of the SOC ultrasound.

Conclusions- Based on the initial analyses, detection and classification of breast pathologies using the VSI protocol appears to have a similar sensitivity and specificity to ultrasonography performed by a trained sonographer.

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A Retrospective Review of Pancreatic Cystic Lesions

Advancements in cross-sectional imaging, especially with respect to CT and MRI technology, has led to an increased detection of pancreatic cysts. According to recent reports, roughly 2.2% of abdominal CT examinations and 19.6% of MRI examinations find evidence of pancreatic cysts.[1] A large proportion of these cysts are incidentally detected.[2]

While several options for cyst management have been established, radiologists are often unable to characterize the specific type of pancreatic cyst at the time of detection.[1] In particular, mucin-producing pancreatic cysts have been reported to have an increased risk of developing into pancreatic adenocarcinoma.[3] As pancreatic ductal adenocarcinoma has an extremely low 5-year survival rate, patient and physician concerns about potential cyst malignancy are justified. However, the prevalence of malignant transformation of pancreatic cysts to mucin-producing pancreatic adenocarcinomas is rare.[2] Despite the rarity of this transformation, the increased detection of these pancreatic cysts has resulted in increased imaging, with the development of stringent imaging and clinical surveillance protocols. This aggressive follow up has increased resource utilization, increased healthcare costs, and increased patient anxiety without definite evidence of improved survival.[4]

This retrospective review evaluated pancreatic cyst imaging studies (MRI & CT) and medical records for patients who underwent imaging surveillance for pancreatic cysts between January 1,

2010 and January 1, 2020 within the University of Rochester Medical Center System. Data collection and analysis included the patient demography, history of pancreatic cancer, total number of pancreatic cysts, size and location of the three largest pancreatic cysts.

Our preliminary results gathered over 2,291 MR scans from roughly 800 different patients. Overall, we observed 197 cysts in the uncinate (8.6%), 653 cysts in the head (28.5%), 93 cysts in the neck (4.1%), 751 cysts in the body (32.8%), and 597 cysts in the tail (26.1%) of the pancreas. From the 800 patients with evidence of at least one pancreatic cyst, only 14 (1.75%) had a history of or developed pancreatic cancer confirmed by FNA. The American Cancer Society estimates the average lifetime risk of pancreatic cancer to be 1 in 64 (1.56%).^[5] While this research project is still ongoing, our preliminary results show that evidence of at least one cyst is only associated with a small fraction of a percent increase in lifetime risk of developing pancreatic cancer in comparison to the whole population.

References

1. Megibow AJ, Baker ME, Morgan DE, et al. Management of Incidental Pancreatic Cysts: A White Paper of the ACR Incidental Findings Committee. *Journal of the American College of Radiology*. 2017;14(7):911-923. doi:10.1016/j.jacr.2017.03.010
2. Gardner TB, Glass LM, Gordon SR. Pancreatic Cyst Prevalence and the Risk of Mucin-Producing Adenocarcinoma in United States Adults. *Gastroenterology*. 2013;144(5):S-797-S-798. doi:10.1016/S0016-5085(13)62945-5
3. Pandey P, Pandey A, Luo Y, et al. Follow-up of Incidentally Detected Pancreatic Cystic Neoplasms: Do Baseline MRI and CT Features Predict Cyst Growth? *Radiology*. 2019;292(3):647-654. doi:10.1148/radiol.2019181686
4. Scheiman JM, Hwang JH, Moayyedi P. American Gastroenterological Association Technical Review on the Diagnosis and Management of Asymptomatic Neoplastic Pancreatic Cysts. *Gastroenterology*. 2015;148(4):824-848.e22. doi:10.1053/j.gastro.2015.01.01
5. American Cancer Society. *Facts & Figures 2021*. American Cancer Society. Atlanta, Ga. 2021.

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Use of the Volume Annotation and Segment Tool (VAST) for Analysis of Axon Myelination

The ratio of internal axon diameter and external myelin diameter, or G-Ratio, has been used as an index of optimal, cross-sectional neuron myelination. A problem arises with this method because axons are non-circular in vivo, and may also be further distorted by injury. Diameter is therefore an inconsistent and unrepresentative measurement for oblong or other irregularly shaped neurons. Recognizing this limitation, current softwares that calculate G-ratio first transform cross-sectional areas into theoretical circles, then calculate the diameter from these. We propose that directly comparing cross-sectional areas of axon and myelin will more accurately reflect the myelination of an axon than a traditional diametric G-ratio. Sciatic nerves from C57BL6 mice and MRL mice 3, 6, 9, 12, or 24 weeks after a direct nerve repair or nerve graft procedure were imaged with transmission electron microscopy. Image segmentation was done with the Volume Annotation and Segment Tool (VAST) lite for comparison of axons and corresponding myelin. For comparison to G-ratios derived from untransformed diametric measurements, the ImageJ measure tool was used to measure long-axis lengths of the axons for calculation of a G-ratio. The G-Ratio for ImageJ plugin has been used extensively in the literature, and it was used for comparison of our method to an extant tool. While both the VAST lite segmentation tool and the G-ratio for ImageJ plugin are both semi-automatic and freely available, the VAST lite comparison of axon and myelin performs fewer data transformations than its counterpart. These findings will also be used to correlate sensory and motor findings in a murine model of sciatic nerve injury repair.

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Thyroid Eye Disease: Understanding TSHR-mediated pathways underlying disease

Thyroid eye disease (TED) is a disfiguring and sight-threatening autoimmune disease that involves inflammation and remodeling of the orbit. TED manifests itself in up to 50% of patients with Graves' disease, an autoimmune condition that causes hyperthyroidism due to activating thyroid stimulatory hormone receptor (TSHR) autoantibodies. Despite being the most common orbital pathology worldwide, researchers and clinicians alike have been challenged by detection and treatment of TED. Patients experience a number of debilitating ocular symptoms. Among the most severe symptoms include vision loss, double vision, pain (that worsens with eye movement), and even blindness if left untreated. There is presently no cure for TED. However, the current first-line therapy for TED is teprotumumab, an insulin-like growth factor 1 receptor (IGF1R) blocking antibody. Orbital fibroblasts express high levels of IGF1R and are likely a major target of teprotumumab. IGF1R can stimulate proliferation, promote cell survival, and increase myofibroblast formation. However, the downstream pathways that control IGF1R signaling in TED are not clear. Based on the incidence of TED among Graves' disease patients, researchers suspect that TSHR plays a key intermediary role in the pathogenesis of disease. As such, our work this summer focused on comparing activation of TSHR vs. non-TSHR-expressing immortalized human fibroblasts in the presence of TED patient serum (which contains TED autoantibodies), IGF1, and a monoclonal anti-TSHR antibody, M22. Using western blotting, we found that TSHR-containing cells showed a greater response to M22, as well as TED patient serum. This data suggests that fibroblast expression of TSHR is key to the complex signaling pathways of TED. TSHR-expressing cells also produced more cyclooxygenase-2 (COX-2) when treated with patient plasma or M22. COX-2 is a key enzyme that produces the pro-pain prostaglandin, PGE2. This novel result highlights a molecular link for the development of pain symptoms in TED patients. Currently, we have progressed to studying the orbital fibroblasts of patients with TED from the Flaum Eye Institute. Specifically, we are analyzing the activation of these fibroblasts in the presence of various

cytokines such as IL-17, TNF α and IL-1 β . Through these studies, we hope to better characterize the inflammatory pathways underlying thyroid eye disease, with the ultimate goal of providing more effective treatments (and prevention) for this condition.

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Quantifying Exercise and Rehabilitation of Stroke Patients using Dynamic Time Warping

Prior studies suggest that proper exercise and rehabilitation are critical for motor function recovery after a stroke. However, the optimal timing and “dose” of rehabilitation exercise remains unknown. Current methods of monitoring patient exercise quantity and quality are laborious and can be highly subjective. New technologies, such as wearable sensors that can measure accelerometry and gyroscopy, may provide a novel method for objectively measuring exercise dose.

We hypothesize that by recording accelerometry and gyroscopy data of subjects performing rehab exercises, we could use dynamic time warping to generate an idealized "template" of the exercise. Using this template, a patient's motions could be compared to determine whether or not they had performed the exercise. We attached sensors to several healthy controls and stroke patients and recorded video of them as they performed activities such as: cup stacking, rolling a pin, pouring water, wiping a table, and picking up pills. Human labelers recorded the times in the video when the exercises were performed.

We developed a program to extract the sensor data and segment it based on the times the exercises were performed. Our program then used a modified version of dynamic time warping, Softdtw, to transform the sensor data into templates. We constructed individualized templates with only one subject's movements, as well as templates constructed from the movements of a set of patients. We checked the templates against the subjects who generated them, as well as on subjects whose data was not used to train the templates. The program was designed to find the best alignments between the test subject's motion data and the template. Once it found the best alignments, it extracted relevant video and audio segments of the test patient's exercise recording.

Early results indicate that a patient's own template can predict their own motions. A patient's template can accurately label motions that it was trained on. However, there are still significant challenges creating generalized templates that can accurately label other subject's motions. Future work will include validating the concept of "individualized templates" and showing they can accurately label not only data they are trained on, but exercises a patient performs in the future. In addition, we will also try to improve the generalizability of our templates going forward. If successful, this strategy will automatically quantify a stroke patient's exercise and rehab dose.

Such a system will be a valuable tool in future clinical trials studying the effect of rehabilitation dose on motor recovery post-stroke.

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Leveraging caspase-9 apoptosis inducing gene to understand role of liver non-parenchymal cells (specifically myofibroblasts)

A pertinent challenge in the field of hepatology research is the survival of hepatocytes in culture; current biologically engineered culturing systems recapitulate the liver's physiological environment in-vitro through various techniques to tackle this challenge. One key technique is co-culturing hepatocytes with cell types such as non-parenchymal cells (NPCs; thought to be liver myofibroblasts) that are isolated via liver enzymatic perfusion. While co-culturing has shown increased hepatocyte functioning and viability, the exact mechanisms behind this are unclear. It is understood that the NPC fraction contain multiple cell types including Kupffer cells, liver endothelial cells, and hepatic stellate cells. However, it is unclear whether NPCs improve hepatocyte function over time by depositing a stabilizing insoluble extra cellular matrix (ECM) initially upon co-culturing or by secreting necessary soluble factors continuously throughout co-culturing. Elucidating this mechanism is key, as it could change how one may design a co-culturing protocol. Caspase-9 induced apoptosis has been used in the field previously to elucidate the role of human umbilical vein endothelial cell fibroblasts in co-culture, so my experiment was designed closely following these established protocols. Here, we attempted to specifically test the role of NPCs by transducing a lentiviral plasmid vector containing the kill-switch gene caspase-9 and triggering apoptosis in the NPC cell fraction in order to observe the impact on co-cultured hepatocytes. Key steps of this experiment included creating a stock of the lentiviral plasmid vector construct using pre-existing constructs and transfecting HEK293T cells to produce a lentivirus

containing the caspase-9 gene. The methods used to prepare the lentiviral construct (pCCL.PGK.DmrB.Casp9.IRES.Neo) included bacterial inoculation, DNA Miniprep, restrictive enzyme digestion, agarose gel electrophoresis, DNA isolation from agarose, bacterial transformation, colony PCR screening, and PCR amplification. Once the construct was prepared and the plasmid sequence was confirmed via Sanger sequencing, cell culture techniques were to produce and test the lentiviral plasmid vector. The results of the experiment showed successful preparation of the plasmid construct containing caspase-9, as confirmed by Sanger sequencing, but there was unsuccessful production of lentivirus containing the plasmid. The transduced lentivirus cells did not have antibiotic resistance to various dosages of G418 over a period of one week and had no response to the caspase-9 dimerizing agent, which indicated absence of the designed plasmid. While the correct dosages of G418 for HEK293T cell death were not known at the time, experimental trials suggested 10mg/mL concentrations to be most promising indicators of antibiotic resistance in this cell line. It was understood there was likely an error in the lentiviral production step, during which the pCCL.PGK.DmrB.Casp9.IRES.Neo plasmid did not efficiently insert into the lentiviral backbone. Knowing that the sequence of the plasmid was correct, the next steps in this experiment are to carry out another trial of lentiviral production and use the dosage data from this trial to continue testing the integrity of the lentiviral plasmid vector.

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Retrospective Analysis of the Outcomes of Genetic Testing in Patients Suspected to Have Hereditary Hearing Loss and Deafness

There are over 400 genetic syndromes that include hearing loss. Hereditary hearing loss and deafness can be classified as either syndromic or non-syndromic (Toriello *et al.* 2004). Syndromic hearing impairment can sometimes be diagnosed by its identifiable phenotypic characteristics but often needs to be confirmed by molecular genetic testing. Conversely, non-syndromic hearing impairment is not associated with anomalies beyond the internal auditory tract (Shearer *et al.* 1999).

Of the genetic causes of pre-lingual hearing loss, approximately 30% is syndromic while the remaining 70% is non-syndromic. There are over 70 genes involved with non-syndromic autosomal recessive hearing loss with varying clinical manifestations. Homozygous mutations in *GJB2* is the most common cause of severe to profound autosomal recessive non-syndromic hearing loss while the mutation of *STRC* is the most common cause of mild to moderate autosomal recessive hearing loss (Sloan-Heggen *et al.* 2016). For the genes known to cause hereditary hearing loss and deafness, a diagnosis can often be confirmed through molecular genetic testing. Multi-gene panels have recently replaced stepwise single-gene testing and have greatly improved the diagnostic rate regardless of presumed inheritance or race (Shearer & Smith 2015).

Uncorrected hearing loss can result in consistent and detrimental sequelae (Shearer *et al.* 1999). If children experience auditory deprivation during their first two years of life, they often have poor reading performance, poor communication skills and poor speech production that cannot be sufficiently remediated by educational intervention. However, if corrected early on by amplification, otological surgery or cochlear implants such deficiencies are not observed (Smith *et al.* 2005). Whether a family elects to have cochlear implant or not, genetic testing helps to identify possible co-morbidities that may have significant medical implications.

The purpose of this study is to analyze the outcomes of molecular genetic testing in patients suspected of having hereditary hearing loss and deafness to identify how genetic testing can be used in the most efficient and effective way possible to identify genetic type hearing loss in children.

Data collection and analysis is still ongoing but an EMR query for pediatric and adult patients suspected of having hereditary hearing loss or deafness in the last ten years from 1/1/2016 to 1/1/2021 will be conducted alongside the creation of a data base that classifies the outcomes of genetic testing among the different patients based on their respective group. These groups will include but is not limited to congenital vs non-congenital hearing loss, prelingual vs postlingual, progressive vs not progressive hearing loss, bilateral vs unilateral hearing loss, and syndromic or non-syndromic hearing loss. The diagnostic yield of genetic testing in each of these subgroups will be analyzed and significance of differences in diagnostic yield in each group will be done by the Chi square method. Potentially eligible subjects will be identified via an EMR query of all genetics visits in Pediatrics and Medicine with any of the providers listed below who had "hearing loss" and/or "hearing impairment" listed as a visit diagnosis and/or on their EMR diagnosis list.

Literature Cited

- Shearer A. E., M. S. Hildebrand, R. J. H. Smith, 1999 Feb 14 [Updated 2017 Jul 27], Hereditary hearing loss and deafness overview. In: Adam M. P., H. H., Ardinger, R. A., Pagon, *et al.*, editors. GeneReviews [Internet]: 1993-2021.
- Shearer A.E., R. J. H. Smith. Massively parallel sequencing for genetic diagnosis of hearing loss: the new standard of care. *Otolaryngol Head Neck Surg.* 2015; 153:175–82. PubMed PMID: 26084827.
- Sloan-Heggen C. M., A. O. Bierer, A. E. Shearer, D. L. Kolbe, C. J. Nishimura, K. L. Frees, S. S. Ephraim, S. B. Shibata, K. T. Booth, C. A. Campbell, P. T. Ranum, A. E. Weaver, E. A. Black-Ziegelbein, D. Wang, H. Azaiez, R. J. Smith. Comprehensive genetic testing in the clinical evaluation of 1119 patients with hearing loss. *Hum Genet.* 2016; 135:441–50. PubMed PMID: 26969326.
- Toriello H. V. , W. Reardon, R. J. Gorlin, eds. *Hereditary Hearing Loss and Its Syndromes.* New York: Oxford University Press: 2004.

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ZnT1 as a Potential Regulator of p53

Rationale and Background: p53's role as a suppressor of tumorigenesis is dependent on the conformation of its DNA-binding domain, which requires the binding of a zinc atom; many p53 mutations in tumors cause dysfunction by decreasing p53's affinity for zinc (3). Studies have shown that increasing intracellular zinc reactivates and restores function to zinc-free p53 mutants, and conversely, eliminating zinc causes a conformational change that impairs p53's DNA-binding ability

(4, 2). Previous work of the Carpizo lab has shown that ZMC1, a zinc metallochaperone, reactivates a zinc-binding p53 mutant by raising intracellular zinc concentrations (5). Further, ZnT1 is a zinc exporter whose gene expression increases in the presence of activated p53 (1). This suggests that p53 autorepresses its activity by inducing ZnT1 expression. Autorepression is a key to p53 biology; p53 also induces expression of MDM2, which catalyzes p53 proteolysis (1, 5).

Hypothesis: ZnT1 functions as a negative regulator of p53 through its effect on intracellular zinc levels.

Methods: To explore the relationship between ZnT1 and p53, we studied several cancer cell lines under various conditions, including ZnT1 overexpression, ZnT1 silencing, and p53 activation. We also created a stable cell line that over-expresses ZnT1 under tet-control (tetracycline-inducible

gene expression system). For silencing gene expression, we used CRISPR-Cas9 with a lentiviral vector to knock out ZnT1 and employed p53 shRNA to knockdown the gene expression of p53. An enzyme linked immunosorbent assay (ELISA) was used to quantify p53 folding in different conditions. To analyze the relationship between p53 and ZnT1 genes in clinical samples, data from cBioPortal were examined. There are ongoing immunoblotting experiments to look at protein expression of ZnT1 in different treatment conditions. Planned experiments include quantifying p53 folding using conformation-specific antibodies and investigating whether ZnT1 can act as an oncogene by testing whether ZnT1-overexpressing 3t3 cells are more tumorigenic than 3t3 cells that do not overexpress ZnT1.

Results: p53 can be activated with treatment of Nutlin or, in the case of cells with a temperature dependent p53 mutation, a temperature shift. Quantitative RT-PCR shows ZnT1 transcription increases with p53 activation in several cell lines. The effect of Nutlin on ZnT1 expression is not seen in p53-null cell lines which suggests ZnT1 transcription is dependent on p53. p53 activation with Nutlin is known to increase p21 expression, an indicator of active p53 function, and our analysis shows that this effect is reduced in cell lines containing a ZnT1 over-expressor. ELISA results confirm that a temperature shift in cells containing a temperature-dependent p53 mutation results in an increase of Wild-Type p53 conformation. cBioPortal analysis shows that the ZnT1 gene amplifications are mutually exclusive with p53 gene mutations and potentially with MDM2 amplifications as well. Experiments are still ongoing with samples containing ZnT1 over- and under-expressors.

Conclusion: Our results suggest that there is a strong interaction between ZnT1 function and p53 activity that is potentially regulated via ZnT1's role in affecting intracellular zinc levels and thus influencing p53's dependence on zinc for proper folding and function.

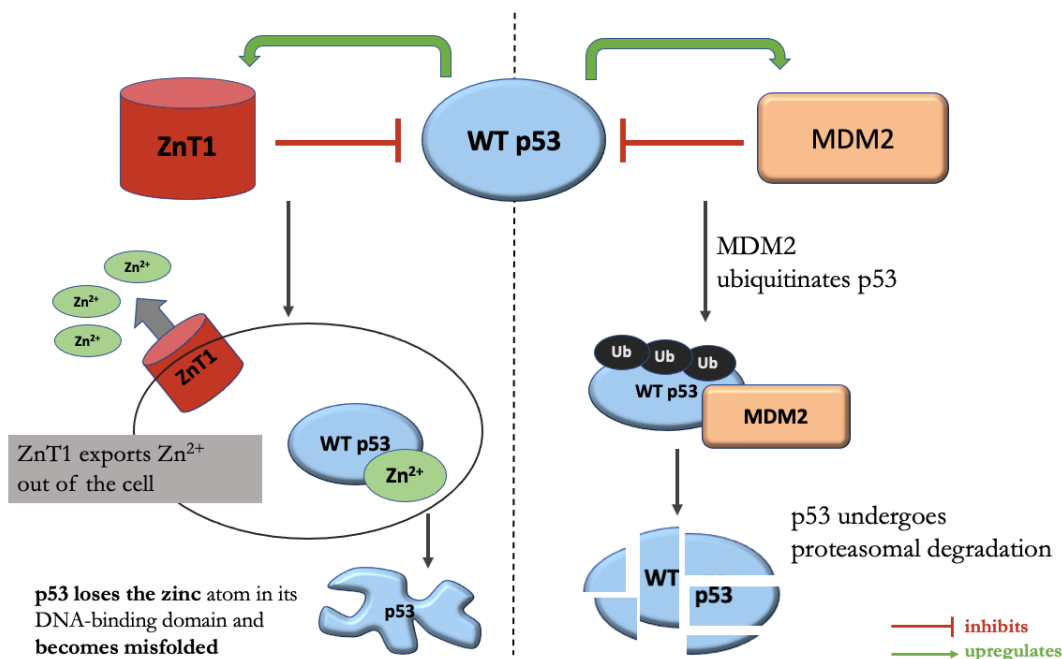


Figure 1: A potential mechanism of ZnT1 as a negative regulator of p53 using MDM2 as a comparison, a known negative regulator of p53. p53 increases the expression of MDM2, an inhibitor of p53 activity, and thus autorepresses itself by inducing MDM2 expression. The potential mechanism in which ZnT1 regulates p53 might work in a similar way: p53 autorepresses itself by upregulating the expression of ZnT1, whose increased activity leads to misfolded p53.

References:

1. Brik, B. (2019). *A novel function of p53: Regulation of zinc homeostasis* [Unpublished Bachelor of Arts in Genetics thesis]. Rutgers The State University of New Jersey
2. Butler, J. S., & Loh, S. N. (2003). Structure, function, and aggregation of the zinc-free form of the p53 DNA binding domain. *Biochemistry*, 42(8), 2396–2403. <https://doi-org.ezpmminer.urmc.rochester.edu/10.1021/bi026635n>
3. Cho, Y., Gorina, S., Jeffrey, P. D., & Pavletich, N. P. (1994). Crystal structure of a p53 tumor suppressor-DNA complex: understanding tumorigenic mutations. *Science (New York, N.Y.)*, 265(5170), 346–355. <https://doiorg.ezpmminer.urmc.rochester.edu/10.1126/science.8023157>
4. Méplan, C., Richard, M. J., & Hainaut, P. (2000). Metalloregulation of the tumor suppressor protein p53: zinc mediates the renaturation of p53 after exposure to metal chelators in vitro and in intact cells. *Oncogene*, 19(46), 5227–5236. <https://doiorg.ezpmminer.urmc.rochester.edu/10.1038/sj.onc.1203907>
5. Yu, X., Blanden, A. R., Narayanan, S., Jayakumar, L., Lubin, D., Augeri, D., Kimball, S. D., Loh, S.N., & Carpizo, D. R. (2014). Small molecule restoration of wildtype structure and function of mutant p53 using a novel zinc-metallochaperone based mechanism. *Oncotarget*, 5(19), 8879–8892. <https://doi-org.ezpmminer.urmc.rochester.edu/10.18632/oncotarget.2432>

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Biochemical Isolation and Antimicrobial Activity of a Novel *Streptomyces radiopugnans*-Derived Lasso Peptide

In recent decades, the emerging problem of antibiotic resistance has made the need for novel antimicrobials highly evident. While antibiotic resistance amongst pathogens continues to climb precipitously, the rate of antibiotic discovery has failed to compensate. Of particular concern are the ESKAPE pathogens: *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* spp., a group of highly virulent and multidrug-resistant pathogens responsible for the majority of nosocomial infections. As such, the discovery of lasso peptides—a novel class of post-translationally modified peptides with the appearance of a slipknot—has been of great interest, especially since certain lasso peptides appear to have antimicrobial activity against ESKAPE pathogens. However, very few of these antimicrobial lasso peptides have been fully isolated and characterized.

In this project, a novel lasso peptide isolated from a strain of *Streptomyces radiopugnans* (PAIL27) with activity against *Vibrio cholerae* was cloned into an inducible plasmid construct in *E. coli*, for the purposes of eventual characterization for activity against the ESKAPE pathogens. The lasso peptide biosynthetic genes under the same promoter as the lasso peptide were cloned in as well; of particular note was a set of pump genes which were hypothesized to be important for efflux of the lasso peptide out of the host cell. The lasso peptide was successfully expressed only in cells with the pump genes, but appeared to be so toxic to *E. coli* even prior to induction of expression that cell-free methods for expression and isolation of the lasso peptide were deemed necessary. Due to the difficulties in producing and isolating a sufficient amount of the lasso peptide for characterization, the suitability of the PAIL27 lasso peptide for subsequent antimicrobial development has yet to be evaluated. Future work will involve optimizing the cell-free protocol for expression of the lasso peptide, and characterizing the role of the pump genes in the antimicrobial activity of the peptide.

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Non-invasive Assessment of the Ulnar Nerve Around the Elbow and Diagnosis of Cubital Tunnel Syndrome using Ultrasound

Objective:

Assess the feasibility of ultrasound as an alternative to NCS/EMG for the diagnosis of cubital tunnel syndrome.

Background:

Cubital tunnel syndrome is characterized by compression of the ulnar nerve at the elbow. It is the second most common peripheral entrapment neuropathy behind carpal tunnel syndrome, with an estimated 72,000 cases per year in the United States [1]. Currently, the gold standard for diagnosis of cubital tunnel syndrome is electrodiagnostic studies, comprised of nerve conduction study (NCS) and electromyography (EMG). The sensitivity of NCS/EMG however, can range from 37-86% [2], and therefore recently, ultrasound (US) emerged as a promising non-invasive modality for cubital tunnel diagnosis. Using US, the ulnar nerve can be visualized and its cross-sectional area (CSA) can be quantified. CSAs that exceed 10 mm² indicate swelling within the nerve which suggests downstream nerve compression consistent with cubital tunnel syndrome.

Methods:

Fifty-one patients who presented to Clinton Crossings clinic (Rochester, NY) with symptoms consistent with cubital tunnel syndrome were enrolled in this prospective study after providing informed consent. The following data were collected: EMG/NCS, maximum CSA, grip strength, key pinch, and two-point discrimination in the ulnar distribution. Patients were also administered the following symptom-based questionnaires: PRUNE, PROMIS, and DASH. To assess classification differences between NCS/EMG and US, a McNemar's test was used to quantify agreement. PRUNE scores were compared between patients classified as abnormal and normal on both NCS/EMG and US using an independent samples t-test. Pearson's correlation coefficients were used to

assess the associations of NCS/EMG and maximum CSA with various symptom measures. A p-value of <0.05 was considered statistically significant for all analyses.

Results:

Fifteen patients were classified as abnormal both by NCS/EMG and US, 14 were classified abnormal by US only, 2 were classified abnormal by NCS/EMG only, and 8 were classified normal by both NCS/EMG and US ($p=0.003$, $K = 0.23$). Mean PRUNE scores among those with abnormal and normal NCS/EMG were 49.00 ± 18.13 and 40.23 ± 20.30 , respectively ($p=0.17$). Mean PRUNE scores among those with abnormal and normal US were 45.22 ± 19.19 and 40.65 ± 21.58 , respectively ($p=0.53$). Of those with PRUNE scores above the 10th percentile, EMG/NCS classified 17 patients as abnormal and 18 as normal. However, US classified 27 patients as abnormal and 8 as normal. Sensory amplitude correlated weakly with PRUNE ($r=-0.27$, $p=0.11$), PROMIS-Physical Function ($r=0.36$, $p=0.03$), and DASH ($r=-0.37$, $p=0.03$). Motor conduction velocity across the elbow weakly correlated with PROMIS-Physical Function ($r=0.30$, $p=0.08$), PROMIS-Pain Interference ($r=-0.27$, $p=0.11$), and DASH ($r=-0.23$, $p=0.17$). Maximum CSA only correlated with PROMIS-Depression ($r=0.34$, $p=0.04$).

Conclusion(s):

US may be a more sensitive tool than EMG/NCS for cubital tunnel syndrome diagnosis, while EMG/NCS may be a stronger predictor of symptom severity. Future studies will investigate the prognostic value of US following cubital tunnel release surgery.

References:

1. Staples, J.R. and R. Calfee, *Cubital Tunnel Syndrome: Current Concepts*. J Am Acad Orthop Surg, 2017. 25(10): p. e215-e224.
2. Terlemez, R., et al., *Comparison of Ultrasonography and Short-Segment Nerve Conduction Study in Ulnar Neuropathy at the Elbow*. Arch Phys Med Rehabil, 2018. 99(1): p. 116-120.

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Research location: remote

Title: Evaluation of CT-guided Pudendal Nerve Block for Pudendal Neuralgia

Purpose: This study aimed to evaluate the benefit of the current treatment protocol of multiple regularly spaced computed tomography (CT) guided nerve blocks (>3) with a combination of anesthetics and steroids. A thorough assessment of the factors increasing likelihood of better therapeutic outcomes is needed. The influence of the accuracy of localization of the pudendal nerve during blockade, demographics, and social factors were analyzed to determine the influence on the benefit of CT-guided pudendal nerve blocks.

Materials and Methods: 217 patients diagnosed with pudendal neuralgia per the NANTES criteria underwent CT-guided pudendal nerve block and were assessed for therapeutic benefit. The patients' demographics, inciting events, initial pain criteria, treatment data, and follow-up data were collected. Those who did not respond to treatment were compared to responders using Fisher's exact test for binary variables and chi squared test for categorical variables. Univariate logistic regression was used to examine prediction of response to the nerve block. A p value <0.05 was indicative of a significant difference.

Results:

The most common chief complaint was pain during sitting or squatting and most common areas of pain involved the vulva, labia, perineum, and vagina (44.2%). Treatment response rates increased with the number of blocks with a maximum response rate of 92.2% after the 4th dose. Responders underwent more nerve blocks in the first year when compared to treatment non-responders (3.1 ± 1.5 vs. 2.6 ± 1.6 , $p=0.026$). 29.4% of treatment non-responders were on disability compared to 9.7% of responders ($p=0.043$). History of preadolescent sexual abuse was present in 41.7% of non-responders versus 15.7% in responders ($p=0.046$) and was a significant predictor of response to treatment (odds ratio = 0.27, $p=0.04$).

Conclusion:

CT guided pudendal nerve block improves pain in patients meeting NANTES criteria. Significant predictors of response include history of preadolescent sexual abuse, being on disability at the time of treatment, and total number of blocks in the first year.

Clinical Relevance: Approaches to managing pudendal neuralgia are varied with mixed outcomes. Improving and standardizing treatment necessitates further investigation of current practices.

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Adapting Cognitive Behavioral Therapy for Treatment Seeking for Deaf Individuals with Alcohol Use Disorder

Alcohol Use Disorder (AUD) is a serious condition affecting more than 14 million adults in the United States as of 2019¹. Heavy alcohol use has been identified as a risk factor for AUD² and it is known that Deaf individuals are more likely to engage in heavy alcohol use than their hearing counterparts.³ Despite this disparity, members of the Deaf community are less likely to seek treatment for substance use and mental health disorders.⁴ Stecker et al. (2012) created a Cognitive Behavioral Therapy intervention (CBT-TS) that has been shown to successfully improve treatment-seeking for members of the hearing community suffering from AUD.⁵ To date, no intervention has been created to encourage members of the Deaf community to engage in treatment for AUD. This study assesses the unique cultural thoughts, beliefs, and attitudes of the Deaf community surrounding treatment for AUD and mental health in order to adapt the current CBT-TS intervention in a culturally-sensitive manner for use with the Deaf population. Semi-structured elicitation interviews were conducted with 16 members of the Deaf community from across the US via Zoom. Participants were interviewed in American Sign Language and asked questions about their Behavioral, Normative, and Control Beliefs according to the Theory of Planned Behavior outlined by Stecker et al. (2007). The interviews were then interpreted and transcribed into English before being analyzed and coded by two separate researchers. Coders used the Framework Method for qualitative data analysis⁷ to identify themes that arose in each interview related to the unique beliefs, attitudes, and barriers of the Deaf community regarding treatment seeking and organized them into the framework of TPB. Preliminary results from the first four interviews revealed a total of 52 themes that were broken down into the components represented in Table 1 below.

TPB Component	Number of themes
<i>Behavioral Beliefs</i>	
Advantages of treatment	6
Disadvantages of treatment	9
<i>Normative Beliefs</i>	
Community support for treatment	2
Community opposition to treatment	5
<i>Control Beliefs</i>	
Facilitators for treatment	8
Barriers to treatment	22

Table 1: Number of themes identified per component of the Theory of Planned behavior

The participants identified advantages of treatment including the fact that treatment would provide them with support and resources and that they could avoid negative consequences of their alcohol use. At the same time, the participants noted several disadvantages of treatment including potential negative effects (i.e., increased stress and vulnerability), the questionable benefits of treatment, the fear of life without alcohol, and the belief that treatment is a waste of resources (i.e., time and money). They acknowledged that today's society, including their family and friends, is more supportive of alcohol and mental health treatment. However, they also reported that there is still societal stigma surrounding treatment for alcohol, especially in marginalized communities, and that the dynamics of the Deaf community do not encourage treatment seeking. The participants believed several myths about treatment that created barriers for them accessing treatment, in addition to reporting that their general unfamiliarity in the treatment process made them less likely to engage in it. Additional barriers that they identified included anticipated problems with the treatment system (i.e., bias and mistrust), questionable competency of hearing providers in Deaf-related issues, confidentiality concerns due to the smallness of the Deaf community, and general lack of resources including: not enough culturally competent treatment options, communication barriers, and limited time and money necessary to access treatment. Participants did indicate, however, that they would be more likely to seek treatment if there were culturally-sensitive options available and if they could be assured of their privacy. These themes and those collected from further data analysis will be compiled and synthesized into the first draft of the adapted CBT-TS intervention, which will be done using the ADAPT-ITT model⁸. Finally, we will adjust this draft based on feedback from key stakeholders in the Deaf community and experts in the field of Deaf AUD treatment. The final adapted intervention will be essential for combating the disparity seen in the prevalence of AUD in the Deaf population.

References:

1. SAMHSA, Center for Behavioral Health Statistics and Quality. 2019 National Survey on Drug Use and Health. Table 5.4A – Alcohol Use Disorder in Past Year among Persons Aged 12 or Older, by Age Group and Demographic Characteristics: Numbers in Thousands, 2018 and 2019. <https://www.samhsa.gov/data/sites/default/files/reports/rpt29394/NSDUHD...> Accessed September 1, 2021.
2. Drinking levels defined. National Institute on Alcohol Abuse and Alcoholism. <https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/moderate-binge-drinking>. Accessed September 1, 2021.
3. Anderson ML, Chang BH, Kini N. Alcohol and drug use among deaf and hard-of-hearing individuals: A secondary analysis of NHANES 2013-2014. *Subst Abus.* 2018;39(3):390-397. doi:10.1080/08897077.2018.1442383
4. Fellingner J, Holzinger D, Pollard R. Mental health of deaf people. *Lancet.* 2012 Mar 17;379(9820):1037-44. doi: 10.1016/S0140-6736(11)61143-4. PMID: 22423884.
5. Stecker T, McGovern MP, Herr B. An intervention to increase alcohol treatment engagement: a pilot trial. *J Subst Abuse Treat.* 2012 Sep;43(2):161-7. doi: 10.1016/j.jsat.2011.10.028. Epub 2011 Dec 3. PMID: 22138200; PMCID: PMC3297732.
6. Stecker, T., Fortney, J. C., Hamilton, F., & Ajzen, I. (2007). An assessment of beliefs about mental health care among veterans who served in Iraq. *Psychiatric Services*, 58(10), 1358-1361. doi: <https://doi.org/10.1176/appi.ps.58.10.1358>
7. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol.* 2013 Sep 18;13:117. doi: 10.1186/1471-2288-13-117. PMID: 24047204; PMCID: PMC3848812.
8. Wingood, G. M., & DiClemente, R. J. (2008). The ADAPT-ITT model: a novel method of adapting evidence-based HIV Interventions. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 47, S40-S46. doi: 10.1097/QAI.0b013e3181605df1

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A murine model that mitigates the onset of chemotherapy induced neuropathy

Introduction: Chemotherapy induced peripheral neuropathy (CIPN) is an impactful clinical entity affecting 30-70% of patients that often determines the length and dosage of cancer treatment. While an effective treatment against cancer cells, it also has an affinity for peripheral nerve fibers leading to dysfunction or degeneration in 50-70% of patients acutely and 30% of patients chronically. The Murphy Roths Large (MRL/MpJ) strain of mice have demonstrated resistance to scar formation and superior wound healing, yet little is reported peripheral nerve regenerative outcomes. We have presented data to support the beneficial role that the MRL/MpJ strain has in improved peripheral nerve regeneration and is likely linked to the activation of M2 macrophages – this has the potential to diminish the impact of CIPN by encouraging mechanistic responses to prevent the degradation of myelin. The degradation of myelin is one of, if not the crucial factor in developing CIPN. The purpose of this study is to examine whether the same principles that apply to peripheral nerve regeneration can prevent the development CIPN and open the door to exploring a direct translatable mechanistic approach.

Methods: A validated model of CIPN was used to compare two strains of mice, MRL/MpJ (experimental) and C57/BL6 (control). Both strains received paclitaxel (PTX) at a total dose of 8mg/kg administered at 2mg/kg for four doses on alternate days. Functional outcomes were recorded at baseline and weekly thereafter. These included testing for allodynia, heat and cold sensitivity; and were recorded at baseline and weekly until the 4th week. Baseline electrophysiological analysis was compared to the 4-week study endpoint. Sciatic nerves were harvested as controls from 4 mice prior to administration of PTX. At the 4-week end point sciatic nerves were harvested from both groups for analysis.

Results: Both strains failed to demonstrate significant deterioration in clinical functional outcomes. However, statistically significant differences were seen with the MRL/MpJ strain demonstrating no change in peak amplitude, latency, or velocity over the experimental period.

However, the C57/BL6 strain demonstrated a significant increase in latency and a significant decrease in velocity, both directly implicate in CIPN. Furthermore, histologically MRL/MpJ mice demonstrated superior myelination at 4 weeks (g ratio) and significantly better circularity; both metrics of mitigation to CIPN.

Conclusion: This study presents an exciting pathway towards the poorly understood mechanism of CIPN, however this needs to be replicated at human equivalent dosing (35mg/kg). The results open an exciting avenue to pursue a mechanistic approach to improve patient tolerance, and therefore survival of cancer treatment. The study presents a clear approach to investigating a potential molecular pathway that may mitigate the development of CIPN.

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Trends in lumbar spine fusion in HIV positive patients

Introduction

As of June 2020, there were approximately 38 million people living with human immunodeficiency virus) HIV. Due to improvements in diagnostics and subsequently relevant access and adherence to HAART, people living with HIV are living long enough to develop comorbidities that are in line with HIV-negative populations in similar age groups such as degenerative spine disease. Our objective was to evaluate outcomes and complications associated with lumbar spine fusion in HIV positive patients.

Methods

The Statewide Planning and Research Cooperative System was used to identify patients who had undergone lumbar spine fusion surgery as well as a subset of those individuals who are HIV positive in New York State from 2017 to 2019. Bivariate and multivariate logistic regression analyses were performed to estimate outcomes.

Results:

39,242 patients undergoing lumbar spine fusion from 2017 to 2019 were identified, and 274 were positive for HIV. Within our HIV negative cohort, there was an equal distribution between male and female patients, and most patients were white with a median age of 59. Amongst our HIV positive cohort, the majority of patients were male with a median age of 56, with white patients being the majority and Black/African-American patients as the second highest. The majority of patients underwent elective surgery and discharged to home/self-care. The mean length of stay for our HIV negative cohort was 4 days and 6 days the HIV positive cohort. Multivariate regression analysis showed the odds of undergoing spine surgery was higher in Blacks and Native Hawaiian/Pacific Islander compared with other races (odds ratio [OR]: 2.4 and 3.3 respectively; 95% confidence interval [CI]: .33-17, .29-36; P=0.38, P=0.33). The odds of undergoing spine surgery were higher in males compared to females ([OR]: 2.64; 95% [CI] 2.03-3.45, P=0.000).

Analysis of hospital characteristics showed that the majority of patients with HIV underwent surgery in urban facilities located in the five boroughs of New York City or Long Island, with Black patients mostly undergoing surgery in facilities located in Bronx County, Erie County and Kings County. The HIV negative cohort was evenly distributed within New York State. The odds of undergoing surgery in a facility located in an urban location was 1.03 times higher for patients living with HIV (95% confidence interval [CI] = .72 - 1.49; P=0.848). Analysis of Elixhauser Comorbidities showed that the HIV positive cohort were 2.3 times more likely to have pulmonary circulatory disorders (95% confidence interval [CI] 1.04-5.34, P=1.04-5.34), 7.3 times more likely to have liver disease (95% confidence interval [CI] = 4.91-11.04, P=0.000), 2.6 times more likely to have peptic ulcer disease (95% CI = .64-10, P=0.18), 4.5 times more likely to have lymphoma (95% CI = 1.68-12.53, P=0.003), 6.8 times more likely to have a drug abuse diagnosis (95% CI = 4.3-8.8) and 3.07 times more likely to have a diagnosis of psychosis (95% CI = .97-9.7, P= 0.56).

Conclusions

Our findings suggest that while people living with HIV within New York State are presenting with well controlled HIV, they have higher rates of comorbidities.. Our HIV positive cohort have a longer length of stay in the hospital post-operatively as compared to Non-HIV patients. Authors: Bianca Audrey Duah, BA, Mina Botros MD, Caroline P. Thirukumaran MBBS, PhD, Addisu Mesfin MD Research conducted at University of Rochester School of Medicine and Dentistry

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Knowledge and Education of Patient Reported Outcome Measures Among Medical Students

Introduction: Patient reported outcomes (PROs) are measures of a patient's health that are directly provided by the patient. PROs are not modified or interpreted by clinicians or others, and therefore directly reflect the voice of the patient. PROs provide clinicians with efficient and relevant information regarding how the patient is feeling and functioning in the context of their health status. Currently, the utilization of PROs to improve patient care is a very active area of clinical care assessment, research, and has expanded into quality and payment models. Current evidence has demonstrated that routinely collected PROs improve patient-provider communication, symptom reporting and communication, increase patient satisfaction and engagement, and lead to changes in patient treatment, decision making and management.^{1,2} With these proven benefits of PRO collection and integration into care, sufficient training and education for both patients and clinicians is an important step linking clinician action and intended outcomes.^{3,4,5}

Despite their importance, PROs are not required in medical education curriculum. Therefore, medical graduates and residents could feel quite unprepared to use them when they start their residency or fellowship, and this gap can be a barrier to delivery high quality care. Therefore, the objective of this project was to examine the knowledge of PROs among medical students at the

University of Rochester School of Medicine & Dentistry. Secondly, we assessed if an educational PRO session improved medical student knowledge.

Methodology/Procedure: A 20 question IRB approved survey was developed using survey research methodology and began with an extensive literature review for patient reported outcomes. Key terms included patient reported outcome, patient-reported outcome measurement, information system, PROMIS, patient-reported, and self-reported. The survey was validated through expert review, cognitive interviews, and a pilot study.^{6,7,8,9} The survey was distributed via email to all medical students at the University of Rochester School of Medicine & Dentistry.

In order to help determine the effectiveness of formal education on PROs, an educational lecture on PROs was conducted to 4th year medical students by Judy Baumhauer, MD, MPH. The 4th year medical students were invited to share their familiarity with PROs prior to the lecture. After the educational session, they were again invited to participate in a post-educational survey inquiring about their knowledge of PROs.

Results:

Of 77 responding medical students at the University of Rochester School of Medicine & Dentistry, only 61% (47/77) reported knowing what a PRO is, however, only 51% (31/61) correctly identified the definition of a PRO. Additionally, only 12% (9/77) have ever received formal education (e.g., a lecture) on PROs, while 29% (22/77) and 13% (10/77) have utilized PROs themselves (i.e., as a student, employee, or researcher) or seen a provider use PROs, respectively. When asked to correctly identify a PRO in a case vignette, only 59% (36/61) of responding medical students did so correctly. In addition, 68% (40/59) correctly responded when asked about shared decision making when utilizing PROs. 23% (14/60) respondents demonstrated an understanding of the need to incorporate PROs in patient care as identified by the Centers for Medicare & Medicaid Services (CMS). Most respondents correctly answered questions about PRO reporting (72%, 42/58) and privacy (71%, 41/58).

Most respondents demonstrated positive attitudes towards PROs. Greater than 80% (47/58) of responding medical students agreed PROs are a key component in delivering high-quality patient care, >70% (41/58) agreed they would utilize PROs in their future practice, and 84% (49/58) were interested in learning more about PROs. Despite the positive perception of PROs among respondents, less than 20% of responding medical students felt prepared to utilize PROs in a patient care setting (11/58).

When 4th year medical students were asked the definition of a PRO both prior to and after an educational session, a large increase in correct responses was identified in the latter. Specifically, 67% (46/69) correctly answered prior to the lecture, compared to 93% (37/40) after the lecture. After receiving formal education on PROs, 88% (35/40) felt PROs are an important aspect of delivering high-quality care.

Conclusion:

The results of this survey provide important insight into current medical students' knowledge of PROs. The deficiencies in knowledge of PROs is further supported by the low (>20%) proportion of students who feel prepared to utilize PROs in a patient care setting. Additionally, >80% of medical students agreed they would like to receive education on PROs. The gaps in knowledge identified in this survey could be bridged with the implementation of formal education of PROs into the medical education curriculum.

References:

1. Chen J, Ou L, Hollis SJ. A systematic review of the impact of routine collection of patient reported outcome measures on patients, providers and health organisations in an oncologic setting. *BMC Health Services Research*. 2013;13(1):211.
2. Etkind SN, Daveson BA, Kwok W, et al. Capture, transfer, and feedback of patient-centered outcomes data in palliative care populations: Does it make a difference? A systematic review. *Journal of Pain and Symptom Management*. 2015;49(3):611-624.
3. Chen J. Integrated Care Patient reported outcome measures and patient reported experience measures – a rapid scoping review. NSW Agency for Clinical Innovation. 2020.
4. Cleeland CS, Wang XS, Shi Q, et al. Automated symptom alerts reduce postoperative symptom severity after cancer surgery: A randomized controlled clinical trial. *Journal of Clinical Oncology*. 2011;29(8):994-1000.
5. Takeuchi EE, Keding A, Awad N, et al. Impact of patient-reported outcomes in oncology: A longitudinal analysis of patient-physician communication. *Journal of Clinical Oncology*. 2011;29(21):2910-2917.
6. Artino AR, Jr., Durning SJ, Sklar DP. Guidelines for Reporting Survey-Based Research Submitted to Academic Medicine. *Acad Med*. 2018;93(3):337-340.
7. Willis GB, Artino AR, Jr. What Do Our Respondents Think We're Asking? Using Cognitive Interviewing to Improve Medical Education Surveys. *Journal of Graduate Medical Education*. 2013;5(3):353-356.
8. Lancaster GA, Dodd S, Williamson PR. Design and analysis of pilot studies: recommendations for good practice. *J Eval Clin Pract*. 2004;10(2):307-312.
9. Hassan ZA, Schattner P, Mazza D. Doing A Pilot Study: Why Is It Essential? *Malays Fam Physician*. 2006;1(2-3):70-73.

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Barriers to Implementation of an Inpatient Medical-Legal Partnership at Strong Memorial Hospital

BACKGROUND: It is widely accepted that social determinants of health impact patients' ability to receive appropriate care and subsequent health outcomes. Medical-legal partnerships (MLPs), in which a legal partner is added to a patient's healthcare team, have been shown to effectively address many social determinants of health by resolving health-harming legal needs (HHLN), in successful partnerships across the US. During the planning phase for a proposed pilot MLP at Strong Memorial Hospital (SMH), we performed a qualitative study, aiming to understand provider perspectives of barriers to successful implementation.

METHODS: URMIC IRB determined this study to be exempt from full-board review and approved all procedures. Over two weeks, we interviewed 13 providers in 11 semi-structured interviews, each lasting 30-60 minutes. Interviewees were experienced stakeholders working within the SMH Hospital Medicine Division, including physicians, advanced practice practitioners, bedside nurses, social workers, care coordinators, and a physical therapist. All were provided an honorarium of \$25 per 15 minutes of interview. A topic guide (formulated with the [Consolidated Framework for Implementation Research](#)) included questions about provider experiences with patients with HHLN, current workflows, and thoughts about our proposed MLP program. Interviews were professionally transcribed, then coded in MAXQDA analytic software. One coder developed a codebook and coded all transcripts, and a second coder reviewed.

RESULTS: Interviewees identified potential challenges ranging from the individual to the structural level. Barriers originating with providers included: (1) lack of knowledge, (2) concern that asking patients about HHLN would create more work and/or new problems, and (3) questions as to whether HHLN can or should be addressed in a hospital setting, coupled with a "treat and release" mentality. Providers noted potential patient barriers, such as: (1) patient follow-through, (2) patients' willingness and/or ability to engage with an inpatient MLP, and (3) some patients might exploit the program. Some institutional barriers were also raised, including: (1) concern that the institution would expect quantifiable impact too quickly, and (2) staffing and time constraints, which affect healthcare widely.

DISCUSSION: Through analysis of these interviews, we elicited an array of concerns that can inform implementation of a pilot MLP at SMH. These concerns were often accompanied by provider expressions of frustration with patients and current workflows, indicating that other improvements such as educating the workforce on existing services to address complex patient situations, could accompany the pilot. Overall, most interviewees hypothesized that addressing HHLN would allow providers more time and energy to perform tasks more aligned with their job descriptions, improve patient health outcomes, repair trust between providers and patients, and eventually decrease utilization.

CONCLUSION: Provider, patient, and institutional barriers elicited in our pre-pilot study are surmountable. Critically, all providers interviewed affirmed that they would participate in an MLP program, citing numerous expected benefits for themselves, their patients, and the hospital system.

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Patient-Reported Acceptability of Adverse Childhood Experience (ACE) Screening in Adult Primary Care

Background: Given the dose-response relationship between adverse childhood experiences (ACEs) and poor health outcomes, there has been a growing push for routine ACE screening in health care settings. This study evaluated patient-reported acceptability of completing ACE screening among adult primary care patients.

Methods: Patients attending their scheduled primary care visit at an academic safety-net internal medicine clinic were asked to complete (1) a standard ACE screener, (2) a follow-up survey assessing patient-reported acceptability of ACE screening and (3) demographic questions. Chi-squared analysis and Fisher's exact tests were utilized to examine associations between variables.

Results: Among 131 patients, 37% reported 4 or more ACEs. Almost two-thirds of patients reported they were comfortable completing the ACE screener during their primary care visit (65%), were comfortable letting their clinician know the results of their ACE screener (66%), and believed it was valuable for their clinician to know the results of their ACE screener (65%), regardless of ACE

Score. There were significant differences in the distributions of race ($p=0.005$) and ethnicity ($p=0.012$) when patients were stratified by ACE Score. Both Black/African American patients and Hispanic/Latinx patients were overrepresented in the high ACE Score (4+) group. Furthermore, compared to non-Hispanic/Latinx patients, Hispanic/Latinx patients reported they were less comfortable completing the ACE screener ($p=0.032$) and sharing the results of their ACE screener with their clinician ($p=0.040$) (Table 4). Finally, compared to men, women reported higher belief in the value of their clinician knowing the results of their ACE screener ($p=0.034$).

Conclusions: ACE screening was found to be acceptable for most surveyed primary care patients being seen in an academic safety-net clinic, regardless of ACE score. Findings may encourage clinicians to include ACE screening as an integral component of a trauma-informed medical care approach.

Table 1. Distribution of ACE Scores		
ACE Score	Frequency, no. (%)	
0	28 (21.4)	28 (21.4)
1	22 (16.8)	55 (42.0)
2	17 (13.0)	
3	16 (12.2)	
4	18 (13.7)	48 (36.6)
5	4 (3.1)	
6	2 (1.5)	
7	8 (6.1)	
8	6 (4.6)	
9	5 (3.8)	
10	5 (3.8)	

Table 2. Chi-squared Distribution of Patient Acceptability by ACE Score			
ACE Score	Yes, n (%)	No, n (%)	p value (χ^2)
I am comfortable completing an ACE screener during my primary care visit			
0	22 (16.8)	6 (4.9)	0.08804
1-3	37 (28.2)	18 (13.7)	
4+	26 (19.8)	22 (16.8)	
Total	85 (64.9)	46 (35.1)	
I am comfortable letting my clinician know the results of my ACE screener			
0	22 (16.8)	6 (4.6)	0.2522
1-3	35 (26.7)	20 (15.3)	
4+	29 (22.1)	19 (14.5)	
Total	86 (65.6)	45 (34.4)	
I believe it is valuable for my clinician to know the results of my ACE Screener			
0	19 (14.6)	9 (6.9)	0.9527
1-3	35 (26.9)	19 (14.6)	
4+	31 (23.8)	17 (13.1)	
Total	85 (65.4)	45 (34.6)	

Table 3. Distribution of Demographic Characteristics by ACE Score				
	Frequency, no. (%)	ACE score 0, no. (%)	ACE score 1-3, no. (%)	ACE score, 4+ no. (%)
Race				
Native American	3 (2.5)	0 (0.0)^c	1 (2.08)^d	2 (5.00)^{c,d}
Asian	3 (2.5)	1 (3.70)^c	0 (0)^d	2 (5.00)^{c,d}
Black or African American	43 (35.5)	6 (22.22)^c	15 (31.25)^d	22 (55.00)^{c,d}
White	70 (57.9)	20 (74.07)^c	32 (66.67)^d	14 (35.00)^{c,d}
Ethnicity				
Hispanic or Latinx	15 (15.6)	2 (9.52)	3 (7.69)^e	10 (33.33)^e
Not Hispanic or Latinx	75 (78.1)	19 (90.48)	36 (92.31)^e	20 (66.67)^e
Combined Race and Ethnicity				
Minoritized^a	62 (50.4)	9 (32.14)^f	19 (38.00)^g	34 (75.56)^{f,g}
Not Minoritized^a	61 (49.6)	19 (67.86)^f	31 (62.00)^g	11 (24.44)^{f,g}
Gender				
Man	53 (41.1)	14 (50)	22 (43.14)	17 (35.42)
Woman^b	73 (56.6)	14 (50)	29 (56.86)	31 (64.58)
Age (years)				
18-34	22 (17.2)	3 (11.54)	10 (19.61)	9 (18.75)
35-64	67 (52.3)	12 (46.15)	28 (54.9)	27 (56.25)
65+	36 (28.1)	11 (42.31)	13 (25.49)	12 (25)

^a Minoritized includes those patients that self-identified as not White, or Hispanic or Latinx. Not Minoritized includes those patients that self-identified as both White and not Hispanic or Latinx.

^b Includes one patient that self-identified as transgender woman.

^c Significant, $p = 0.005$.

^d Significant, $p = 0.007$.

^e Significant, $p = 0.012$.

^f Significant, $p = 5.00E-04$.

^g Significant, $p = 4.00E-04$.

Table 4. Distribution of Demographic Characteristics by Patient Preferences						
	I am comfortable completing an ACE screener during my primary care visit.		I am comfortable letting my clinician know the results of my ACE Screener.		I believe it is valuable for my clinician to know the results of my ACE Screener.	
	Yes, no. (%)	No, no. (%)	Yes, no. (%)	No, no. (%)	Yes, no. (%)	No, no. (%)
Race						
Native American	0 (0)	3 (7.69)	0 (0)	3 (7.89)	1 (1.28)	2 (5.41)
Asian	2 (2.63)	1 (2.56)	2 (2.6)	1 (2.63)	2 (2.56)	1 (2.70)
Black or African American	28 (36.84)	15 (38.46)	29 (37.66)	14 (36.84)	30 (38.46)	13 (35.14)
White	46 (60.53)	20 (51.28)	46 (59.74)	20 (52.63)	45 (57.69)	21 (56.76)
Ethnicity						
Hispanic or Latinx	6 (10.00)^c	9 (30.00)^c	6 (10.34)^d	9 (28.12)^d	7 (12.28)	8 (24.24)
Not Hispanic or Latinx	54 (90.00)^c	21 (70.00)^c	52 (89.66)^d	23 (71.88)^d	50 (87.72)	25 (75.76)
Combined Race and Ethnicity						
Minoritized^a	63 (79.75)	29 (65.91)	63 (79.75)	29 (65.91)	61 (77.22)	31 (70.45)
Not Minoritized^a	16 (20.25)	15 (34.09)	16 (20.25)	15 (34.09)	18 (22.78)	13 (29.55)
Gender						
Man	36 (43.37)	17 (38.64)	36 (42.86)	17 (39.53)	29 (34.94)^e	24 (54.55)^e
Woman^b	47 (56.63)	27 (61.36)	48 (57.14)	26 (60.47)	54 (65.06)^e	20 (45.45)^e
Age (years)						
18-34	14 (17.28)	8 (18.18)	15 (18.52)	7 (15.91)	18 (22.22)	4 (9.09)
35-64	40 (49.38)	27 (61.36)	41 (50.62)	26 (59.09)	42 (51.85)	25 (56.82)
65+	27 (33.33)	9 (20.45)	25 (30.86)	11 (25.00)	21 (25.93)	15 (34.09)

^a Minoritized includes those patients that self-identified as not White, or Hispanic or Latinx. Not Minoritized includes those patients that self-identified as White and not Hispanic or Latinx.

^b Includes one patient that self-identified as transgender woman.

^c Significant, $p = 0.032$.

^d Significant, $p = 0.040$.

^e Significant, $p = 0.039$.

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Attitudes Toward COVID-19 Vaccination Among Pregnant Women: Exploring Themes in Vaccine Hesitancy

LOCATION: University of Rochester Medical Center

OBJECTIVE: To explore beliefs and attitudes toward the COVID-19 vaccine among vaccinated and unvaccinated pregnant women to identify reasons for vaccine hesitancy and trusted sources of vaccine information.

METHODS: From June-August 2021, we conducted a qualitative study consisting of semi-structured interviews with pregnant women (n=30). Participants were recruited from university-owned obstetric practices during prenatal and ultrasound appointments. Interviews were audio recorded and transcribed; transcripts were coded and analyzed to identify themes and subthemes.

RESULTS: Of the participants, one-third (n=10) had received the COVID-19 vaccine, while two-thirds (n=20) were unvaccinated. Primary themes for unvaccinated participants were concern about the paucity of research on the vaccine in pregnancy and potential impact of the vaccine on both fetal development and maternal health. For vaccinated participants, main themes included potential maternal and fetal protection from COVID-19 and anticipated health complications from contracting COVID-19 as their motivations to get vaccinated. While most participants cited healthcare providers as the most *trusted* source of vaccine information, a majority reported that the internet was their *primary* source of vaccine information. Many participants wanted to learn more about the COVID-19 vaccine from their obstetric providers, and notably, most vaccinated participants reported the importance of their obstetrician in their vaccine decision-making process.

CONCLUSIONS: COVID-19 vaccine hesitancy is prevalent among pregnant women, with concerns for the health of their fetus, as well as their own health, being common. Prenatal visits are an important opportunity to discuss COVID-19 vaccine hesitancy with pregnant patients and offer counseling, emphasizing the abundance of evidence indicating the vaccine's safety in pregnancy, as well as the increased risk of severe complications associated with COVID-19 infection. Obstetric providers should enthusiastically recommend the COVID-19 vaccine to their patients, creating an open dialogue to discuss patients' questions and concerns.

Box 1. Themes for Vaccine Hesitancy

Too Rushed/ Too New/ Needs More Research

- “I personally do not feel that [the vaccine has] been developed enough for me to be putting it in my body.” (Participant 13)

Safety/Potential Side Effects for Baby

- “I’m worried that they could affect the baby. I don’t care, like, after, if I get it done... to me. It’s fine. But since I have the baby, I don’t want to get it right now.” (Participant 17)

Safety/Potential Side Effects for Self

- “I have so many health conditions, I’m like really worried about getting sick with it or having complications...” (Participant 27)

Long Term Side Effects

- “I think that yes it might be safe right now, but it could be 5,10 years down the line and ‘if your family member got this, call this number, blah, blah, blah’” (Participant 25)

Conflicting Expert Recommendations/ Messaging Changes

- “I just feel like they change their guidelines so often, that I feel like they don’t know much about the vaccine, either. So, I’m skeptical.” (Participant 16)

Not Fully FDA Approved

- “I [won’t get it] because it’s not fully FDA approved yet.” (Participant 28)

Not Fully Effective

- “Not saying that it’s not working, but it doesn’t protect you against all strains. So, it’s just, if it’s something that’s not going to protect you completely then I don’t see the point of it.” (Participant 24)

Future Fertility Concerns

- “I want to have more children, and then there’s just not enough studies for me. With all my [miscarriages], that plays a big part. I don’t want to cause anything that could harm my future kids.” (Participant 20)

Box 2. Themes for Vaccine Uptake

Protecting Baby

- “So [many] people are infected with COVID and I don’t want to get, because I’m not only me, I have my baby with me also. So, more thinking about the baby’s health, so I decided to get it.” (Participant 29).

Potential Complications of COVID in Pregnancy

- “Most of the doctors said that there are risks, that if you get COVID and you are pregnant then the risks can be higher... that the consequences might be higher.” (Participant 8)

Protecting Self

- “I wanted to be, like, as safe as possible, both for me and the baby. I did more research on it because I was pregnant, to make sure that from what they could tell it would be okay for the baby as well. So, I was probably a little more hesitant because I was pregnant, but I still decided to get it.” (Participant 15)

Evidence of Safety from Other Pregnant Women

- “I don’t know what I would have done if it was in the beginning and there were so many questions. Since there were a group of women before me, it made me a lot more comfortable. But in the beginning, I don’t know what I would have done.” (Participant 12)

Evidence of Safety from Vaccinated Family/Friends

- “My husband did get the shot, my mom did, my grandparents, and they’re okay.” (Participant 27)

Minimizing Risk for Household Members

- “Once I found out that I was pregnant, I was more fearful of the unknowns of getting COVID-19 while pregnant, with my little children at home, than what the vaccine may do.” (Participant 18)

Perceived Higher Risk due to Employment

- “I want to get it because I work in health care.” (Participant 6)

Return to Normalcy

- “I was able to finally take a breath once the needle was in my arm, or out of my arm, I guess.” (Participant 23).

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Effectiveness of a short duration of neoadjuvant endocrine therapy in patients with HR+ breast cancer– an NCDB analysis (2004-2016)

ABSTRACT

BACKGROUND: National medical/surgical organizations have recommended the use of NET to bridge surgery delay of weeks to months for patients with hormone receptor positive (HR+) breast cancer during the ongoing COVID-19 pandemic. The effects of NET of varying durations on pathologic response is unclear. Using the National Cancer Database (NCDB), we evaluated objective response to short (<9 weeks), moderate (9-27 weeks), and long (>27 weeks) duration of neoadjuvant endocrine therapy (NET).

METHODS: The study cohort included female patients diagnosed with non-metastatic invasive HR+ breast cancer, stratifying by those who received NET vs. no NET between 2004-2016. Pathologic response was grouped into four categories (complete, downstaged, stable, upstaged) by comparing clinical and pathologic staging data. Objective response to NET included those with

complete, downstaged, and stable pathologic response. Clinical characteristics were compared using chi-square and ANOVA tests. Multivariable logistic regression was used to determine factors associated with NET use and objective response according to NET duration.

RESULTS: A minority (1.2%) received NET in our cohort. Factors associated with NET use included older age, non-Black patients, more advanced clinical stage, higher co-morbidity score, government insurance, and lobular histology. Objective response rate (ORR) was 56.7%, 52.1%, and 49.1% after short, moderate, and long NET duration respectively.

CONCLUSION: Short NET duration did not result in an inferior ORR. Future study to evaluate the interaction between surgery delay and NET use on clinical outcome will provide insights in the safety of NET to bridge potential surgery delay in patients with HR+ breast cancer.

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Intravascular access in hypotensive trauma patients

Background

Video review (VR) is an old but still not commonly used technology for conducting quality improvement research. Using it can greatly benefit research because of the level of data granularity achievable using video recordings. Trauma video review technology is instrumental in studying the duration of very short procedures, such as vascular access, because attempts are measured in minutes to seconds and obtaining accurate timestamped data from an EMR is historically unreliable. This study looks at gathering accurate time measurements and success rates for peripheral intravenous and intra-osseous methods for vascular access in hypotensive trauma patients.

Methods

The data for this project was abstracted from audiovisual recordings of hypotensive patients undergoing resuscitation in level 1 and 2 trauma activations. Patient variables include demographics, injury mechanism, injury severity using the Injury Severity Score (ISS), New Injury Severity Score (NISS), and physiologic data. Additionally, patient outcomes and other associated data points were collected from chart review. Pursuant to the secondary objectives, training levels and provider levels (nurse, EMT, physician) were collected. Finally, resuscitation metrics and trauma teamwork scores were determined using a standardized trauma scoring metric, NOTECHS. The gathered and abstracted data is recorded in REDCAP.

Results

Analysis is ongoing as additional patients are added to the study. Preliminary analysis of current data shows an average successful peripheral IV time of 67 seconds. The average success rate of peripheral IV attempts is 54%. The preliminary average successful intraosseous time (including both humoral and femoral IO attempts) is 33 seconds. The average success rate of IO attempts is 66%. Successful IO access attempts are 49% quicker than successful PIV access attempts.

Conclusion

Preliminary results currently show that intra-osseous attempts appear to be both faster and more successful than peripheral IV access attempts. Results are limited by the low count of total IO attempts (n=3), which will improve as more patients are added to the study.

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Demographic and Clinical Characteristics Associated with Increased Risk of Mechanical Ventilation among a Cohort of SARS-CoV-2 Patients Admitted to Two Hospitals in Upstate, NY

Introduction:

Ventilator-Associated Pneumonia (VAP), a type of Ventilator Associated Event (VAE), is broadly defined as pneumonia presenting at least 48 hours after onset of mechanical ventilation, and is a leading cause of death among intensive care unit (ICU) patients. Yet, comprehensive knowledge on hospital-acquired infections such as VAP among SARS-CoV-2 (COVID-19) patients is limited. There is a large degree of disagreement in the existing literature reporting both incidence of COVID and VAP co-infection and in determining what, if any, demographic factors or clinical interventions may predict onset of VAP. This study aims to determine both the incidence of VAP in ICU patients as well as identify independent clinical predictors for this outcome.

Methods:

A retrospective cohort study was conducted using a pre-existing clinical quality assurance registry maintained by the faculty mentor. Patients age 18 and older who were admitted to the ICU at either Strong Memorial Hospital (SMH) or Highland Hospital (HH) between December 1, 2020 through December 31, 2020 were included in this study. The existing registry was used to identify all COVID-19 patients admitted to either SMH or HH was used to both identify patients for the study and to determine those who were ventilated. This project's goals were defined in an iterative fashion due to the constantly evolving state of the COVID-19 literature. The published literature was continually reviewed to define project scope and key variables for collection.

Registry data included patient demographics, admission location, and basic details of the patient's clinical course. Manual chart review of the electronic medical record was conducted at both hospitals to collection additional variables related to clinical characteristics and to confirm ventilation status and the development of key outcomes. The medical record abstraction process was pilot-tested and a standardized process was developed for the collection of all variables. Descriptive statistics were used to characterize the study sample. The independent effect of

various demographic and clinical risk factors was assessed using relative risks and chi-square tests of association. A p-value of <0.05 was considered statistically significant for all analyses.

NOTE: At the time of this abstract submission, data collection from the electronic medical record is ongoing, and will be utilized to determine the incidence of the VAE's including iVAC (Infectious Ventilator-Associated Condition), Possible VAP, and Probable VAP in the patient population. An online tool developed by the National Health and Safety Network, the NHSN Ventilator-Associated Event (VAE) Calculator Ver. 7.0, was pilot tested to evaluate diagnostic criteria for VAE's. These data will be collected over the next two months with a goal of finalizing data analysis for publication by the end of 2021.

Results:

Preliminary descriptive statistical analysis shows that 573 patients were admitted to SMH and HH. 344 (64.0%) were White or Caucasian, 134 (24.2%) were Black or African American, 8 were Asian (1.4%), and 57 (10.3%) were Other; 95 (53.3%) were Male, 258 (46.7%) were Female; no data exists for additional gender or sex criteria; the average age was 61.11 years for the total patient population, 67.0 years for the Male population, and 63.0 years for the Female population. 107 patients were ventilated (Incidence of Ventilation = 19.4%). Of those ventilated, 65 (60.7%) were Male, 42 (39.3%) were Female; 71 (66.4%) were White or Caucasian, 27 (25.2%) were Black or African American, 0 (0.0%) were Asian, and 9 (8.4%) were Other; the average age of ventilated patients was 64.16 years for the total population, 67.4 years for the Male population, 59.2 years for the Female population. Preliminary relative risk calculations were performed comparing both comorbidities and medical history in ventilated patients. Statistically-significantly increased Relative Risk was demonstrated for presence of Acute Respiratory Distress Syndrome (ARDS) (RR = 3.68, p = 0.0001), Respiratory Failure (RR = 2.65, p = 0.0001), and Leukemia (RR = 2.64, p = 0.0077), and statistically non-significant yet potentially clinically significant increased Relative Risk was found for presence of Asthma (RR = 1.43, p = 0.09), Heart Failure (RR = 1.30, p = 0.26), Obesity (RR = 1.23, p = 0.32), Cancers (RR = 1.43, p = 0.08), Sarcoidosis (RR = 1.48, p = 0.52), GERD (RR = 1.25, p = 0.23), Lupus (RR = 1.48, p = 0.54), being Male (RR = 1.35, p = 0.09), and being Ages 40-65 (RR = 1.17, p = 0.39).

Conclusion:

In our sample of COVID-19 patients admitted to two hospitals in Upstate, NY, we identified numerous predictors of mechanical ventilation. Of note, ARDS, respiratory failure, and leukemia were associated with a increased risk for mechanical ventilation, with large effect sizes. While data collection is ongoing for our VAP and VAE outcomes, we anticipate identification of similar risk factors for these outcomes as well. Final analyses will incorporate the use of multivariable regression to identify independent predictors.

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**Changes in Income and Household Spending During Early Months of COVID-19 Pandemic
Reveal Racial and Ethnic Disparities Among Older Adults**

Abstract:

The COVID-19 pandemic has both elucidated and exacerbated racial and ethnic disparities in the United States. Conspicuous early effects in healthcare access and direct morbidity and mortality due to COVID-19 disease revealed that, compared to White populations, Black and Hispanic communities suffered greater rates of mortality,^{1,2} especially among older adults.³ Preliminary findings also suggest that Black and Hispanic adults were more vulnerable to income instability and food insecurity during the pandemic.⁴ This study examined racial and ethnic disparities in household finances during the early period of the pandemic. Using data from a nationally representative survey, we tested the hypotheses that Black and Hispanic older adults experienced reduced income and increased household spending in the first 3 months of the pandemic.

We used the University of Michigan Health and Retirement Study (HRS) COVID-19 September 2020 Supplement data fielded beginning on June 11, 2020.⁵ The institutional review board of the University of Rochester approved the study with a waiver of informed consent because of the use of publicly available, de-identified data. The study cohort consisted of 3212 respondents aged 50 or over who reported on income and household spending changes during the pandemic. After excluding respondents living in a nursing home (n=49), those who selected "other" for race/ethnicity (n=153; other than non-Hispanic White, non-Hispanic Black, or Hispanic), and those with inappropriate sampling weights due to non-responses (n=105), the sample consisted of 2905 respondents representing a weighted 93 266 929 community-dwelling older adults.

We controlled for variables that may affect the association of race and ethnicity with a change in financial resources (see Tables 1 and 2). Bivariate analyses were performed using the Rao-Scott Chi-square tests for categorical variables and t-tests for continuous variables. Separate multivariable logistic regression models were performed to test the independent associations of race and ethnicity and the odds of reduced income and increased household spending after adjustment for respondent characteristics. All analyses were performed in SAS 9.4[®] and accounted for household and respondent level weights to make results nationally representative.⁶

During the first 3 months of the COVID-19 outbreak, a weighted 17.2% of respondents experienced a decrease in income, while a weighted 16.4% of respondents experienced an increase in household spending. Decreased income was reported by 15.3% of non-Hispanic White, 14.2% of non-Hispanic Black, and 34.0% of Hispanic respondents (Table 1). In multivariable analysis (Table 2), demographic characteristics that were independently associated with decreased income were Hispanic (OR 2.79; 95% CI 1.84-4.23; p<.0001) vs White race/ethnicity, and age 50-64 (OR 1.45; 95% CI 1.02-2.07; p=0.0408) vs age 65 and over. Increased household spending was reported by 13.6% of non-Hispanic White, 25.9% of Non-Hispanic Black, and 25.9% of Hispanic respondents (Table 1). In multivariable analysis (Table 2), characteristics that were independently associated with increased household spending were Hispanic (OR 2.10; 95% CI 1.40-3.15; p=0.0003) and Black (OR 1.83; 95% CI 1.28-2.61; p=0.0009) vs White race/ethnicity, as well as worse self-rated health (OR 1.34; 95% CI 1.13-1.59; p=0.0007).

Hispanic older adult respondents were more than twice as likely as Whites to experience decreased household income, and both Black and Hispanic older adult respondents were nearly twice as likely as Whites to experience increased household spending during the first 3 months of the COVID-19 pandemic. These findings suggest that the financial health of Black and Hispanic older adults was precarious at the pandemic onset. The increased spending in both groups may have been driven by an increased need to switch to private transportation, losses in employment-based insurance, additional residents, or increases in energy insecurity or utility disconnection.⁷ These findings also suggest that older adult Hispanics were especially susceptible to loss of employment or supplemental income, reduced hours, or reduced pay, which may be partially due to discrepancies in job flexibility.⁸

Notably, worse self-rated health scores were associated with increased household spending, suggesting that necessary precautions and services may have been more financially burdensome for those with compromised health. The association between decreasing income and younger age is likely due to differences in employment, with older adults receiving more reliable income (e.g., social security payments). Populations more susceptible to societal inequities and discrimination in housing, education, and labor markets may benefit from increased emergency funds and access to social services such as Medicaid, SNAP, and TANF during public health crises. Poor short-term economic outcomes only corroborate the need for stronger federal public health emergency response infrastructure,⁹ and ongoing intervention in addressing nationwide inequity. Our study was limited by inability to assess magnitude of decreased income and increased household spending.

References:

- ¹ Yu Q, Salvador CE, Melani I, Berg MK, Neblett EW, Kitayama S. Racial residential segregation and economic disparity jointly exacerbate COVID-19 fatality in large American cities. *Ann N Y Acad Sci.* 2021 Jun;1494(1):18-30. doi: 10.1111/nyas.14567. Epub 2021 Jan 31. PMID: 33521931; PMCID: PMC8013888.
- ² Strickland OL, Powell-Young Y, Reyes-Miranda C, Alzaghari O, Giger JN. African-Americans Have a Higher Propensity for Death from COVID-19: Rationale and Causation. *J Natl Black Nurses Assoc.* 2020 Jul;31(1):1-12. PMID: 32853490.
- ³ Garcia MA, Homan PA, García C, Brown TH. The Color of COVID-19: Structural Racism and the Disproportionate Impact of the Pandemic on Older Black and Latinx Adults. *J Gerontol B Psychol Sci Soc Sci.* 2021 Feb 17;76(3):e75-e80. doi: 10.1093/geronb/gbaa114. PMID: 32756973; PMCID: PMC7454923.
- ⁴ Lauren BN, Silver ER, Faye AS, Rogers AM, Woo Baidal JA, Ozanne EM, Hur C. Predictors of households at risk for food insecurity in the United States during the COVID-19 pandemic. *Public Health Nutr.* 2021 Jan 27:1-19. doi: 10.1017/S1368980021000355. Epub ahead of print. PMID: 33500018.
- ⁵ HRS Staff. 2020 HRS COVID-19 Project. Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan; 2020. hrsdata.isr.umich.edu/data-products/2020-hrs-covid-19-project.
- ⁶ HRS Staff. Sampling Weights: Revised for Tracker 2.0 & Beyond. Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan; 2019. https://hrs.isr.umich.edu/sites/default/files/biblio/wghtdoc_0.pdf

⁷ Memmott, T., Carley, S., Graff, M., & Konisky, D. M. (2021). Sociodemographic disparities in energy insecurity among low-income households before and during the COVID-19 pandemic. *Nature Energy*, 6(2), 186-193

⁸ Helppie-McFall, B., & Hsu, J. W. (2020). Financial profiles of workers most vulnerable to coronavirus-related earnings loss in the spring of 2020. *Financial Planning Review*, 3(4), e1102

⁹ Maani, N., & Galea, S. (2020). COVID-19 and underinvestment in the public health infrastructure of the United States. *The Milbank Quarterly*, 98(2), 250

Figures & Tables

Table 1. Changes in Income and Household Spending During the First 3 Months of the COVID-19 Pandemic, by Characteristics of Survey Respondents^a

Feature	% Respondents	Income ^b			Household Spending ^c		
		Increased or stayed the same	Decreased	P value	Decreased or stayed the same	Increased	P value
Race/Ethnicity				<.001			<.001
White	77.5%	84.7%	15.3%		86.4%	13.6%	
Black	11.3%	85.8%	14.2%		74.1%	25.9%	
Hispanic	11.2%	66.0%	34.0%		74.1%	25.9%	
Age Group				<.001			0.978
50-64	42.0%	76.2%	23.8%		83.7%	16.3%	
65-74	34.8%	84.5%	15.5%		83.6%	16.4%	
≥75	23.2%	91.7%	8.3%		83.2%	16.8%	
Gender				0.163			0.385
Female	53.3%	84.0%	16.0%		82.8%	17.2%	
Non-female	46.7%	81.2%	18.8%		84.4%	15.6%	
Education Level				0.067			<.001
College	38.9%	80.7%	19.3%		87.9%	12.1%	
No college	61.1%	84.5%	15.5%		80.8%	19.2%	
Marital Status				0.623			0.002
Married	58.9%	82.2%	17.8%		85.9%	14.1%	
Single	41.1%	83.2%	16.8%		80.1%	19.9%	
Insurance Status				0.211			<.001
Medicaid	10.9%	79.4%	20.6%		74.2%	25.8%	
No Medicaid	89.1%	83.0%	17.0%		84.7%	15.3%	
	Mean ± SD	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
IADL Score^d	0.29±0.02	0.31±0.02	0.19±0.03	<.001	0.27±0.02	0.41±0.05	<.001
Self-Rated Health^e (Each point higher)	2.83±0.03	2.82±0.03	2.84±0.06	<.001	2.76±0.03	3.16±0.06	<.001
Depressive Symptoms^f	1.24±0.05	1.21±0.05	1.36±0.12	<.001	1.14±0.05	1.70±0.12	<.001

^a Sample sizes vary slightly for different variables due to missing values; all analyses controlled for common medical conditions, including hypertension, diabetes, cancer, lung disease, heart disease, stroke history, psychiatric illness, and arthritis.

^b Associated survey question: "Since the start of the coronavirus pandemic, has your income gone up or down or stayed about the same because of the pandemic?"

^c Associated survey question: "Has your household spending gone up or down or stayed about the same?"

^d Instrumental activities of daily living (IADLs) included managing money, taking medication, preparing a hot meal, making phone calls, and shopping for groceries. Impairment in each item was coded as 1=yes, and 0=no. The range of the total IADL score is 0 to 5.

^e Self-rated health was coded as 1=excellent, 2=very good, 3=good, 4=fair, and 5=poor.

^f Depressive symptoms were assessed as the sum of eight yes/no items from the Center for Epidemiologic Studies Depression scale (CES-D). The range of the score is 0 to 8 with higher score indicating more depressive symptoms.

Table 2. Multivariable Analysis of Changes in Income and Household Spending During the First 3 Months of the COVID-19 Pandemic, by Characteristics of Survey Respondents^a

Feature	Decreased Income ^b		Increased Household Spending ^c	
	OR (95% CI)	P value	OR (95% CI)	P value
Race/Ethnicity				
White	Ref.	Ref.	Ref.	Ref.
Black	0.83 (0.54-1.27)	0.3822	1.83 (1.28-2.61)	0.0009
Hispanic	2.79 (1.84-4.23)	<.0001	2.10 (1.40-3.15)	0.0003
Age Group				
50-64	1.45 (1.02-2.07)	0.0408	0.91 (0.64-1.31)	0.6191
65-74	Ref.	Ref.	Ref.	Ref.
≥75	0.58 (0.38-0.89)	0.0132	0.91 (0.65-1.27)	0.5735
Female Gender	0.83 (0.60-1.13)	0.2363	0.92 (0.69-1.23)	0.5603
College Degree	1.34 (0.96-1.89)	0.0877	0.80 (0.58-1.12)	0.1985
Married	1.06 (0.76-1.47)	0.7531	0.78 (0.58-1.060)	0.1092
Medicaid	1.06 (0.66-1.70)	0.8156	1.17 (0.79-1.74)	0.4418
IADL Score^d (per each compromised)	0.84 (0.65-1.07)	0.1566	1.04 (0.87-1.24)	0.6759
Self-Rated Health^e (Each point higher)	1.06 (0.89-1.27)	0.5021	1.34 (1.13-1.59)	0.0007
Depressive Symptoms^f (Each point higher on CES- D)	1.05 (0.96-1.15)	0.3373	1.04 (0.96-1.12)	0.3414

^a Multivariable logistic regression adjusted for respondent characteristics listed in Table 1; all analyses controlled for common medical conditions, including hypertension, diabetes, cancer, lung disease, heart disease, stroke history, psychiatric illness, and arthritis.

^b Associated survey question: "Since the start of the coronavirus pandemic, has your income gone up or down or stayed about the same because of the pandemic?"

^c Associated survey question: "Has your household spending gone up or down or stayed about the same?"

^d Instrumental activities of daily living (IADLs) included managing money, taking medication, preparing a hot meal, making phone calls, and shopping for groceries. Impairment in each item was coded as 1=yes, and 0=no. The range of the total IADL score is 0 to 5.

^e Self-rated health was coded as 1=excellent, 2=very good, 3=good, 4=fair, and 5=poor.

^f Depressive symptoms were assessed as the sum of eight yes/no items from the Center for Epidemiologic Studies Depression scale (CES-D). The range of the score is 0 to 8 with higher score indicating more depressive symptoms.

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Using a Controlled Substance Safety Committee and reporting MMEs in Family Medicine in response to CDC opioid guidelines

Research Objective: Millions of Americans are treated with prescription opioids for chronic pain and are at risk of misuse and overdose. In 2016, the Centers for Disease Control (CDC) put forward clinical practice guidelines which suggest an upper threshold of 90 morphine milligram equivalents (MME) for prescribed opioids. In response to the new guidelines, a primary care practice implemented practice-wide monthly MME reports and a controlled substance safety committee (CSSC) to support the CDC's guidelines. The goal of this study is to understand the impact of implementation on patients' MME dose.

Study Design: An observational cohort study.

Population Studied: A cohort of 96 adult patients on chronic nonmalignant pain medication in a primary care practice from 2017-2021.

Principal Findings: Fifty-eight percent of the patients were White, 38% were Black, and 4% did not have information on race. Patients were primarily male (60%) and 40% were female. Clinicians were comprised of physicians (73%), residents (18%), nurse practitioners (8%), and fellows (1%). From 2017 to 2021, 95% of patients received a change in MME dose. The overall mean MME was 194.4 in 2017 to 132.7 in 2021 ($p < 0.001$). In 2017, 4% of patients were below the 90 MME threshold, which increased to 42% in 2021. There were not statistically significant associations between patient characteristics or clinician type and threshold status.

Conclusions: Despite limited practice-driven clinician education or training around the CDC guidelines, our findings suggest the pragmatic implementation of the MME reports and CSSC had a significant impact on changes in patients' MME dose. While our observational study suggests the implementation of the CSSC and monthly reporting were effective interventions for decreasing the prescription of controlled substances for chronic pain, more rigorous methodology will be required to determine if the changes were due to the CSSC, the monthly MME reporting, social pressures, and or some other factors.

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Disclosures: None.

Location: University of Rochester

Comparing Autopsy Thoracic Injury Patterns between In-Hospital CPR Patients receiving LUCAS™ Device vs Manual Chest Compressions

Background: Although current research has compared CPR-associated injuries between those receiving LUCAS™ and manual CPR, the population of focus has primarily been on patients who suffered out-of-hospital cardiac arrest (OHCA). During the SARS-CoV-2 pandemic, more hospitals leveraged mechanical CPR devices to provide distant yet high quality, consistent chest compressions in in-hospital cardiac arrest (IHCA) patients. We sought to investigate autopsy thoracic injury patterns in in-hospital non-traumatic cardiac arrests, comparing traditional manual compressions with the mechanical LUCAS™ device chest compressions.

Design: Autopsies were screened for the presence of non-traumatic in hospital cardiopulmonary resuscitation at a single, large quaternary care center from 1/1/2018 to 12/31/20. 10 received LUCAS™ compressions and 40 received manual compressions. Student's T-Tests were used to

compare means for continuous variables, while chi-squared and Fischer's exact tests were used for categorical variables. An alpha of 0.05 was chosen as the threshold for statistical significance.

Results: We found a statistically significant decrease in sternal fractures during the mechanical CPR period, and a statistically significant increase in other soft tissue injuries. We found no significant difference in age, proportion male, or rate of scoliosis or kyphosis between cohorts. Results are listed in table 1 and table 2.

Conclusion: Little research has looked at the injury potential of mechanical CPR in the IHCA patient population. Our study points to a potential differential in thoracic injury patterns during manual compressions when compared to LUCAS device compressions. The statistically significant decrease in sternal fractures is noteworthy. Conversely, the increase in other soft tissue injury demands further examination. Further research should examine both survivors and non-survivors of cardiac arrest and quantify additional comorbidities.

Table 1:

Mode of Compressions	Mechanical Compressions (n=10)	Manual Compressions (n= 40)	P value (*indicates significance)
Age mean (std dev)	70.1 (13.6)	64.5 (14.7)	0.88
%male	90.0%	60.0%	0.13
Bilateral Rib fracture rate	80.0%	95.0%	0.30
Rib fracture severity			
Simple	41.7%	35.0%	P value unable to be reliably calculated due to low sample size per category
Displaced	25.0%	50.0%	
Plural Laceration	16.7%	12.5%	
Flail Chest	16.7%	0.0%	
Mean total rib fractures (std dev)	6.7 (4.4)	9.0 (4.0)	0.11
Mean L rib fractures (std dev)	3.6 (2.2)	4.5 (1.8)	0.18
Mean R rib fractures (std dev)	3.1 (2.5)	4.5 (2.4)	0.10
Sternal Fracture rate	40.0%	85%	0.007*
Rate of multiple sternal fractures	20.0%	50%	0.15
Cardiovascular/Great vessel Injury	50.0%	22.5%	0.11
Other soft tissue injury	40.0%	7.5%	0.02*
Rate of scoliosis or kyphosis	20.0%	20.0%	1.00
Severity of Rib Injury			
Mild rib injury (simple, or displaced)	6	34	p = 0.07 Fischer's Exact Test
Severe rib injury (plural laceration, or flail chest)	4	5	

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Assessment of β -amyloid peptide deposition, ICAM-1 expression, and lipoprotein receptor protein 1 expression in brain following low dose iron particle irradiation

High-energy, high-charged (HZE) particle irradiation has been shown to exacerbate Alzheimer's disease (AD) pathology in double-transgenic APP/PS1 mice through increased accumulation of cranial β -amyloid peptide ($A\beta$) [1]. Downregulation of efflux transporter LRP1 has been proposed as a mechanism; however, localization to endothelial cells within the blood-brain barrier (BBB) has not been pursued. Here, we attempted such localization of LRP1 in order to determine if expression is altered. While we did not detect clear expression of LRP1 in brain endothelial cells, we detected expression in the choroid plexus and spleen. Further work is needed to better characterize cell-specific LRP1 expression in these tissues. As part of this project, brain sections from 8 male APP/PS1 mice exposed to 50cGy ^{56}Fe and 8 unirradiated control mice were stained using Congo red to examine cranial $A\beta$ deposition 6 months after exposure. Another 6 male C57BL/6J mice exposed to 50cGy ^{56}Fe and 6 unirradiated control mice were stained using DAB to examine ICAM-1 expression – a marker of vascular inflammation – 4 months after exposure. Contrasting previous findings, we were not able to replicate an increase in $A\beta$ deposition after HZE particle irradiation, with average cortical Congo red positive plaque area being 0.12% in both

irradiated and unirradiated APP/PS1 mice, and 0.09% and 0.10% in hippocampi of irradiated and control mice, respectively. Neither finding was statistically significant. On the other hand, we saw an increase in ICAM-1 expression following irradiation as measured by percent area stained by DAB. Although no values reached statistical significance due to substantial variability between mice, percent area of cortical ICAM-1 staining was $0.50\% \pm 0.17\%$ and $0.84\% \pm 0.59\%$ in control and irradiated mice, respectively, whereas hippocampal staining was $0.76\% \pm 0.19\%$ and $1.1\% \pm 0.62\%$ in control and irradiated mice. Increased ICAM-1 expression following 50cGy ^{56}Fe irradiation aligns with previous findings which analyzed the effects of larger radiation doses (100cGy ^{56}Fe) [1]. These results suggest that lower dose radiation still causes increased ICAM-1 expression, but may not exacerbate AD pathology. Moving forward, a female cohort would help determine if AD pathology and vascular inflammation are gender-specific following low dose radiation.

Bibliography/Citations

- 1) Cherry, JD, B Liu, JL Frost, CA Lemere, JP Williams, JA Olschowka and MK O'Banion. 2012. Galactic cosmic radiation leads to cognitive impairment and increased A β plaque accumulation in a mouse model of Alzheimer's disease. PLoS One 7:e53275

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Ruxolitinib Cream for the Treatment of Discoid Lupus Erythematosus: Pilot Study

Background and Objective:

Discoid lupus erythematosus (DLE), a chronic variant of cutaneous lupus erythematosus, has limited treatment options. Hydroxychloroquine is the only FDA-approved medication for DLE. Topical steroids, calcineurin inhibitors, and systemic immunosuppressive medications are also used to treat DLE. Treatment is effective in some patients but may be associated with adverse side effects.

Type I interferons are key inflammatory cytokines in DLE pathogenesis. Janus kinase (JAK) inhibitors, which block interferon signaling, are a new class of therapeutics with potential efficacy in lupus. Ruxolitinib, a JAK inhibitor, has been shown to be effective in several inflammatory skin diseases. Systemic side effects have not been reported with topical ruxolitinib use.

Given the limited treatments for DLE and the previously reported effectiveness of JAK inhibitors in treating inflammatory skin diseases, we predict that topical ruxolitinib will be an effective and safe treatment for DLE. The goal of this study is to assess the efficacy of topical ruxolitinib (1.5% cream) as a targeted treatment for DLE.

Methods:

We designed a 12-week, single center, open label study of ruxolitinib 1.5% cream for the treatment of DLE. Fifteen patients with a clinical diagnosis of DLE will participate. Participants will apply ruxolitinib 1.5% cream twice daily to areas of active disease. At each study visit, an Investigator's Global Assessment (IGA) score, a measure of the severity of global disease, and a Cutaneous Lupus Area and Severity Index (CLASI) score, a measure of disease activity and damage, will be recorded. Participants will rate their pain and pruritus levels daily.

The US Food and Drug Administration approved the study in May 2021 (IND 156455). Institutional Review Board (IRB) approval (STUDY00006186) is expected in September 2021. Participant recruitment and data collection will proceed following IRB approval.

Results:

The primary outcome is mean percentage change in IGA scores. Secondary outcomes include mean percentage change in CLASI scores and changes in pain and pruritus levels. Matched pair t-tests will be utilized to evaluate changes in patient scores. Differences will be considered significant at $p < 0.05$.

Discussion:

Results from this study will evaluate the potential efficacy of topical ruxolitinib as a treatment for DLE. Given the limited sample size of this pilot study, a robust statistical analysis will be limited. Future studies investigating the effectiveness of ruxolitinib in DLE treatment should be appropriately powered to detect clinically significant effects.

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A Financial Analysis of Physician Modified Endografts for the Repair of Complex Aortic Aneurysms

Study Design

Single-center retrospective study

Objective

To compare the clinical and financial outcomes associated with physician-modified endografts (PMEGs) in treating thoracoabdominal aortic aneurysms (TAA), to the FDA-approved Cook Zenith Fenestrated (ZFEN) graft for juxtarenal aortic aneurysms (JAA) and to open aneurysm repair.

Methods

We conducted a single-center retrospective review of clinical and financial data for all patients who have undergone endovascular or open surgery repair for juxtarenal aortic aneurysms and thoracoabdominal aortic aneurysms from January 2018 – December 2020. For each case, clinical and financial in-patient data for the primary aneurysm operation and associated hospitalization was examined. Relevant cases were identified through the Vascular Quality Initiative (VQI). Clinical information for each case, including preoperative risk factors and post-operative outcomes, was also collected through a systematic chart review. Patient-level financial data was obtained through the University of Rochester Revenue Integrity department for the primary operation and hospitalization.

Results

The average gross profit for all endovascular operations, and their associated hospitalizations, was -\$24,339.06. Endovascular repair of TAAs with PMEGs resulted in an average gross profit of -\$36,696, while repair of JAAs with ZFEN grafts was -\$9,449. Meanwhile, the average gross profit across all open repair operations was -\$7,371.16. Open repair of TAAs yielded an average gross profit of -\$18,464 and open repair of JAAs resulted in a gross profit of \$14,582.

Although endovascular and open repairs were reimbursed at similar rates, endovascular operations were associated with significantly higher total costs. Operating room supplies were the primary cost-driver for endovascular operations, particularly device cost. Average device cost in TAA operations was the highest, at \$72,344.60. This figure was lower for JAA operations, which had an average device cost of \$24,103.25.

In contrast, the major cost-driver for open repair surgeries was nursing services post-operation, in both ICU and semi-private room care settings. These findings were consistent with the improved post-operative outcomes that were observed in endovascular repair operations. Following endovascular operations, the average time spent in the ICU and overall hospital stay was 4.08 and 12.3 days, respectively. For TAA operations that utilized PMEG, the average ICU stay was 8.25 days, and the average length of hospital stay was 10.25 days. For JAA operations using ZFEN grafts, the average ICU stay was 2 days, and the average length of hospital stay was 6.75 days. Across all open repair operations, the average ICU stay was 9.9 days, and the average length of hospital stay was 17.9 days. Open repair surgeries were also associated with an increased need for ventilator services and dialysis.

Conclusion

The endovascular approach is an important and rapidly advancing field in the treatment of complex abdominal aortic aneurysms. This comparison of PMEGs to custom ZFEN grafts and open repair surgeries provides insight into the current financial viability of these methods. Further research into long-term financial and clinical outcomes will be necessary for a more accurate assessment of these techniques and may inform treatment strategies of complex abdominal aortic aneurysms at regional medical centers who are reliant on PMEG technologies to treat their patients.

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Coping Mechanisms while Hospitalized: A Qualitative Study of Caregivers of Children with Neurodevelopmental Disabilities

BACKGROUND AND OBJECTIVES: Children with Neurodevelopmental Disabilities (ND) are a medically complex subset of children who frequently require healthcare services. When these children are hospitalized, their caregivers often experience heightened stress, anxiety, and depression. This study aims to examine the ways in which caregivers of children with ND emotionally cope with the stressors associated with their child's hospitalization.

METHODS: We conducted semi-structured interviews with caregivers of children with ND who were enrolled in care at the University of Rochester Medical Center. Caregivers were recruited over the phone and interviews took place virtually, using a video-conferencing platform. Interview audio was recorded, transcribed, and then analyzed using a modified grounded theory approach. Themes were identified through group consensus.

RESULTS: We interviewed 13 caregivers: 10 mothers and 3 fathers, and identified two major themes of parent coping strategies with subthemes in parenthesis. Theme 1: Feeling as though they are fulfilling their role as a parent allows caregivers to emotionally cope with the stress of having a hospitalized child (over time caregivers become more comfortable with the hospital routine, and caregivers feel fulfilled by completing family responsibilities). Theme 2: Caregiver trust in the medical team supports their ability to productively cope while their child is hospitalized (trust facilitates the sharing of direct caregiving responsibilities between the caregivers and the child's medical team, and trust facilitates caregivers adapting their existing effective coping mechanisms to the hospital setting).

CONCLUSIONS: Key processes that facilitate caregiver coping are becoming more comfortable with the hospital routine which allows caregivers to feel as though they are fulfilling their role as a parent and trusting in their child's healthcare team to take good care of their child. Interventions to improve caregiver coping could focus on helping parents adapt to the hospital routine, building trust between the caregiver and the child's healthcare team, and helping caregivers adapt their known coping mechanisms to the hospital setting.

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The Impact of Atherosclerotic Plaque Calcium Scores on Residual Stenosis and Restenosis in Trans-Carotid Artery Revascularization Patients.

Introduction: Trans-carotid artery revascularization (TCAR) is a novel endovascular procedure in which carotid artery stenting is performed via direct common carotid artery (CCA) access with arterial blood flow reversal to minimize the risk of embolic injury. TCAR has no contraindications with respect to the calcific content of atherosclerotic plaques. However, the safety and effectiveness of TCAR has not yet been established in patients with total occlusion of the artery nor in those with highly calcified plaques resistant to percutaneous transluminal angioplasty. This study aimed to investigate whether the amount of calcific plaque was associated with increased percent residual stenosis, or with the rate of restenosis or risk of restenosis after TCAR.

Methods: From December 2015 to May 2021, 179 patients underwent TCAR at the University of Rochester Medical Center (URMC). We performed a retrospective study of a subset of these patients (n=73). We analyzed pre-operative computed tomography (CT) neck imaging using a semi-automated workflow in Philips IntelliSpace Portal (Philips North America, Cambridge, Massachusetts) to measure the calcium score (CS) of atherosclerotic plaques in patients with carotid artery stenosis. In order to account for contrast dye background noise, a threshold of 505 Hounsfield Units was used as a lower limit for detection of calcific plaque. This threshold was calculated as four standard deviations above the average CS in healthy carotid artery from ten randomly selected patients. Intra-operative angiograms were used to measure the percent residual stenosis of stented arteries immediately after stent deployment according to North American Symptomatic Carotid Endarterectomy Trial (NASCET) criteria. We calculated rate of restenosis and risk of restenosis using carotid artery duplex ultrasound studies obtained at post-operative

follow-up appointments. Rate of restenosis was defined as the ratio of peak-systolic velocity (cm/s) (PSV) of the internal carotid artery (ICA) within the stent to PSV in the distal CCA. Risk of restenosis was defined as the highest end-diastolic velocity (cm/s) (EDV) reported within the stent and served as a measure of turbulent flow. Data was gathered from the 1-month, 6-month, and

every available subsequent appointment at 6-month intervals. A Spearman Test was used to determine the relationship between CS and percent residual stenosis. Separately, Friedman Tests were used to analyze the relationship between CS and EDV over time, and CS and ICA PSV:CCA PSV over time.

Results: 73 patients who underwent TCAR at URM from December 2015 to May 2021 were included in this study. Patients were excluded if the indication for TCAR was fracture or restenosis of a prior stent. A weak association was found between calcium scores and percent residual stenosis via Spearman Test ($r_s = 0.24853$, $p = 0.03528$, $n=72$) (Fig. 1). A Friedman Test found no statistically significant change in rate of restenosis with respect to CS over time [ICA PSV:CCA PSV: $X^2_r = 2.12$ ($df=3$, $n=15$), $p = 0.54788$]. A separate Friedman Test found no statistically significant change in risk of restenosis with respect to CS over time [EDV: $X^2_r = 2.7$ ($df=3$, $n=15$), $p = 0.44023$].

Conclusion: A weak association was found between carotid artery plaque CS and percent residual stenosis immediately after stent placement. However, no statistically significant relationship was found between CS and the risk of restenosis or rate of restenosis. This may imply that TCAR is a safe and effective long-term option for patients regardless of calcium burden in their carotid plaques. Further analysis of the remainder of our institutional patient database will provide a larger sample size with more long-term follow-up data which may elucidate a stronger association between calcified plaque content and TCAR outcomes.

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Assessing Patients' Perspective of DermExpert, a Machine Learning Device by VisualDx, in Dermatology Clinics

Introduction: As the use of virtual modalities for education has increased due to the physical restrictions placed by the COVID-19 pandemic, medical education is no exception. VisualDx's DermExpert is a type of Machine Learning (ML) device that utilizes Artificial Intelligence (AI) to educate and guide its user, like medical students or providers, on differential diagnoses (ddx) for a patient's visible skin concern.

Objective: To assess dermatology patients' perspective and acceptance of ML apps, like DermExpert, in clinic for potential medical education use, as well as the extent of disruption to clinic by using such an app.

Methods: 40 patients with visible skin concerns or lesions were surveyed, via REDCap, with a 9 question survey, after the researcher administrating the study used, timed, and followed the instructions from DermExpert to generate a list of ddx. Surveys were administered at 2 URM dermatology clinics.

Results: Out of 40 subjects (N = 40), the average age was 56 ± 22 , White/Caucasian (33, 82.5%), Black/African American (5, 12.5%), Asian (2, 5.0%), female (20, 50.0%), and male (20, 50.0%). The average time to use DermExpert was 67 ± 23 seconds.

From the survey responses we found the following:

- 75.0% of patients supported the use of the app by medical providers (Q4: 22, 55.0% agreed and 8, 20.0% strongly agreed) and 82.5% for medical education (Q5: 24, 60.0% agreed and 9, 22.5% strongly agreed).
- 85.0% of patients did not feel like the app was disruptive to their clinic visit (Q7: 23, 57.5% agreed, and 11, 27.5% strongly agreed).
- 77.5% would use a smartphone app to better understand their skin (Q6: 21, 52.5% agreed and 10, 25.0% strongly agreed).

- Interestingly, only 57.6% reported they would actually use a smartphone app for skin education (Q9: 12, 30.0% Probably Yes and 11, 27.5% Definitely Yes) while 72.5% would actually use an app for monitoring their skin condition (Q9: 16, 40.0% Probably Yes and 13, 32.5% Definitely Yes).

Conclusion: The majority of participants felt positively towards the use of DermExpert in healthcare but more so for medical education use than a provider. As such, there are two areas for future research: (1) assessment of benefit for patients with a similar self-use app, and (2) measuring how helpful DermExpert or ML is for the user's education, which could possibly be measured through academic scoring or diagnostic accuracy.

Table 1. Patient Survey on DermExpert					
1. How confident would you be in your doctor's ability to diagnose if your doctor used a smartphone app or computer-based tool to assist in diagnosis?	Not at all confident (1, 2.5%)	A little confident (2, 5.0%)	Somewhat confident (9, 22.5%)	Confident (15, 37.5%)	Very confident (13, 32.5%)
Please select your level of agreement with each of the five statements below.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
2. I would be comfortable using a smartphone app that could help me diagnose my skin condition.	2, 5.0%	2, 5.0%	8, 20.0%	20, 50.0%	8, 20.0%
3. The doctor showing me how the App works resulted in a better understanding of my diagnosis and confidence in it.	1, 2.5%	0, 0.0%	13, 32.5%	19, 47.5%	7, 17.5%
4. I support the use of a diagnostic smartphone app by my doctor in routine clinical care.	1, 2.5%	1, 2.5%	8, 20.0%	22, 55.0%	8, 20.0%
5. I support the use of a smartphone app to assess skin conditions for medical education during routine clinical care.	2, 5.0%	0, 0.0%	5, 12.5%	24, 60.0%	9, 22.5%
6. I would use a smartphone skin picture analysis app to better understand my skin concerns.	1, 2.5%	1, 2.5%	7, 17.5%	21, 52.5%	10, 25.0%
7. I did not feel that the use of a smartphone app during my clinic visit was disruptive.	1, 2.5%	1, 2.5%	4, 10.0%	23, 57.5%	11, 27.5%
8. I have used a smartphone app for a skin condition.	No (27, 69.2%)	Yes (1, 2.6%)	I am not aware of such an app. (11, 28.2%)		

9.How likely are you to use a smartphone app for skin concerns for the following:	Definitely Not	Probably Not	Maybe	Probably Yes	Definitely Yes
Self-triage (decide whether I need to see a doctor or not)	1, 2.5%	6, 15.0%	13, 32.5%	13, 32.5%	7, 17.5%
Skin education	2, 5.0%	6, 15.0%	9, 22.5%	12, 30.0%	11, 27.5%
Facilitate discussion with doctor	2, 5.0%	3, 7.5%	8, 20.0%	15, 37.5%	12, 30.0
Monitoring of skin condition	3, 7.5%	4, 10.0%	4, 10.0%	16, 40.0%	13, 32.5%
Telemedicine	3, 7.5%	6, 15.0%	9, 22.5%	9, 22.5%	13, 32.5%

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Assessing the Impact of COVID-19 on Disparities of Accessibility of Genetic Testing, Treatment and Care

Objective:

The purpose of this study is to evaluate the delivery and accessibility of pediatric genetics care, testing, and follow-up in the Division of Pediatric Genetics before and after the SARS-CoV-2 pandemic (COVID-19) began. Additionally, with the expansion and integration of clinical genetics and shifts in the use of telemedicine as a method of care delivery, we sought to assess if disparities in genetics care access and delivery exist pre-COVID and during-COVID based on demographic factors.

Methods:

We retrospectively reviewed the electronic medical record for patients ages 0-18 seen for a new visit in the Division of Pediatric Genetics at Golisano Children's Hospital between September 2019 through March 2020 (pre-COVID cohort) and April 2020 through October 2020 (during-COVID cohort). We collected demographic variables such as age at the new visit, race/ethnicity, zip code as a proxy for socioeconomic status (SES), health insurance coverage, and use of medical interpretation services. Zip codes were linked to annual Median Household Income (MHI) estimates from the United States Census Bureau and stratified into three categories: low SES (less than \$42,000 MHI), middle SES (\$42,000 to \$84,000), and high SES (greater than \$84,000 MHI).

Patient age was categorized into 5 groups: ages 0-2, 3-5, 6-12, and 13-18. Outcome measures of interest were the time between receiving a pediatric genetics referral to the new visit, whether a visit was delivered in-person or through telemedicine, whether genetic testing was offered and, when applicable, completed within 6 months, and whether a follow-up visit was offered and, when applicable, completed within 6 months. We applied three outcome-specific exclusion criteria: inpatient referrals, recommended follow-up familial testing, and follow-up visit recommendations outside of 6 months.

Multivariate aggregate analyses were completed using SAS System Software, Version 9.4. Statistical significance was defined as $p < 0.05$.

Results:

For this study, 313 total new patient visits met inclusion criteria – 122 patients in the pre-COVID group and 191 in the during-COVID group. Between the two groups, patient demographics represented across race/ethnicity, socioeconomic status, health insurance plan, and use of medical interpretation services were similar. For age at new visit, a higher proportion of patients ages 0-2 were seen in Cohort 2 (41.4%) compared to Cohort 1 (29.5%).

The time between referral and the new patient visit was significantly shorter in Cohort 2 (170 days) compared to Cohort 1 (201 days) ($p = 0.0283$). Patients in Cohort 1 were significantly more likely to attend visits in-person rather than through telemedicine. A greater proportion of patients in Cohort 2 were able to complete recommended genetic testing within 6 months compared to patients in Cohort 1 ($p = 0.0007$). All other outcome measures showed no significant differences between cohorts.

Patients ages 0-2 in both cohorts had shorter times between receiving a pediatric genetics referral and the first visit ($p < 0.0001$). For Cohort 2, younger patients were more likely to complete recommended testing within 6 months. There were no significant differences across race/ethnicity, health insurance status, socioeconomic status, and use of medical interpretation services that were observed between the pre-COVID and during-COVID groups.

Table 1: Aggregate Pre-COVID 19 (Cohort 1) v. During-COVID 19 (Cohort 2) Comparison

	Cohort 1	Cohort 2	p-values
Time Between Referral and First Appointment *	201 days (n = 119)	170 days (n = 182)	0.0283
Telehealth vs. In-Person	100% In-Person Visits (n = 122)	63.35% In-Person Visits (n = 191)	< 0.0001
Was Genetic Testing Recommended? **	66.96% Yes (n = 112)	66.11% Yes (n = 180)	0.8807
Was Genetic Testing Completed within 6 Months? ***	42.67% Yes (n = 75)	67.23% Yes (n = 119)	0.0007

Was a Follow-Up Visit Recommended? ****	80.91% Yes (n = 110)	80.84% Yes (n = 167)	0.9883
Was a Follow-Up Visit Completed within 6 Months? *****	12.36% Yes (n = 89)	17.04% Yes (n = 135)	0.3397

* Missing values excluded from analysis.

** Out of n = 313, 21 total records met exclusion criteria and excluded from analysis.

*** 119 records either were not recommended genetic testing or met exclusion criteria for this outcome. These were excluded from analysis.

**** Out of n = 313, 36 total records met exclusion criteria and excluded from analysis.

***** 89 records either were not recommended a follow-up visit or met exclusion criteria for this outcome. These were excluded from analysis.

Conclusions:

We did not observe disparities in access to pediatric genetics care either pre-COVID or during-COVID based on race/ethnicity, socioeconomic status, insurance status, or medical interpretation services. Younger patients ages 0-2 in both cohorts had shorter time elapsed between referral and the new visit, which may suggest clinically indicated urgency for younger patients to seek genetics services. Significantly shorter time between referral and the first visit in Cohort 2 may reflect increased availability of appointments due to the influx in telemedicine use compared to Cohort 1. The small proportion of patients completing follow-up visits within 6 months in both cohorts suggests an increased need for care coordination to ensure patients can complete care in a timely manner and to mitigate these gaps in pediatric genetics care.

References

1. Edwards, Todd L et al. "Equity in Health: Consideration of Race and Ethnicity in Precision Medicine." *Trends in Genetics – Cell Press* vol. 36,11 (2020): 807-809. doi:10.1016/j.tig.2020.07.001
2. Maiese, D.R., Keehn, A., Lyon, M. et al. Current conditions in medical genetics practice. *Genetics in Medicine – Nature* 21,1874–1877 (2019). <https://doi.org/10.1038/s41436-018-0417-6>
3. Suther, S., Kiros, GE. Barriers to the use of genetic testing: A study of racial and ethnic disparities. *Genetics in Medicine – Nature* 11,655–662 (2009). <https://doi.org/10.1097/GIM.0b013e3181ab22aa>
4. United States Census Bureau. American Community Survey 2015-2019, 5 year estimates. Accessed July 13, 2021. <https://data.census.gov/cedsci/>

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The Association between Social Vulnerability and Other Risk Factors among a Cohort of Out-of-Hospital Cardiac Arrest Patients Transported by Emergency Medical Services in Rochester, NY

Introduction:

According to the American Heart Association, out-of-hospital cardiac arrest (OHCA), or sudden cardiac death, is a leading cause of death in the United States, impacting approximately 350,000 patients each year. OHCA has a case fatality of 90-96%. These patients are often treated by the ambulance-based emergency medical services (EMS) system. While OHCA arrest remains a significant source of morbidity and mortality within the general public, identifying modifiable risk factors that contribute to OHCA arrest and vary among populations within the US is critical for improving patient outcomes. While the literature has focused primarily on medical conditions that increase the risk of OHCA, our study aimed to utilize a biopsychosocial approach to identify modifiable risk factors associated with incidences of out of hospital cardiac arrest. Furthermore, our study aimed to identify which risk factors, if any, disproportionately impact marginalized communities by stratifying patient zip codes based on a social vulnerability index.

Methods:

We conducted a retrospective cohort study of patients presenting to one local EMS agency for OHCA between January 1, 2019 and December 31, 2019. All EMS patients dispatched as OHCA were included in our initial analyses evaluating demographic risk factors. A comprehensive electronic medical record review was conducted on a sub-cohort of these patients who were transported to Strong Memorial Hospital to identify further medical and psychosocial risk factors. The medical record abstraction process was pre-tested and pilot-tested to identify areas requiring

clarification and to refine variable definitions. Any discrepancies and areas of ambiguity were discussed in consultation with the faculty mentor. A final process for the medical record abstraction was developed and conducted in a standardized fashion.

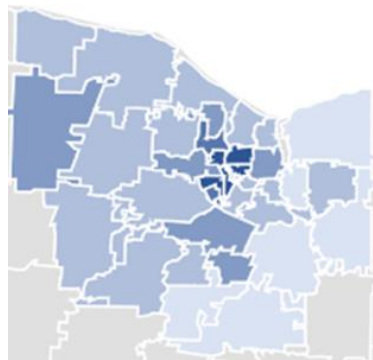
A critical component of this study was the classification of patients according to degree of neighborhood-level social and economic vulnerability. To do this, we used the Social Vulnerability Index (SVI). The SVI uses fifteen U.S. census variables at the tract level to identify communities that are most likely to be affected by stressors on human health, such as natural or human-caused disasters and epidemics. This index has been previously used to study a number of health conditions such as opioid overdose and exposure to environmental pollutants. We used the patient's zip code at the time of their EMS encounter to classify patients as having high or low social vulnerability.

Descriptive statistics were used to characterize the study sample for both the EMS cohort and the sub-sample of patients transported to Strong Memorial Hospital. SVI was classified into high and low categories and all potential demographic and clinical risk factors were explored via bivariate analyses. A p value < 0.05 was considered statistically significant for all analyses. Additionally, the mapping feature within Microsoft Excel was used to visually present SVI in the Rochester, NY community.

Results:

Data were analyzed on 1,058 OHCA EMS patients. In our analyses, we identified areas of Rochester, NY that were classified as areas of high social vulnerability according to the CDC's SVI tool. A total of 270 (25.5%) patients were classified as having low social vulnerability and 788 (74.5%) were classified as having high social vulnerability. The gradient of social vulnerability can be seen in Figure 1.

Figure 1: Social vulnerability across Monroe County zip codes.



In our cohort of OHCA patients, we observed statistically significant differences in demographic characteristics based on degree of social vulnerability. Patients who were transported from a high social vulnerability zip code were more frequently of Black race when compared to those transported from low social vulnerability zip codes (55.5% vs 20.1%; $p < 0.0001$). Patients transported from high social vulnerability zip codes were also more frequently of female gender

(41.1% vs 32.0%; $p = 0.007$) and of younger age ($p = 0.005$). Although it did not reach statistical significance, we also observed that the frequency of patients from high social vulnerability zip codes with a documented substance use disorder was nearly double that of patients from a low social vulnerability zip code (38.5% vs. 19.2%; NS). Similarly, a greater percentage of OHCA patients transported from high social vulnerability indexes had visited the emergency department in the last 6 months when compared to patients transported from low social vulnerability indexes (46% vs 28%; NS).

Conclusion:

The preliminary results of our study suggest that differences in demographic and clinical characteristics of OHCA patients from communities with differing social vulnerability indexes exists, and may present an opportunity for further intervention amongst our most socially vulnerable patients.

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**EXTRACRANIAL CEREBROVASCULAR ATHEROSCLEROSIS IN FIBROMUSCULAR
DYSPLASIA**

INTRODUCTION

Fibromuscular dysplasia (FMD) is a non-inflammatory, non-atherosclerotic vascular disease that has been described in virtually every vascular bed in the body but is most commonly found in the renal and extra-cranial cerebrovascular arteries. FMD can lead to stenosis, beading, dissection, and/or aneurysm with sometimes devastating effects. It is most commonly associated with hypertension (due to renal artery stenosis) or stroke, although it seems to be asymptomatic in the majority of cases.

Stroke prevention and care is a major topic in the current medical community. Common risk factors for stroke include hypertension, carotid artery stenosis, hyperlipidemia, smoking, diabetes, male sex, and advancing age. Almost invariably, patients presenting for stroke are started on statin therapy, as HLD is highly associated with formation of atherosclerosis and subsequent increase in risk of further stroke.

Interestingly, FMD tends to be associated with stroke due to entirely different factors and is associated with intracranial aneurysm rupture, spontaneous carotid/vertebral artery dissections and occlusions, and even spontaneous subarachnoid hemorrhage especially in younger women.

Another unique characteristic that has not previously been described is the apparent lack of formation of atherosclerotic plaque at the carotid artery bifurcation, even in the setting of typical risk factors for its formation.

The authors gathered more than 50 patients above 50 years old that underwent advanced vessel imaging (in the form of CTA, MRA, or DSA) and were noted to have FMD, and then independently evaluated the extracranial cerebrovascular vessels for carotid artery stenosis secondary to atherosclerotic plaque. These patients were then compared to published data and found to have similar "amount" of risk factors as age-matched controls.

The pathogenesis of FMD is poorly understood. Therefore, we will not attempt to explain why patients with this disease appear to be resistant to the formation of atherosclerotic plaques. However, the lack of carotid artery stenosis on advanced vessel imaging in FMD patients is a novel concept that has not previously been reported. It may imply that FMD patients deserve tailored stroke risk factor modification or entirely different care altogether.

OBJECTIVE

Evaluate for the presence of atherosclerotic stenosis in patients with extra cranial cerebrovascular fibromuscular dysplasia (FMD).

BACKGROUND

FMD is a non-inflammatory, non-atherosclerotic vascular disease most commonly found in the renal and extra-cranial cerebrovascular arteries. In most cases, it is benign, but it can also lead to transient ischemic attacks and/or stroke secondary to stenosis, beading, dissection, pseudoaneurysm, and intracranial aneurysm. FMD predominantly affects a young female population without the typical stroke risk factors.

In 2012, it was estimated that approximately 15% of ischemic stroke was secondary to carotid artery atherosclerosis. Interestingly, although a portion of these stroke patients are noted to have FMD, there was minimal evidence of extracranial cervicocranial atherosclerosis in that population.

DESIGN/METHODS

We collected 57 patients who were noted to have FMD on advanced vascular imaging of the head and neck and performed a retrospective chart review. The imaging was independently reviewed by an attending neuroradiologist to assess first for the presence of atherosclerotic carotid artery stenosis, and then to grade it based on severity of stenosis. We have since collected 316 more patients who were identified and will be analyzed using the same methods.

RESULTS

Current literature describes a carotid artery stenosis (CAS) as >50% narrowing of the vessel, with a prevalence of approximately 3.4% in asymptomatic patients who are above 50 years old in the American population. We found 57 patients in this age group who were noted to have FMD, many of whom presented symptomatically from stroke, none had CAS secondary to atherosclerosis. One patient had CAS due to ICA occlusion secondary to dissection rather than due to atherosclerosis. Furthermore, only 8 out of 46 patients had atherosclerosis of any severity despite having a similar prevalence of HTN, HLD, tobacco use, and DM.

FUTURE PLANS

Complete imaging and data analysis for 316 more patients with FMD to add to the pilot data (see above). Follow FMD patients long term to evaluate their risk of adverse event secondary to stroke. Examine FMD multicenter database to adequately power a study. Develop guidelines for stroke prevention in the FMD population.

CONCLUSIONS

Although atherosclerotic carotid artery stenosis is a major risk factor for ischemic stroke, patients with extracranial cerebrovascular FMD have a significantly lower prevalence of atherosclerosis than the general population.

REFERENCES

1. Slovut, David. Fibromuscular Dysplasia. *N Engl J Med* 2004; 350:1862-1871. DOI: 10.1056/NEJMra032393
2. Pasquini, M., Trystram, D., Nokam, G., Gobin-Metteil, M., Oppenheim, C., & Touzé, E. (2015). Fibromuscular dysplasia of cervicocephalic arteries: Prevalence of multisite involvement and prognosis. *Revue Neurologique*, 171(8-9), 616-623. doi:10.1016/j.neurol.2015.02.011
3. Narula, N., Kadian-Dodov, D., & Olin, J. W. (2018). Fibromuscular Dysplasia: Contemporary Concepts and Future Directions. *Progress in Cardiovascular Diseases*. doi:10.1016/j.pcad.2018.03.001
4. Cheng, S. F., & Brown, M. M. (2017). Contemporary medical therapies of atherosclerotic carotid artery disease. *Seminars in Vascular Surgery*, 30(1), 8-16. doi:10.1053/j.semvascsurg.2017.04.005

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Evaluating colorectal cancer screening rates: Adherence status and validity of self-reports in the emergency department

BACKGROUND: Colorectal cancer (CRC) and lung cancer are among the most common and most deadly types of cancer throughout the world¹, representing two of the top three causes of both new cancer diagnoses and cancer related death in the USA in 2016². In CRC, significant reductions in morbidity and mortality have been seen over the past several decades, which has been largely attributed to an increase in preventative screening participation^{2,3}. Morbidity and mortality of lung cancer has also been declining, though this is more widely attributed to changes in smoking habits than screening utilization, which remains exceedingly low⁶⁻⁸. Creation of effective health maintenance guidelines for screening relies on accurate measurement of current utilization in the general population, however, most current statistics have been gathered using potentially unreliable self-reporting methods and some studies have indicated that over-reporting may be common. We hypothesize that potential reasons for over-reporting include difficulty remembering detailed person health histories, and poor comprehension of various screening protocols (ie, colonoscopy vs sigmoidoscopy).

METHODS: Our study attempted to quantify the reliability of standard self-reporting measures by comparing self-reported history with screening behavior documented in electronic medical records (EMR). A total of 157 subjects were recruited from a patient pool consisting of patients admitted to the Strong Memorial Hospital (SMH) emergency department (ED) who fell within the current USPSTF guidelines for CRC or lung cancer screening. Each subject was given a short survey in the ED consisting of demographic and access to care questions, as well as screening history questions taken from the National Health Interview Survey (NHIS) sections on CRC and lung cancer screening. Data from these surveys were then compared recorded screening procedures in each patient's EMR.

RESULTS: Data analysis for this project is ongoing, and no significant results have been determined at this stage. Preliminary results indicated that self-reported screening rates within our patient pool are on-par with nationally reported average rates. Initial chart review shows that significantly

fewer screening test or procedures have been documented in EMR than were self-reported on surveys, however, final analysis will have to account for the possibility that documentation of past tests may not be available via the SMH eRecord system. Likely, guidelines will be established regarding the robustness of records available for a given subject, and those with overly sparse electronic histories will be excluded from data analysis. After completing primary analysis, additional analysis will be conducted using demographic and access to care question from the surveys to determine whether any self-reported social factors are predictive of screening adherence or accuracy of self-reporting.

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Effects of Air Pollution Exposure on Brain Development as a Risk Factor for Neurodevelopmental Disorders

Numerous epidemiological studies have shown evidence linking air pollution (AP) and neurodevelopmental disorders (NDDs), including autism spectrum disorder, schizophrenia (SCZ), and ADHD, with brain development as a potential target. Additionally, biological plausibility has been provided for this association in assessments of mice with developmental exposures to inhaled concentrated ambient ultrafine particulate (UFP; < 100 nm particulate matter) at human relevant levels, with UFP considered the most reactive and inflammatory component of air pollution. These studies demonstrate phenotypic characteristics similar to those of SCZ and other NDDs, including persistent, microglial activation, enlarged lateral ventricles, reduced size and myelination of corpus callosum/brain disconnectivity, altered brain glutamate and dopamine, and impairments in social, cognitive and impulsive-like behaviors. Additionally, these effects in mice were highly male biased, consistent with the greater frequency of SCZ and other neurodevelopmental disorders in males.

Human and animal studies have shown oxidative stress, inflammation, and consequent microglial activation during brain development as imparting high risk for SCZ. UFP, particularly redox active contaminants such as Cu and Fe, are inflammatory stimuli that we hypothesize enhance microglial activation and the release of pro-inflammatory cytokines leading to exaggerated synaptic pruning, phagocytosis of stressed neurons, and impaired oligodendrocyte maturation, resulting in the reduction of both gray matter and white matter volume. Brain microglial colonization/activation occurs earlier in the male brain (postnatal days 4-7 and 10-13/ human 3rd trimester brain equivalent), compared to females (postnatal days 20-28/ mid-adolescence), a mechanism that may be key to male-biased vulnerability.

This project aims to elucidate whether UFP exposures during development and/or adolescence, both periods of significant brain development, lead to brain metal dyshomeostasis and thereby reproduce features of these NDDs, specifically ventriculomegaly, white matter disconnectivity, and

how such changes reflect different critical periods of exposure. Groups of 9-12 mice of each sex were exposed to either UFPs (at human-relevant concentrations) or filtered air (control) at postnatal days 4-7 and 10-13, postnatal days 39-42 and 45-48, yielding 4 different exposure groups (Air-Air, Air-UFP, UFP-Air, UFP-UFP). Brain tissue samples were collected, sliced, and stained with antibodies against IBA-1, GFAP, and MBP to assess microglia activation, astrocyte count, and myelination status respectively using immunofluorescence. Data analysis will be conducted using multi-factor ANOVAs with factors initially including sex and treatment group in order to further investigate how timing of UFP exposure impacts neurodevelopment and how these outcomes differ based on sex, in order to gain a better understanding of SCZ and other NDD's etiology.

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Feasibility and preliminary findings of an evidence-based exercise intervention with novel electronic health record integration for testicular cancer survivors: a randomized controlled pilot study

ABSTRACT

Background

Testicular cancer survivors (TCS) treated with chemotherapy have increased risk of cardiovascular disease compared to the general population. The Exercise for Cancer Patients (EXCAP™©) intervention was developed as a self-directed, individually tailored exercise intervention to improve cardiovascular and muscular function for cancer patients and survivors. Health data integration (eHealth) with the electronic medical record (EMR) may be an optimal modality to deliver this program to TCS.

Methods

TCS were randomized to Arm 1 (EXCAP and eHealth EMR integration), Arm 2 (EXCAP), or Arm 3 (Usual Care). Arm 1 and Arm 2 completed a 12-week EXCAP intervention with a goal of progressively increasing daily steps (up to 12,000) and daily resistance band exercises (up to 4 sets of 15 repetitions for each exercise). Arm 1 utilized the eHealth platform, which integrated data from a wearable digital activity tracker (DAT) into the participant's EMR. Arm 2 recorded daily physical activity in a diary. Arm 3 was given a standardized TCS survivorship care plan that emphasized exercise. An exercise physiologist provided feedback and exercise prescription adjustments to participants in Arms 1 and 2, with participants in Arm 1 receiving this information via the Epic MyChart virtual portal. Feedback via MyChart was based on real time physical activity data collected via the EPIC MyChart portal that synced exercise data to EHR.

Results

43 TCS consented to the study and 28 TCS (65%) completed the study and 3-month follow-up. For Arm 1 participants (N=10), exercise physiologist utilized 159 MyChart messages to adjust step prescriptions (N=61) and remind subjects to upload steps and resistance band exercises into the EHR by syncing their DAT. Each TCS in Arm 1 received an average of 15.5 messages over the course of the intervention. Exercise physiologists took an average of 2.5 days to respond to messages categorized as "questions"; 3 days for "feedback" messages; and 4 days for "health and work updates". Six of the 10 Arm 1 participants (60%) reported weekly contact by study staff to be a motivating component of the intervention, and all Arm 1 participants reported wearing the DAT band was a motivating component. For Arm 2 (N=10), four participants (40%) reported recording daily activity in the activity diary as a motivating component of the intervention. Arm 1 participants rated little to no difficulty with using the MyChart portal (0.3/4 on a 4-point scale), and moderate difficulty with synchronizing data from the DAT to MyChart (1.5/4).

Conclusions

Data integration with EHR is technically reliable and may enable efficient delivery of the EXCAP intervention to TCS. Further analyses are being conducted to evaluate the effects of the EXCAP program on participant fitness and quality of life.

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Development of a pragmatic theoretically grounded semi-structured interview guide to understand the implementation of controlled substance safety committees in primary care settings

Background: Controlled Substance Safety Committees (CSSC) are becoming increasingly common in primary care practices (PCP) to ensure patients have access to safer guideline concordant medication treatment for chronic pain. Recent quantitative data suggest they helped reduce deaths, but strategies for implementation of CSSCs are not well-understood. To close this gap, we developed and tested a theoretically grounded semi-structured interview (SSI) guide that can be used for rapid qualitative assessment.

Methods: The study design for this research project is a Sequential Rapid Assessment. The population studied in this project is primary care providers.

Findings: The CSSC SSI was developed in 4 phases using the COM-B (capabilities, opportunities, motivation, behavior) theoretical framework. In phase 1, we reviewed the literature to develop a pool of n=43 potential questions. In phase 2, we mapped those questions to components of the COM-B model. In phase 3, the questions were member checked by expert clinicians to identify gaps in content. Ten questions were dropped, the SSI was restructured, and core adaptations were incorporated. In phase 4, we field tested the SSI with n=4 clinicians involved in managing chronic pain with opioid medications. Subsequent changes were made related to broadness and specificity. The final SSI contained 33 theoretically grounded questions and took approximately 20 hours to develop.

Conclusions: Our findings have implications for both advancing the field of CSSCs in primary care and rapid qualitative assessment methodology in implementation research science. There were many challenges encountered in developing the SSI. The research team developed multiple drafts of the SSI and protocol. Several of the drafts were related to not only content, but selection of theory, SSI structure and format.

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Tic Severity and Family Function in Children with Tourette Syndrome and Coprophenomena

Objective

To determine associations among tic severity, commonly co-occurring symptoms, and family functioning in youth who have Tourette Syndrome (TS) with coprophenomena compared to those who have TS without coprophenomena.

Background

Tourette Syndrome is a neuropsychiatric condition affecting about 1% of children that is defined by the presence of multiple motor tics and one or more phonic tics with symptom duration of at least one year. Although uncommon, coprophenomena are a widely popularized category of tics that are characterized by obscene sounds, words, or gestures, which are inappropriate within the social context. Children with TS commonly have co-occurring Attention-Deficit Hyperactivity Disorder (ADHD), Obsessive-Compulsive Disorder (OCD), Oppositional-Defiant Disorder (ODD), or a combination. Previous studies have also shown that children with TS have lower scores on measures of individual and family functioning than their peers without TS. Overall tic severity has not been shown to be associated with impaired function, but due to the potential social impact of coprophenomena we wondered whether their presence may impact individual and family function. We conducted analyses to compare symptoms and function in youth with (TS+copro) and without (TS-copro) coprophenomena.

Methods

The University of Rochester (UR) and University of South Florida (USF) jointly conducted the Tic Impact Study, a cross-sectional study involving children with tic disorders recruited at both UR

and USF. Data were collected from a sample of 205 children with tic disorders aged 5-18 years, as well as their caregivers and teachers. We limited our analyses to the 170 subjects with a TS diagnosis who provided information about the presence or absence of coprophenomena. Assessments were completed at a single research visit and included structured and semi-structured interviews and child self-report and parent-proxy report instruments. Key clinical features assessed by physician raters included tic severity, ADHD symptom severity including an ODD subdomain, OCD symptoms, and global function. Family impact was measured in the domains of parent health-related quality of life (HRQOL), family functioning, and total family impact. Wilcoxon rank-sum testing was used to compare the median scores of the clinical feature and family function measures.

Results

Of the 170 recruited subjects with TS, 17 (10%) exhibited coprophenomena. Subjects with TS and coprophenomena had a clinically significant higher tic severity score than those without coprophenomena (TS+copro = 36.9, TS-copro = 20.8, $p < 0.0001$). Subjects with coprophenomena had higher scores in all but one subdomain of tic severity, the frequency of motor tics. This included higher scores for number of tics, frequency of phonic tics, tic intensity, tic complexity, and tic interference in intended speech or actions. Patients with coprophenomena also had lower median scores for global function (TS+copro = 51, TS-copro = 60, $p = .0042$), family functioning (TS+copro = 43.75, TS-copro = 59.38, $p = .0007$), parent HRQOL (TS+copro = 57.5, TS-copro = 72.5, $p = .0003$), and total family quality of life (TS+copro = 50.69, TS-copro = 65.28, $p = .0042$).

Conclusions

Overall tic severity was positively associated with the presence of coprophenomena. Of ten tic severity subdomains, patients with coprophenomena had higher scores in all but one. We found that youth with TS and coprophenomena have lower global functioning and poorer family function and that parent HRQOL was also lower than in youth with TS without coprophenomena. These results indicate that coprophenomena may be a component of a more severe phenotype of TS. Given the association of coprophenomena in TS patients with decreased global function, family function, and parent HRQOL, these patients may particularly benefit from interventional treatment for tics and family counseling. Future studies will benefit from a larger sample size of patients with coprophenomena, as well as prospectively following subjects over time.

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Performance of the ARUP Extended Myositis Panel for Idiopathic Inflammatory Myopathies

Background: Idiopathic inflammatory myopathies (IIM) are a heterogeneous group of autoimmune disorders with multisystem involvement. Traditionally, this group includes dermatomyositis (DM), polymyositis (PM), and inclusion body myositis (IBM) which are classified using predominantly skin presentation. The critical requisite for defining seropathological features in IIM has given the impetus to change the IIM classification into four major subgroups: DM, IBM, immune-mediated necrotizing myopathy (IMNM) and anti-synthetase syndrome (ASS). Given the multisystem involvement of IIM and the overlap of subgroups within IIM, patients typically see multiple providers including dermatologists, rheumatologists, and neurologists and can thus receive varying diagnoses. The optimal treatment for each IIM subgroup varies and involves immunosuppressants and anti-malarials. Herein, we propose to test a commercially available kit, the ARUP Extended Myositis Panel, to determine its validity to serve as a tool for the diagnosis of IIM subgroups. Another objective of this study is to investigate the clinical manifestations of different subgroups of IIM in the context of autoantibody positivity.

Methods: This study included 462 patients who had the ARUP Extended Myositis Panel ordered at the University of Rochester Medical Center. The ARUP Extended Myositis Panel is a kit used to test for myositis specific and associated autoantibodies. In this retrospective chart review, pertinent clinical and lab data for each patient was collected through Epic. The sensitivity, specificity, and positive predictive value (PPV) of the panel for different IIM subgroups were evaluated using GraphPad. The correlation between autoantibodies and clinical manifestations was analyzed with a Chi-squared and Fisher's exact test using SPSS.

Results: Overall, 150 patients tested positive for an autoantibody with 100 patients having an IIM. 63 patients had DM, 14 had ASS, 10 had IMNM, 9 had overlap syndrome, 1 had IBM, and 3 had nonspecific PM. The sensitivity and specificity of the panel for IIM was 68% and 91% respectively. Of those with DM or ASS, the panel had an 81% sensitivity. The PPV for dermatomyositis specific autoantibodies (DMSA) was 87% and for ASS autoantibodies was 93%. The panel had a 100%

sensitivity for overlap syndrome and 60% for IMNM. The PPV for signal recognition particle (SRP), an autoantibody correlated with IMNM, was 75%. There were 15 significant ($p < 0.05$) associations between autoantibodies and clinical presentation including Jo1 and lung disease.

Conclusions: The high specificity of the ARUP Extended Myositis Panel for IIM is reassuring since misdiagnosis may cause iatrogenic harm. The panel had the highest sensitivity for overlap syndrome and ASS with every patient testing positive for a respective autoantibody. Each of the significant associations between autoantibodies and clinical presentation corroborated with literature that was primarily based on non-commercially available assays. Data from our retrospective study demonstrates that the commercially available ARUP Extended Myositis Panel is a valid tool for the diagnosis of IIM subgroups. Overall, these seropathological features aid the diagnosis and management of the newly reclassified IIM subgroups DM, IBM, IMNM, and ASS.

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Suicide and Non-suicidal Self-injury Risk in Transmasculine Adolescents with Chest Dysphoria

Transgender individuals have been shown to disproportionately experience several negative health outcomes and are at higher risk for suicidality, non-suicidal self-injury (NSSI), anxiety, depression, substance use disorders, and experiencing violence.^[1-9] Transmasculine (TM) individuals are people who were assigned female at birth but whose gender identity is male or falls somewhere along the male spectrum. Compared to their transfeminine, non-binary, and cisgender peers, TM youth have been shown to have higher rates of attempted suicide.^[9] In addition, TM youth are at higher risk of engaging in NSSI compared to trans youth of other identities.^[10] One unique phenomenon that many TM youth experience is chest dysphoria, which is emotional or physical discomfort and distress related to the unwanted development of breasts. Chest dysphoria is often associated with impairment in daily living and physical functioning. Studies have begun to explore TM youth's experience with chest dysphoria via validated measures and chest dysphoria has been associated with higher anxiety and depression in transmasculine and nonbinary adolescents assigned female at birth.^[11-13] However, the relationship between chest dysphoria and suicidality and NSSI has not yet been explored. Thus, the goal of this summer research project was to design a survey study that explores the risk of suicide and non-suicidal self-injury (NSSI) in transmasculine adolescents with chest dysphoria. In drafting this survey, primary literature was searched and various validated measures including the Chest Dysphoria Scale, The Youth Risk Behavior Survey, and the Self-Injurious Thoughts and Behaviors Interview (SITBI) were explored and integrated into a survey draft. Work was done in collaboration with suicide researchers to overcome the safety and ethical challenges of surveying for high-risk behaviors in order to develop a method of assessment that could be ethically performed without requiring parental consent. Moving forward, the next steps will be to pilot the survey instrument with a limited number of youth and further refine it, disseminate the survey instrument to TM youth across the United States, analyze the data, and specifically examine the correlation between chest dysphoria and suicidality/NSSI in transmasculine youth.

References

1. Aitken, M., et al., *Self-Harm and Suicidality in Children Referred for Gender Dysphoria*. J Am Acad Child Adolesc Psychiatry, 2016. **55**(6): p. 513-20.
2. Austin, A., et al., *Suicidality Among Transgender Youth: Elucidating the Role of Interpersonal Risk Factors*. Journal of Interpersonal Violence, 2020: p. 088626052091555.
3. Hunt, Q.A., Q.J. Morrow, and J.K. McGuire, *Experiences of Suicide in Transgender Youth: A Qualitative, Community-Based Study*. Archives of Suicide Research, 2020. **24**(sup2): p. S340-S355.
4. Johns, M.M., et al., *Transgender Identity and Experiences of Violence Victimization, Substance Use, Suicide Risk, and Sexual Risk Behaviors Among High School Students — 19 States and Large Urban School Districts, 2017*. MMWR. Morbidity and Mortality Weekly Report, 2019. **68**(3): p. 67-71.
5. Newcomb, M.E., et al., *High Burden of Mental Health Problems, Substance Use, Violence, and Related Psychosocial Factors in Transgender, Non-Binary, and Gender Diverse Youth and Young Adults*. Arch Sex Behav, 2020. **49**(2): p. 645-659.
6. Perez-Brumer, A., et al., *Prevalence and Correlates of Suicidal Ideation Among Transgender Youth in California: Findings From a Representative, Population-Based Sample of High School Students*. Journal of the American Academy of Child & Adolescent Psychiatry, 2017. **56**(9): p. 739-746.
7. Peterson, C.M., et al., *Suicidality, Self-Harm, and Body Dissatisfaction in Transgender Adolescents and Emerging Adults with Gender Dysphoria*. Suicide and Life-Threatening Behavior, 2017. **47**(4): p. 475-482.
8. Taliaferro, L.A., et al., *Risk and Protective Factors for Self-Harm in a Population-Based Sample of Transgender Youth*. Archives of Suicide Research, 2019. **23**(2): p. 203-221.
9. Toomey, R.B., A.K. Syvertsen, and M. Shramko, *Transgender Adolescent Suicide Behavior*. Pediatrics, 2018. **142**(4): p. e20174218.
10. Leon, K., et al., *Prevalence and Risk Factors for Nonsuicidal Self-Injury in Transgender and Gender-Expansive Youth at a Rural Gender Wellness Clinic*. Transgend Health, 2021. **6**(1): p. 43-50.
11. Mehringer, J.E., et al., *Experience of Chest Dysphoria and Masculinizing Chest Surgery in Transmasculine Youth*. Pediatrics, 2021. **147**(3): p. e2020013300.
12. Olson-Kennedy, J., et al., *Chest Reconstruction and Chest Dysphoria in Transmasculine Minors and Young Adults*. JAMA Pediatrics, 2018. **172**(5): p. 431.
13. Sood, R., et al., *Association of Chest Dysphoria With Anxiety and Depression in Transmasculine and Nonbinary Adolescents Seeking Gender-Affirming Care*. J Adolesc Health, 2021. **68**(6): p. 1135-1141.

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Physical Restraints in the Emergency Department – A Case Series of Demographic and Clinical Characteristics and Potential Race and Gender Disparities

Background:

Race and gender disparities are well-documented in the medical literature. One area of recent focus is the acute care setting, including the emergency department (ED), where care decisions are often time-sensitive. The management of acutely agitated patients is crucial in maintaining safety for both patients and healthcare providers and the application of physical restraints is required. The lack of an established standard of care to manage these patients, who often present with an array of symptoms and chief complaints, can complicate provider decision-making. As such, provider discretion is often used to assess what interventions are needed in these high stress patient encounters. This judgement is subject to implicit bias, potentially worsening health disparities. The purpose of this study is to describe the demographic and clinical characteristics of patients who received physical restraints at a large academic ED and identify potential race and gender differences.

Methods:

A retrospective case series was conducted on patients presenting to Strong Memorial Emergency Department from January 1, 2019, to December 31, 2019 who had an electronic medical record order for physical restraints in the ED. As the ED is a common intersection for different services in the hospital, restraint orders placed by ED providers were evaluated separately than restraint orders placed by non-ED providers. Patients who had incomplete data on demographic information were excluded from the study.

All data were entered into a HIPAA compliant database using the Research Electronic Data Capture (REDCap) platform. Patient variables that were collected included: 1) demographic data (race, age, sex, zip code); 2) baseline health status (weight, height, BMI, Charlson comorbidity index, current medications); 3) social history (employment status, mental health history/diagnosis including addiction history, controlled substance use history, smoking status, marijuana use, alcohol use disorder, parental status); and 4) healthcare utilization (health insurance, PCP). Characteristics of the ED encounter were also abstracted and included: mental health arrest at the time of the visit, type of provider who placed restraint order (ED vs. non-ED), time of triage/registration, vital signs, location of room assignment (hallway bed or room), time of provider assignment, total treatment time, physical restraint type, discharge diagnosis, and ED disposition. A detailed data abstraction guide was developed based on expert consensus and a review of the literature. This abstraction guide was reviewed in an iterative fashion with faculty advisors and updated regularly. In areas of disagreement or ambiguity, individual patient records were discussed among the study team until consensus could be achieved. Descriptive statistics were used to characterize the study sample.

Results:

Data were abstracted on 29 patients who were restrained in the ED. The mean age of the study sample was 43.28 years with a standard deviation of 13.16 years. A majority of the sample was of male gender (62.1%). The majority of the sample was of white race (75.9%), followed by Black/African American race (17.2%), American Indian (3.4%), and other (3.4%). The mean BMI was 26.5 with a standard deviation of 7.72. The majority of patients did not have pre-existing medical comorbidities (61.5%); however, the most common co-morbid conditions were congestive heart failure (11.5%) and cancer (11.5%). The majority of the sample were insured via Medicaid (79.3%) and 10.3% were insured via Medicare. No patients in our sample had private insurance. There were 19 (70.4%) patients who had a prior mental health diagnosis and 12 patients (44.4%) had a documented history of substance use, including cocaine, opioids, amphetamines, cannabis, and sedatives. Current smoking status and alcohol use was common in our sample with 69% being active smokers, 37.9% using marijuana, and 69% using alcohol. The majority of patients had a mental hygiene arrest at the time of their ED visit (65.5%).

Restraint orders were most frequently placed by resident physicians (65.5%), followed by attending physicians (24.1%), and nurse practitioners (10.3%). The most common type of physical restraints were four-point restraints (48.3%), followed by five-point restraints (41.4%), and Posey restraints (10.3%). Twenty patients received medications in addition to physical restraints included Versed (30%), Ativan (30%), Haldol (30.0%), and Geodon (10.0%). The majority of patients were treated and released from the ED (57.1%); however, a large percentage of patients were admitted to the Comprehensive Psychiatric Emergency Program (32.1%) or admitted to an inpatient hospital unit (10.7%).

NOTE: Much of my research experience was spent developing a robust and standardized data abstraction guide. Data abstraction is ongoing, and I intend to continue this over the next 2

months with the goal of submitting an abstract to the Society for Academic Emergency Medicine Annual Meeting (abstract deadline February 3rd 2022).

Conclusion:

In our sample of ED patients who were physically restrained, we identified a number of potential disparities. In our sample, we saw higher than expected numbers of patients of Black race, male gender, Medicaid insurance, history of mental health diagnoses, and history of substance use than would be expected based on demographic and clinical characteristics of the Rochester, NY region. These findings are preliminary in nature and warrant future research with the use of an ED-based control group.

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Educational Impact of Community Harm Reduction Experience: A Qualitative Study with Medical Students

Background and Objectives: Community health outreach experience, and harm reduction experience in particular, has the potential to help medical students develop skills and perspectives that uniquely benefit their clinical education and career preparedness. (Doobay-Persaud et al., 2019; Logan & Marlatt, 2010). Medical student participation in harm reduction community health outreach has the additional potential to benefit communities by building trust between medical systems and marginalized communities (Barbour, McQuade, & Brown, 2017). Our study aimed to assess these potential benefits by qualitatively assessing medical student takeaways from a harm reduction-based community outreach project. The project, a contraceptive health needs assessment, was conducted at Trillium Health Harm Reduction Services (a Syringe Exchange Program [SEP]) by University of Rochester School of Medicine and Dentistry (URSMD) medical students in 2019-2020. We aimed to evaluate how student participation in this project impacted their medical education and career.

Methods: Semi-structured qualitative interviews were conducted with six of the nine medical students who participated in the 2019-2020 Trillium SEP project. The interview guide included questions regarding student learning, impacts on their educational path and career preparedness, perceived benefits to the community, and medical students' perspectives on the role of community outreach and harm reduction education in the medical student experience. Interviews were recorded, anonymously transcribed, and coded to identify emergent themes.

Results: Themes of student takeaways from their experience were grouped into three categories:

- 1) Student learning: Students identified learning outcomes unique to their participation in this project and not afforded elsewhere in their education. Students endorsed improving their preparedness for caring and advocating for marginalized populations, challenging implicit

biases, learning about harm reduction and its application in clinical medicine, and gaining a better understanding of community needs and community resources. Several students reported that this outreach experience impacted their career trajectory by inspiring a new or increased commitment to caring for the population they engaged with during this project— individuals who use drugs. Other educational takeaways included research skills, such as learning to work in partnership with community organizations, write grants, and write manuscripts, and clinical interviewing skills.

2) Community benefits: Students described forming positive relationships with the project's community partner (Trillium Health) and with Trillium's clientele. Students valued the opportunity to establish trust with this community, creating a bridge between the medical system and the marginalized community of individuals who use drugs. They felt the community appreciated the students' presence and, in contrast to a medical setting, were better able to engage in discussions in a comfortable space on their own terms. Students felt these relationships stand to benefit communities in the long term.

3) Logistical considerations: Students shared their perspectives regarding how medical student outreach can be effective and mutually helpful for communities and students. They noted the risk of harm to communities if medical student outreach is approached with anything but humility, interest, and a willingness to learn. Several students highlighted the importance of making outreach participatory, longitudinal, and collaborative, with reciprocity of services offered by students, community partners, and patients alike.

Conclusions: Medical students described a variety of educational takeaways and potential community benefits of their participation in a harm reduction community outreach project. In the setting of a collaborative and mutually respectful partnership between community organizations and medical students, harm reduction community outreach may be a uniquely impactful educational experience for students that simultaneously benefits communities.

References:

- Barbour, K., McQuade, M. & Brown, B. Students as effective harm reductionists and needle exchange organizers. *Subst Abuse Treat Prev Policy* 12, 15 (2017). <https://doi.org/10.1186/s13011-017-0099-0>
- Doobay-Persaud A, Adler MD, Bartell TR, Sheneman NE, Martinez MD, Mangold KA, Smith P, Sheehan KM. Teaching the Social Determinants of Health in Undergraduate Medical Education: a Scoping Review. *J Gen Intern Med.* 2019 May;34(5):720-730. doi: 10.1007/s11606-019-04876-0. PMID: 30993619; PMCID: PMC6502919. <https://pubmed-ncbi-nlm-nih.gov.ezpminer.urmc.rochester.edu/30993619/>
- Logan DE, Marlatt GA. Harm reduction therapy: a practice-friendly review of research. *J Clin Psychol.* 2010;66(2):201-214. doi:10.1002/jclp.20669 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3928290/>

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Good Night, Sleep Tight, Don't Let the Sleep Disturbances Bite

Introduction:

Sleep is a process critical to our daily physical revitalization, but sleep in the hospital is often very disruptive, causing hospitalized patients to have reduced total sleep time, earlier wake-up times, and an increased number of nightly awakenings when compared to sleep at home. There is a strong association between sleep loss during hospitalization and poorer health outcomes, including hypertension, hyperglycemia, delirium, and increased fall tendency. Additionally, fatigue and daytime sleepiness may negatively impact patient participation in physical therapy and ultimately the active recovery of neurological patients. We aimed to assess patient sleep quality and perceptions on sleep disturbances on a neurology inpatient unit, with the intent of eventually minimizing sleep disturbances on the floor.

Methods:

From April 2021 to August 2021, patients completed a series of validated questionnaires on an inpatient neurology unit at Strong Memorial Hospital. The validated questionnaires are the Potential Hospital Sleep Disruption and Noises Questionnaire (PHSNDQ), which assesses possible sleep disturbances experienced by the patient the night prior while on the floor, the Epworth Sleepiness and Berlin Questionnaire, which screen for daytime sleepiness and sleep apnea, respectively, and the Karolinska Sleep Questionnaire to assess sleep quality and sleep duration. Surveys were administered three times a week to patients available to participate (awake, oriented, willing to participate, slept on the unit for at least one whole night). Paper survey data were entered and stored on the REDCap Database Version.

Results:

We surveyed 88 patients on 5-1600, with 100 total surveys completed due to repeat-surveying of some patients on subsequent days. The male: female ratio of those surveyed was 44.6% to 55.4% were female-identifying, with a mean patient age of 50.77 years old. The top primary diagnosis in our patient sample was seizures (35.23%), followed by acute stroke (27.27%). The mean total sleep time across these patients was 6.93 hours, with an average sleep efficiency of 56.93%. Using dichotomized data from PHSNDQ, we calculated the percentage of patients disrupted by each item. Patients found bed comfort (57%), general noise (50%), and vital signs (46.5%) to be the most disruptive sleep disturbances on the floor and ranked neurologic checks (28.6%), staff conversations (24.2%), and light (22.4%) to be the least disruptive. 38 patients (43.18%) screened high risk for obstructive sleep apnea (OSA), though only 12 patients (13.64%) reported previous diagnosis, 7 of those patients (58.33%) reported treatment prior to admission, and providers did not order PAP for 4 of these patients (33%). Of the 9 patients on CPAP during hospitalization, 4 patients (44%) had difficulty tolerating it. Additionally, providers ordered sleep aids on 19 of those screened as high risk for OSA (50%) during their hospitalization.

Conclusion:

Patients agree that bed comfort, noise, and vital signs are the most significant disruptors of their sleep. There is undoubtedly room to minimize such disruptions, with a low sleep efficiency of 56.96% across the floor. Sleep efficiency may improve by bringing more attention to screening for undiagnosed sleep disorders when patients request sleep aids and troubleshooting PAP therapy. Our next steps include implementing sleep protocols onto the floor and reducing unnecessary overnight orders.

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We hope to see you soon; Evaluating the effectiveness of teleophthalmology screening in Rochester NY.

Introduction:

Diabetic Retinopathy (DR) is the leading cause of blindness for a large portion of the diabetic population in the United States. Cases of diabetic mellitus are rising globally due to several factors such as increased life expectancy and changes in global diet, and the use of tobacco products has been documented to contribute towards development of eye pathology.

Early ophthalmic monitoring for at risk patients could allow for earlier detection of ocular pathologies, in addition to reinforcement of adopting healthier lifestyles for patients. Implementation of nonmydriatic cameras in primary care settings could allow for increased ophthalmic screening protocols but their practice is not yet widespread. In this project, we aimed to assess whether patients who underwent ophthalmic screening were more likely to make and attend follow up appointments with the University's ophthalmology department. We also explored the relationship between smoking, visual acuity, and diabetic retinopathy within our patient population.

Methods:

Data was collected from five urban primary care locations located throughout Rochester for patients with diabetes needing an eye exam since 2015. Demographic factors followed were age, gender, and race. Ethnicity was classified as identifying as Hispanic or Non-Hispanic. Health insurance was categorized into commercial, Medicare, Medicare advantage, Medicare/Medicaid,

and Medicaid managed. Smoking behavior was classified as current, former, or non-smoker. Retinal images were used to diagnose vision threatening DR, non-vision threatening DR, no DR, or unknown if the image quality was poor/unreadable. Visual acuity was measured as binocular Logmar, converted from Snellen chart values collected at appointments. Diabetes management and BP control were evaluated on the basis of the patient's A1C and BP at their most screening appointment.

At the appointments, patients had retinal images taken, which were sent to Flaum to be evaluated by ophthalmologists. Based on the images, recommendations for follow up were made. Patients were followed via eRecord to see if they both made and kept these appointments. If the appointment was cancelled and rescheduled, they were followed until they made an appointment.

We aimed to see if there was an association between demographic factors, ethnicity, health insurance, smoking behavior, eye pathology, visual acuity, diabetes management, and blood pressure control with both making and keeping a follow up to eye care after obtaining a camera-based eye exam.

Results:

This data set contains 1321 patients, with 48% identifying as male, 52% identifying as female, and <1% identifying as non-binary. 423 identified as white, 673 identified as black, and 209 identified as other. Ethnically, 216 identified as Hispanic/Latinx, and 1104 identified as not Hispanic/Latinx. 141 had no insurance, while 1180 had some form of insurance. 315 said they were current smokers at the time of their appointment, 710 denied ever smoking, and 296 said they were former smokers. Statistical analysis is currently ongoing, with logistic regressions being run for categorical variables, and linear regression being used for continuous variable of vision.

Preliminary analysis shows that patients who were covered under Medicaid managed plans, who were diagnosed with either vision threatening or non-vision threatening DR, and those who had stage 1 or stage 2 hypertension were more likely to both make and keep follow up ophthalmic appointments. Analysis on the effect of other factors discussed such as race, gender, ethnicity, and so on are ongoing, and shall be reported on the poster. Analysis into the relationship of between smoking with visual acuity and DR is also ongoing.

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Evaluation of Cutaneous to Systemic Lupus Disease Progression Using Revised Classification Criteria

Background: Lupus erythematosus (LE) is an autoimmune disease with a wide spectrum of clinical presentations, from limited cutaneous involvement such as discoid lupus to life-threatening systemic manifestations such as central nervous system involvement. Most individuals with systemic lupus erythematosus (SLE) will have skin disease, which often precedes the diagnosis of SLE, but can also occur in the absence of systemic disease. Cutaneous lupus erythematosus (CLE), whether in the context of SLE or alone, can lead to significant morbidity and decreased quality of life. Accurate diagnosis of the type of LE determines the course of clinical treatment and effective management of symptoms. The primary focus of this project is to use a comprehensive CLE registry to evaluate how the new EULAR/ACR 2019 criteria affects the distinction between CLE and SLE in the context of clinical care.

Hypothesis: Fewer patients will be categorized as having progressed to SLE with the EULAR/ACR 2019 criteria as compared to the ACR 1997 criteria.

Methods: Patients with CLE of all subtypes were recruited into the cohort and added to a registry. A survey was administered at the initial and subsequent clinic visits. All data analysis was performed in Prism.

Results: Forty-nine patients were recruited into the registry, and a total of 109 visits were recorded. We found that 49% of patients met 1997 criteria for SLE while 47% of patients met 2019 criteria. One important factor for classification was the antinuclear antibody (ANA) titer. 41% of those meeting 1997 criteria were reliant on a positive ANA, while the number of patients meeting 2019 criteria would be 34% higher if not excluded based on a negative ANA. Subjects with a positive ANA were least likely to be categorized differently. The most significant change was for ANA- subjects, who by definition do not meet 2019 criteria for SLE at all.

Conclusions: Analysis of the two classification criteria reveals no significant difference in the percentage of subjects classified as having systemic lupus. However, the percentage of patients

classified under each set of criteria does not reflect the real differences between the criteria. ANA titer may account for the difference between the classification systems. The data does emphasize the need for a better understanding of contributing factors, such as ANA titer, in assigning patients to a SLE classification.

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- Femoral Hip offset performed at Charleston Institute of Advanced Orthopedics, Charleston, SC
- Statistical Analysis performed within the University of Rochester School of Medicine.

The Effect of Femoral Malrotation in Offset Templating for Total Hip Arthroplasty: A Cadaveric Study and Curvilinear Analysis

Abstract:

Background: Maintenance of femoroacetabular relationships via optimizing femoral offset and maintaining limb length through preoperative templating is critically important in total hip arthroplasty. In a joint with osteoarthritis, determination of joint normal physiologic location and femoral head center may be hampered by the loss of articular cartilage and bony deformity. Preoperative templating is crucial in selection of the appropriate implant size and optimal neck shaft angle. Techniques allow assessment of pre-operative offset in hip arthroplasty. This study assessed femoral rotation in preoperative offset templating using a cadaveric model.

Methods: Ten femurs were imaged at degrees of rotation. Offset was measured. In order to assist with proper placement of the femurs on the imaging table, a Steinmann pin was placed centrally through the lateral femoral head cortex using a Wright Medical Hemi-Resurfacing Guide™ (Memphis, TN). The pin also served as a known reference value for length to eliminate the parallax error. A general linear model (GLM) was used to analyze the variation in offset and rotation between neutral, 20 degrees of internal rotation (IR), and 20 degrees of external rotation (ER). Furthermore, non-linear regression was used to determine the relative change in adjusted mean offset at various points of rotation using curvilinear analysis techniques. Offset

was chosen as the dependent variable. The independent variables were bone number (numbered 1-10), rater (numbered 1-7), and position (IR, neutral, ER).

Results: Statistically significant differences at rotational positions were found. The adjusted mean offset measurements (and 95% confidence intervals) for neutral, internal and external rotations were 23.6 mm (23.3-23.9), 26.0 mm (25.7-26.3), and 19.1 mm (18.8-19.4) respectively. For all raters, ER was significantly different from IR and neutral positions. In the neutral position most of the variation was explained by variation from bone to bone ($p < 0.0001$), and the variation from rater to rater was not statistically different ($p = 0.13$). Each of the adjusted position means was statistically significantly different from the other.

Conclusions: Improved awareness of malrotation of the proximal femur and templating adjustments may improve THA outcomes.

Level of Evidence: Level III

Keywords: templating; femoral offset, cadaveric study, total hip arthroplasty

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PROMIS Scores Correlate to Treatment Selection for De Quervain Tenosynovitis

Introduction

De Quervain Tenosynovitis (DQT), remains a common source of pain and loss of hand function. Despite conservative management, many patients continue to experience persistent pain in the affected hand. Currently, choice of treatment is largely empiric, but, Patient Reported Outcomes Management Information System (PROMIS) scores at the time of diagnosis might provide insight into success of non-operative management and predict necessity for surgical release.

Materials & Methods

Patients presenting to a tertiary academic medical center from 2014-2019 with a sole diagnosis of DQT were identified. Patients <18 years old or that had other diagnosis were excluded. Patients were separated by treatment: physical therapy, injections, surgery or combinations thereof. Patients' status of undergoing surgery as an initial treatment and at any time before the end of the follow up period was also recorded. Chi-square analysis was performed to identify confounding variables or demographic factors that affect treatment strategy. A two-sided t-test was performed to identify differences in presenting PROMIS scores (PPS) between the initial and final operative status. Patient groups were then dichotomized by PROMIS score using predetermined cut-offs. Using logistic regression, odds-ratio of surgical intervention was determined based on each pertinent variable. Patients without a PPS were excluded from statistical tests involving PROMIS.

Results

Of the 1529 patients that met inclusion/exclusion criteria, 685 had PPS. Notably, survey response rates were much higher from patients choosing more invasive interventions. Older patients tended to choose more invasive treatments as their initial management. For initial treatment, 2.9% of patients chose PT, 84.8% chose injection, and 12.3% chose surgery. By the end of the follow up period 87.0% of patients received an injection, with 29.9% of those patients requiring at least one additional injection, and 29.9% of the total cohort eventually undergoing surgery. There were no significant differences in PPS between patients of any initial treatment group. However, significant differences in scores were found between patients of different final treatment groups. Upon dichotomization of patients by PROMIS scores it was determined that patients with Physical Function (PF) scores less than 40 (OR = 1.62 [1.062-2.47]) or Pain Interference (PI) scores of greater than 60 (OR = 1.62 [1.051-2.496]) had significantly increased odds of undergoing surgery. Age <40 or >60 and female gender also had an increased odds of undergoing surgery. Furthermore, patients who had both a low PF and high PI were observed to utilize the surgical treatment more than if they had either statistic alone.

Conclusions

PROMIS survey results could be used to identify patients that are likely to fail non-operative intervention for DQT. While there were no differences in PPS between patients choosing PT, injection or surgery as their initial management, patients who scored lower than 40 for PF or higher than 60 for PI had significantly increased odds of eventually undergoing surgery. In light of this, the use of PROMIS scores could aid in patient-clinician discussion and facilitate shared decision-making leading to more effective and earlier handling of symptoms for individuals with DQT.

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Social Determinants of Health Impact Postoperative Outcomes in Pediatric Appendicitis

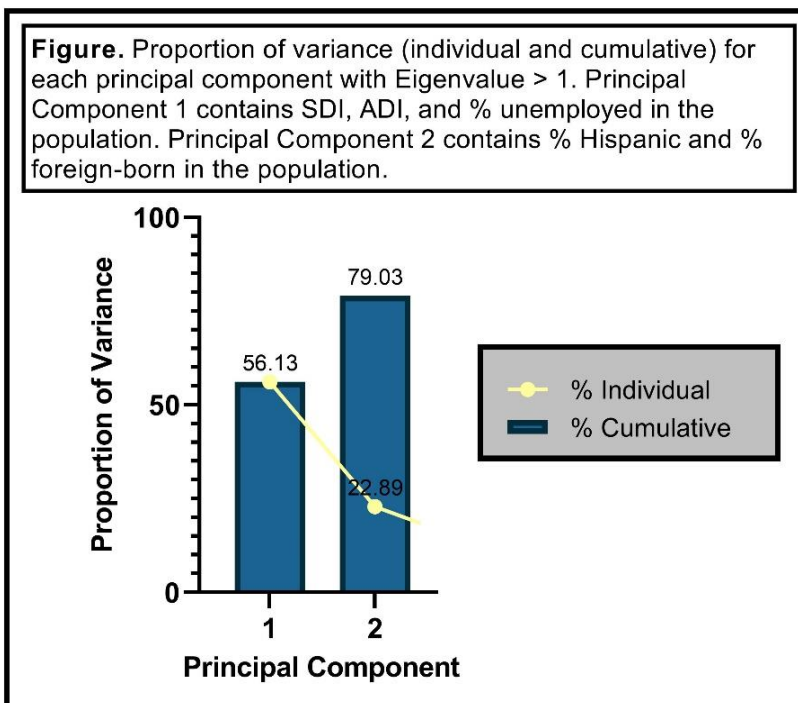
INTRODUCTION: Lower socioeconomic status (SES) has been linked to increased rates of complicated appendicitis. This study uses multivariate modeling to analyze the complex interactions between social determinants of health and postoperative outcomes in pediatric appendicitis.

METHODS: After institutional review board approval, we retrospectively reviewed all pediatric patients (age 0-18 y) who underwent appendectomy at our institution (2015—2020). Demographic variables (age, sex, race/ethnicity, insurance status) were abstracted from NSQIP-P. Home addresses were used to determine composite measures of neighborhood/area-level SES [Area Deprivation Index (ADI) and Social Deprivation Index (SDI)] and other area-level SES indicators. We created a novel composite outcome score; a weighted average of 8 outcome indicators (length of stay, percutaneous drain placement, PICC placement, ED visit within 30 days of discharge, and postoperative fever, antibiotics, imaging, and parenteral nutrition). Demographic, social characteristics, and composite outcomes for simple (SA) and complicated appendicitis (CA) were compared using chi-square analysis. Feature selection and exploratory

factor analysis were used to create a multivariate model predictive of composite outcome score. Principal component analysis was used to investigate consistency of the resulting model.

RESULTS: Of 1117 children with appendicitis, 20.7% had CA. Compared to SA, children with CA were younger [median (IQR) age (y) 9.5(4.8) vs 12.0(5.7), $p < 0.01$] and less likely to be Hispanic (5.2% vs. 10.0%, $p = 0.02$). Children with CA had higher composite outcome scores compared to SA (27(17) vs. 3(7), $p < 0.01$). Factor analysis identified 2 uncorrelated multivariate latent factors; Factor 1 contained SDI, ADI, and % unemployed in the population (based on census data) and Factor 2 contained % Hispanic and % foreign-born in the population. Two similar principal components were identified accounting for 79.0% of data variance (Figure).

CONCLUSIONS: While previous studies have investigated the impact of social determinants of health on CA, ours is the first to use a multivariable approach to analyze interactions between individual indicators of SES and outcomes in CA. Multivariate modeling allows exploration for associations among covariates that add insight over univariate analysis by reducing a large number of variables into underlying latent factors. Intuitively, the factors may reflect overall SES (Factor 1) and cultural elements (Factor 2) that may manifest as different patterns of health care utilization in communities with high percentages of Hispanic and foreign-born residents. Our model suggests that SES and elements of ethnicity are predictive of postoperative outcomes in CA.



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Building a Decision Support Tool to Improve Trauma Triage

Introduction

Unintentional injury is the third leading cause of death in the United States. Trauma triage combats injury-related death by improving resource utilization and decreasing patient mortality. Undertriage (UT) and overtriage (OT) rates are commonly used to assess the efficacy of a trauma center's triage system, with the American College of Surgeons Committee on Trauma (ACSCOT) recommending an acceptable UT rate of <5% and an OT rate of 25-35%.

In the fast-paced environment of the emergency department, the challenges of making accurate triage decisions are intricate and complicated. As such, data-driven computational models are well-suited to provide decision support under complex circumstances. The current study will determine UT and OT rates and trends and investigate prehospital data and postadmission outcomes in trauma care at University of Rochester. These findings will be used to build a machine learning tool to provide decision-making support to healthcare providers in the Emergency Room setting.

Methods

We retrospectively reviewed all patients who activated a trauma team response at URMK Kessler Trauma Center (2014-2020), which is an ACS-verified Level 1 Trauma Center. Data on patient demographics, pre-hospital interventions, level of trauma activation, injury characteristics, physiologic parameters, injury severity score (ISS), patient management, and outcomes were studied. UT and OT rates were calculated using ISS and the Cribari grid method (Table 1A), and UT and OT patient groups were compared using unpaired t-tests or chi-square analyses. Feature selection, multinomial linear regression, and principal components analysis were used to identify patient variables predictive of UT and OT.

Results

From January 2014 through December 2020, 10,374 patients activated a trauma response. Overall, 1,693 (16.3%) were undertriaged and 1,209 (11.7%) were overtriaged. Cribari UT and OT rates were 20.54% and 53.91% respectively. UT patients were more likely to be female (31.8% vs. 23.3%,

p<0.001) and to have a blunt mechanism of injury (92.7% vs. 50.6%, p<0.001) compared to the OT group. UT rates increased from pediatric to adult to geriatric age groups (Table 1B).

UT patients were more likely to have a lower pre-hospital or emergency department Glasgow Coma Scale (GCS) score, Revised Trauma Score (RTS), or systolic blood pressure compared to accurately triaged or OT patients (p<0.0001). Prior to hospital admission, UT patients were less likely to have prehospital airway management (UT: 4.0% vs. OT: 17.0%, p<0.001) and more likely to have spinal immobilization (UT: 53.6% vs. OT: 27.3%, p<0.001) compared to OT patients. UT patients averaged more comorbidities than OT patients (UT: 1.25 vs. OT: 0.81, p<0.001). There were disproportionately more smokers and patients with hypertension, a psychiatric diagnosis, diabetes mellitus, obesity, COPD, or heart disease in the UT compared to the OT group.

Two significant principal components were identified to account for 83.4% of the variance within the pediatric triage population. The first principal component was comprised of prehospital GCS and RTS and accounted for 56.7% of the variance among injured pediatric patients, while the second principal component was comprised of pre-hospital systolic blood pressure and accounted for 26.6%.

A	ISS ≤ 15	ISS > 15	Total
Full Trauma Team Activation	a	b	a+b
Partial Trauma Team Activation	c	d	c+d
Total	a+c	b+d	a+b+c+d

UT	OT
d / (c+d)	a / (a+b)

B	UT (%)	OT (%)
Pediatrics (<18)	13.67	50.82
Adults (18-65)	19.44	56.63
Geriatrics (>65)	27.36	43.75
Overall	20.54	53.91

Table 1. A Cribari grid method for calculating UT and OT rates. **B** URMU UT and OT Cribari rates per age group.

Conclusion

High undertriage and overtriage rates highlight the need for systematic approaches aimed at improving triage accuracy. Our work found that non-linear computational models can be used to identify pre-hospital and injury criteria that are most predictive of trauma triage patterns. Moving forward, we plan to assess the relationship between these pre-hospital variables, triage patterns, and patient outcomes. This will allow us to better understand the true impact of trauma triage on patient safety and will help us build a predictive machine learning framework that can provide clinical decision support to the trauma personnel making individual triage decisions.

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Evaluating the Utility of HEK293 Cells as a Model for Electron Transport Chain Mitochondrial Research

Background

Human Embryonic Kidney cells (HEK293 cells) are an immortalized cell line used in many experiments due to their ease of culturing and manipulation. In particular, they are easily transfected, making them intriguing for use in mitochondrial research. Of particular interest is the peptidyl-prolyl, cis-trans isomerase chaperone protein cyclophilin D (CyPD), which is known to regulate the mitochondrial permeability transition pore (mPTP) and also the assembly of the Electron Transport Chain (ETC), but through currently unknown mechanisms. The mPTP is a non-selective channel in the inner mitochondrial membrane that has been found to have important implications based on its status. Opening of the mPTP leads to uncoupling of the ETC from ATP synthesis, and its closure plays important roles in the developing heart by initiating ATP synthesis, increasing myocyte differentiation, and decreasing reactive oxygen species production.

Objective

Therefore, we sought to observe the effects of post-translational modifications of CyPD in order to better understand the mechanisms by which CyPD regulates ETC assembly and mPTP opening.

Methods

CyPD knockout HEK293 cells were transfected with plasmids where a lysine at amino acid position 166 was substituted with a glutamine or arginine to mimic acetylation or deacetylation, respectively. Differences in ETC complex expression and function were observed through in-gel-assays, enzyme assays, and oxygen consumption (OXPHOS) experiments.

Results

We showed by in-gel-assays and western blotting after native electrophoresis that all ETC complexes were present in HEK293 cells, either on a wildtype or CyPD knockout background. The expression of mutated CyPD, which mimicked either acetylation or deacetylation of lysine 166, had no effect on the presence of the ETC proteins. No supercomplexes were observed in any of

the investigated HEK293 cells. Using oxygen consumption assays stimulating either complex I with malate and glutamate, or complex II with succinate showed that the overall ETC function was poor. HEK293 cells did not respond to potassium cyanide, an inhibitor of complex IV (cytochrome c oxidase). In addition, the enzymatic activity of the ETC complexes was very low in all HEK293 cell lines independent of the expression of CyPD.

Conclusion

It appears immortalized cell lines such as HEK293 cells may have altered metabolism to such a degree that they are not ideal for studying mitochondria under normal culture conditions. This may partly be due to the Warburg effect, but further studies manipulating culture conditions will provide more information and possibly force the cells to use OXPHOS, potentially making them better suited for use in mitochondrial research.

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The Importance of Scout Imaging to Detect Incidental Findings on Cross Sectional Imaging

It is known that spinal imaging incidental findings (IFs) are frequent and can inform diagnoses that are more serious than the initial indication for the imaging study. This study aims to determine the frequency and types of incidental findings detected during MRI and CT spinal imaging of the cervical, thoracic, and lumbar regions. Additionally, to assess whether incidental findings appear on CT and MRI scout imaging (SI), which is also called localizer imaging. A case highlighting the importance of scout imaging is presented below in which a humeral lesion is visualized on the scout imaging in **Figure A**, however the lesion does not appear on the cross-sectional imaging in **Figure B**.

A retrospective single site study was performed by viewing the medical charts and imaging studies for 600 patients treated at URM. Several variables were extracted from the patient charts/ primordial including their MRN, the indication for the image study, the type of imaging carried out (CT cervical spine, MRI cervical spine, etc.), whether an incidental finding was reported by the primary radiologist, and what the incidental finding was if it was reported. The analysis for this data is ongoing. The incidental finding will be assessed to determine whether it is clinically significant and impactful to patient care. The prevalence of incidental findings will be determined for radiographic imaging of each spinal region, as well as their clinical significance. Incidental findings will be assessed both on cross-sectional imaging as well as on scout imaging. Additionally, our results on incidental findings will be compared to current literature values. Once complete, this study will emphasize the importance of scout imaging in the detection of incidental findings on spinal imaging and the impact it has on patient care.

Figures



Figure A: CT C-spine/CTA Scout Image of 67 y.o Pt visualizing IF

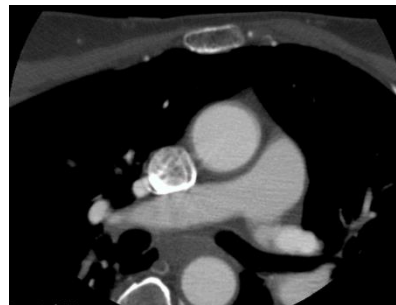


Figure B: CT C-spine/CTA of 67 y.o Pt unable to visualize IF

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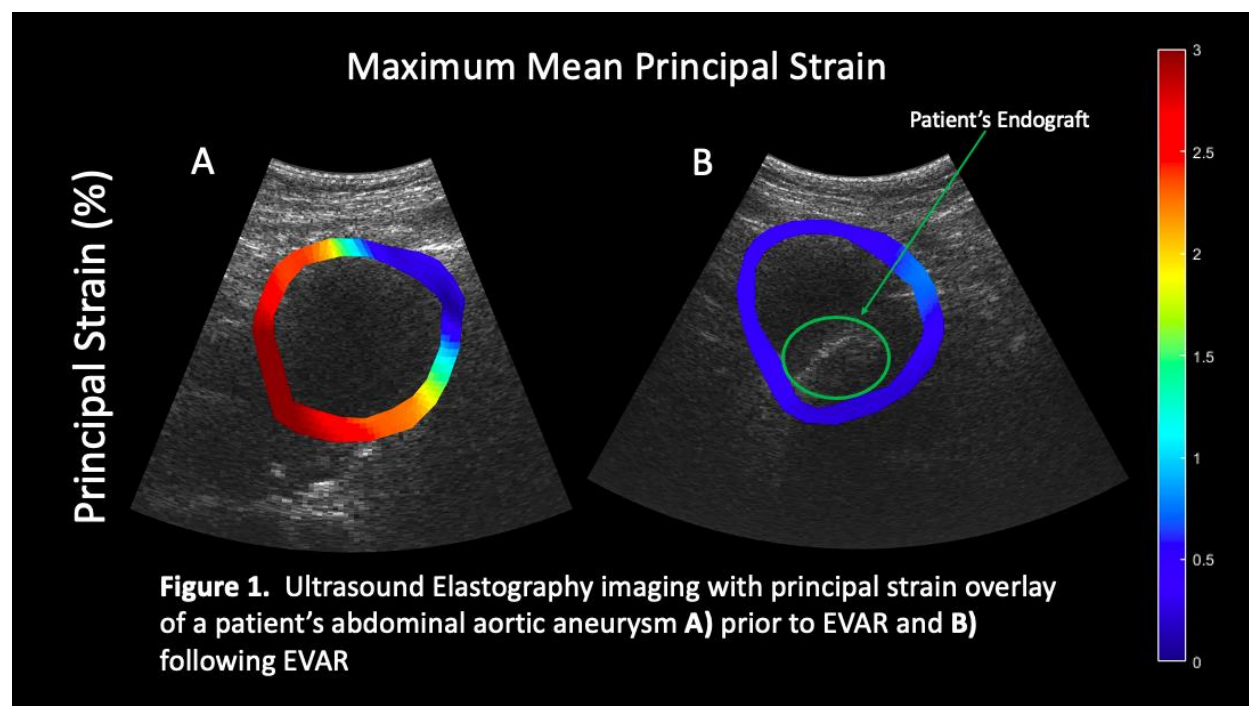
Using Ultrasound Elastography to Detect Changes of Aortic Strain in Patients Following Abdominal Endovascular Aneurysm Repair

INTRODUCTION: As of today, standardized practice for predicting success following endovascular aneurysm repair (EVAR) of abdominal aortic aneurysms (AAA) relies on measurements of diameter and growth rate. However, it is being shown these metrics alone are insufficient to reliably predict the stability of AAA and that biomechanical properties such as strain may provide additional useful information in assessing patient AAA following EVAR. Here we assess the feasibility of using a novel ultrasound elastography technique (USE) to detect changes of aortic strain in patients undergoing EVAR.

METHODS: Eleven patients were imaged both preoperatively and postoperatively using USE. Mean principal strain ($\overline{\varepsilon_{\rho+}}$) for each scan was assessed using our novel technique, which employs a Finite Element mesh to track multiple frame-to-frame displacement fields of a 2D image of the aorta, in the axial view, over an entire cardiac cycle. A two-tailed paired T-test was used to compare preoperative and postoperative $\overline{\varepsilon_{\rho+}}$. A subsequent sub-analysis of six patients, for which pulse pressure data was available, was then conducted using a two-tailed paired T-test to compare preoperative and postoperative pressure-normalized strain measurements ($\overline{\varepsilon_{\rho+}/PP}$).

RESULTS: Analysis of USE imaging demonstrated a significant reduction in average $\overline{\varepsilon_{\rho+}}$ from preoperatively to postoperatively ($1.84\% \pm 0.97\%$ versus $0.70\% \pm 0.33\%$; $p=0.001$). Subset analysis of $\overline{\varepsilon_{\rho+}/PP}$ demonstrated a reduction from preoperatively to postoperatively that trends toward significance ($0.262\% \pm 0.170\%$ versus $0.080\% \pm 0.048\%$; $p=0.056$). Similarly, the patient with the smallest difference in both principal mean and pressure-normalized strain was found to have a Type II endoleak at the conclusion of their procedure.

CONCLUSION: We demonstrate that USE of AAA is a feasible method for detecting changes in aortic strain and the USE technique employed is able to detect significant reductions in mean principal strain of the aorta following EVAR. Further investigation involving larger sample sizes and additional follow up data is warranted to assess the impact on pressure-normalized strain and the ability of USE to predict long-term AAA stability.



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UR Well 2021 Summer Internship Clinic Development Projects

Abstract

UR Well is a URSMD student-led outreach program with a mission to provide free and income based high quality preventative and health maintenance services to uninsured and under-insured individuals in the Rochester, New York region. UR Well partnerships include clinics at Asbury First United Methodist Church, St. Luke Tabernacle Community Church, and St. Joseph's Neighborhood Center, Inc. Three URSMD students were funded to engage in clinic development projects during the Summer 2021.

We created a training presentation for new health team volunteers so they may confidently conduct more thorough and effective work and school physicals from the start of their volunteer service. This presentation was built using methods from evidence-based articles, considers a biopsychosocial perspective, and uses first hand perspective from several experienced primary care physicians who have volunteered extensively in the UR Well health clinics. This will make patient visits more efficient and respect our patients' time more.

We established a source for flu vaccines which may be administered at the Asbury clinic. This will make it easier for our patients to receive the vaccine, which is sometimes required by different workplaces, in the same visit that they are evaluated for a health physical.

At St. Joseph's Neighborhood Center, Inc., we re-established connections with local legal assistance organizations to better assist patients in resolving legal issues affecting their health and wellness. Our goal is to better utilize existing resources by directing patients to an established organization most suitable for addressing their legal issue. Additionally, we have begun to explore medical legal workshops for interested patients in the UR Well community, including one focused on understanding and preparing advance health directives.

According to the Monroe County Heroin Task Force, the UR Well clinics are located in high overdose areas. When patients were asked if they would be interested in receiving information about and access to Narcan, almost 20% expressed interest. Therefore, we expanded our UR

Well Narcan distribution program, at St. Luke's and Asbury, by strengthening our partnership with Strong Recovery, updating our clinical workflows, and ensuring our clinic staff has continued access to Narcan training resources. Furthermore, we compiled a collection of patient educational materials in English and Spanish, which we hope will increase naloxone awareness within Rochester, and prevent fatal opioid overdoses.

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Anxiety-Spectrum Disorders in Children with Human Immunodeficiency Virus in Lusaka, Zambia: A Prospective Cohort Study

Background: Psychiatric comorbidities such as anxiety and depression are common among children with HIV. More than 90% of all children with HIV live in Sub-Saharan Africa, but there are minimal data on psychiatric comorbidities in this population. In this study, we evaluate the prevalence, longitudinal trajectories, and predictors of anxiety-spectrum disorders among children and adolescents living with HIV in Lusaka, Zambia.

Methods: The HANDZ (HIV-Associated Neurocognitive Disorders in Zambia) study is a prospective, longitudinal study that assesses cognitive and psychiatric outcomes among children and adolescents ages 8-17 in Zambia, including both children with HIV and HIV-exposed uninfected (HEU) controls. Participants were interviewed using standardized questionnaires and had neuropsychological testing using both standard lab-based measures and computerized testing using the NIH Toolbox. Participants were evaluated at baseline and seen for follow-up every 3 months for two years. Anxiety-spectrum disorders were evaluated using the NIH Toolbox Fear module and the SCARED (Screen for Child Anxiety Related Disorders) Assessment. Adverse life events were evaluated using a survey developed and validated in Zambia. Linear regression and mixed effects models were used to identify predictors of high anxiety levels, and group based trajectory modeling was used to identify differences between groups of participants over time.

Results: 208 participants with HIV and 208 HEU controls were enrolled. Participants with HIV had higher NIH fear module scores at baseline than HEU participants, after controlling for age and sex (β coefficient=3.411, 95% CI 1.152-5.670, $p=0.003$). Risk factors for developing an anxiety disorder included adverse life events (β coefficient=2.237, 95% CI 1.532-2.941, $p=0.000$), with experiences of violence (β coefficient=4.153, 95% CI 1.524-6.782, $p=0.002$), experiences of abuse (β coefficient=9.369, 95% CI 3.398-15.341, $p=0.002$), and relationships ending (β coefficient 3.567, 95% CI 1.221-5.911, $p=0.003$) being the strongest individual predictors. Group based trajectory modeling identified four groups of participants: a high anxiety group with NIH fear module scores that remained stable over time (5.5% of participants), a low anxiety group with anxiety scores that remained stable over time (54.5%), a group with high anxiety at baseline that improved over time (32.6%), and a group with low anxiety at baseline and 24 months but a spike in anxiety at 12 months (7.5%). The strongest predictors of being in the high anxiety group also included adverse life events (OR=1.435, 95% CI 1.119-1.840, $p=0.004$).

Discussion: Children with HIV have significantly higher anxiety levels than HIV-exposed uninfected controls. Adverse life events were the strongest predictors of anxiety spectrum disorders in this population. Future studies are necessary to identify optimal preventive and treatment strategies for anxiety spectrum disorders among children with HIV in Lusaka.

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Feeding children with moderate acute malnutrition in Sierra Leone results in less deterioration and death compared to providing counseling alone: a retrospective cohort study

Background: Moderate acute malnutrition (MAM) affects ~33 million children under the age of five globally at any one time.^{1,2} Children with MAM are at an increased risk for death, infectious diseases, and deterioration to severe acute malnutrition (SAM), which incurs an even higher risk of adverse outcomes.³⁻⁵ Those who survive experience greater rates of stunting and cognitive impairment throughout life.⁶ Determining how best to manage MAM is thus vitally important. Nevertheless, international and national treatment guidelines vary widely regarding a fundamental question: should children with MAM receive supplementary feeding?^{7,8} Few studies have assessed provision of supplementary food vs. counseling and/or micronutrients for the treatment of MAM.^{9,10}

Objectives: We tested the hypothesis that supplementary feeding leads to lower rates of deterioration to SAM or death compared to nutritional counseling among children with MAM.

Methods: For this retrospective dual cohort study, we extracted data from two cluster-randomized, controlled clinical trials that took place between April 2017 and December 2019 in Pujehun District, Sierra Leone. We included 11 matched clinic sites, where all

children in one study received supplementary food, while all children in the second study received nutritional counseling alone. Further inclusion criteria were the following characteristics at enrollment: age 6-59 months, MAM by mid-upper arm circumference (MUAC) (≥ 11.5 cm and < 12.5 cm) and by weight-for-height z-score (WHZ) (≥ -3 and < -2), no bipedal pitting edema, no immediate transfer from SAM, and no clinical complications.

Our primary outcome was time to development of SAM or death. Secondary outcomes included time to sustained recovery, as well as programmatic outcomes and rates of anthropometric gain 6, 12, and 24 weeks after enrollment. Time-to-event outcomes were assessed using both the Kaplan-Meier method with log-rank test and adjusted Cox proportional hazards regression. Comparisons of anthropometric outcomes were performed using independent samples t-test, while comparisons of programmatic outcomes were performed using chi-square test and odds ratios. All analyses were conducted using R version 4.0.1 (R Foundation for Statistical Computing).

Results: 1077 and 714 children were included in the supplementary feeding and counseling only cohorts, respectively. Baseline characteristics were similar between the two cohorts. The hazard ratio for SAM or death was 0.53 (0.44-0.65) ($p < 0.001$). The hazard ratio for sustained recovery was 1.77 (1.49-2.09) ($p < 0.001$). Differences in rate of weight gain between the cohorts (fed - counseling, g/kg/day) at 6, 12, and 24 weeks were 0.9 (0.7-1.1), 0.4 (0.3-0.5), and 0.2 (0.1-0.3), respectively ($p < 0.001$). Differences in rate of MUAC gain between the cohorts (fed - counseling, mm/week) at 6, 12, and 24 weeks were 0.7 (0.6-0.9), 0.2 (0.2-0.3), and 0.1 (0.1-0.2), respectively ($p < 0.001$). Additionally, the following relative risks were calculated based on programmatic outcome ($p < 0.001$): Healthy = 2.2 (1.9-2.5) at 6-weeks, 1.8 (1.6-2.0) at 12-weeks; MAM = 0.6 (0.5-0.6) at 6-weeks, 0.6 (0.5-0.7) at 12-weeks; SAM = 0.6 (0.5-0.8) at 6-weeks, 0.5 (0.3-0.7) at 12-weeks. Note: All parentheses contain 95% CIs.

Conclusions: Over 24 weeks of follow-up, supplementary feeding resulted in lower rates of SAM and death, higher rates of sustained recovery, and greater rates of gain in weight and MUAC. Further studies investigating the delivery of supplementary food vs. nutritional counseling and/or micronutrients to children with MAM are necessary to elucidate the generalizability of these findings.

References:

1. UNICEF, World Health Organization, World Bank Group. Levels and trends in child malnutrition: key findings of the 2020 edition of the joint child malnutrition estimates. Geneva: WHO, 2020.
2. UNICEF. The State of the World's Children 2019. Children, food and nutrition: Growing well in a changing world. New York: UNICEF, 2019.
3. Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, et al. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet*. 2008; 371:243–60. pmid:18207566.
4. James, P., Sadler, K., Wondafrash, M., Argaw, A., Luo, H., Geleta, B., ... Bahwere, P. (2016). Children with moderate acute malnutrition with no access to supplementary feeding programmes experience high rates of deterioration and no improvement: Results from a prospective cohort study in rural Ethiopia. *PLoS One*, 11(4), e0153530. <https://doi.org/10.1371/journal.pone.0153530>.
5. Bhutta ZA, Berkley JA, Bandsma RH, Kerac M, Trehan I, Briend A. Severe childhood malnutrition. *Nat Rev Dis Primers* 2017;3(1): 1–18.
6. Lelijveld N, Seal A, Wells JC, Kirkby J, Opondo C, Chimwezi E, et al. Chronic disease outcomes after severe acute malnutrition in Malawian children (ChroSAM): a cohort study. *Lancet Glob Heal* [Internet]. 2016 Sep 1 [cited 2019 Jul 19]; 4(9):e654–62. Available from: <https://www.sciencedirect.com/science/article/pii/S2214109X16301334>.
7. World Food Programme. National Guidelines on the Management of Moderate Acute Malnutrition: Manual of Operations. Philippines: WFP, 2017.
8. World Health Organization. Assessing and managing children at primary health-care facilities to prevent overweight and obesity in the context of the double burden of malnutrition: Updates for the Integrated Management of Childhood Illness (IMCI). Geneva: WHO, 2017.
9. Lelijveld N, Beedle A, Farhikhtah A, Elrayah EE, Bourdaire J, Aburto N. Systematic review of the treatment of moderate acute malnutrition using food products. *Matern Child Nutr* 2020;16(1):e12898.
10. Lelijveld N, Godbout C, Krietemeyer D, Los A, Wegner D, Hendrixson DT, Bandsma R, Koroma A, Manary M. Treating high-risk moderate acute malnutrition using therapeutic food compared with nutrition counseling (Hi-MAM Study): a cluster-randomized controlled trial. *Am J Clin Nutr*. 2021 May 8:nqab137. doi: 10.1093/ajcn/nqab137. Epub ahead of print. PMID: 33963734.

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Piloting a Lung Ultrasound Volume Sweep Imaging Protocol in Rural Peru

Introduction: Pneumonia is a leading cause of morbidity and mortality worldwide and disproportionately affects communities lacking access to diagnostic medical imaging. A novel teleultrasound system using a volume sweep imaging (VSI) protocol for the lungs has been developed to address this discrepancy. With this protocol, individuals obtain sweeps of the thorax based on external body landmarks and send the clips via a telemedicine portal to a radiologist for interpretation. This inexpensive and portable technology allows health personnel to obtain lung scans with limited training and knowledge about ultrasound.

Purpose: The purpose of this project was to pilot lung teleultrasound in rural Peru and to evaluate the community members' perceptions about its use in pneumonia screening.

Methods: Health personnel from five rural health centers were trained on the use of the VSI protocol and teleultrasound system over the course of two to three days. After training, these individuals scanned members of the community attending the clinic, obtaining 12 sweeps per patient. VSI images were sent to a Peruvian radiologist for subsequent interpretation. Both patients and health personnel were asked to complete surveys regarding their experiences with lung teleultrasound, and interviews were conducted with individuals involved in the implementation process. The surveys and interviews were translated/transcribed, coded, and analyzed for common themes.

Results: During the pilot period of analysis, 213 patient scans were obtained, representing 2,556 lung sweeps. Of these scans, 210 allowed diagnostic visualization of every single lung field on both transverse and longitudinal sweeps. Between the remaining three scans, there were only four sweeps with non-visualized lung or technical errors. These four sweeps represent 0.002% of all sweeps collected. The average response time for reads was 18.8 hours.

From the 67 patients surveyed, common reasons to visit the health clinic included back pain, seeking a lung ultrasound, and COVID-19. Most patients heard about the service from the health personnel, while others heard from the radio, community members, and employers. Overall, patients rated the teleultrasound service positively. Health personnel reported multiple benefits to the community including improving diagnosis and access to care. The training on VSI and the telemedicine platform was seen as easy by health personnel. No major obstacles to its implementation were identified. Analysis of health personnel surveys and the interviews is ongoing.

Conclusions: Preliminary results suggest successful image acquisition using the VSI lung teleultrasound protocol, and both patients and health personnel have expressed positive experiences with the service. This approach could be used to increase access to imaging around the world. Further analysis is necessary to fully understand employee opinions about the training process, barriers to program implementation, and areas for future improvement.

Medical Humanities Research

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Perspectives of Medical Students on the Anatomy Lab at URMSD

Abstract

Over hundreds of years, the study of anatomy has dramatically changed the way medical professionals think about disease and illness. ^{1,2} Now, it is important for contextualizing our understanding of the human body as well as developing a humanistic approach to patient care.^{2,3} However, students have a wide range of responses to the potentially uncomfortable circumstances of the anatomy lab—from confronting their own mortality to the reminder of a lost loved one.³ Understanding how students experience anatomical dissections provides us with information about how to better support incoming medical students, helping them to get the most from this valuable endeavor. To conduct this study, a REDCap survey was sent all current medical students to assess their experiences in the anatomy lab at the University of Rochester School of Medicine & Dentistry. From those, 46 students completed the survey (47.8% from class of 2024, 6.5% from class of 2023, 23.9% from class of 2022, 4.3% from class of 2021, 8.7% Year-Out students and 8.7% MSTP students). As expected, a majority of students (63%) reported experiencing challenges with the moral, ethical or emotional components of dissection at some point during the course. Of those students, almost all (96.6%) encountered this during dissections. Many (75.9%) encountered this after dissections and nearly half of those students (44.8%) encountered these challenges in anticipation of labs and/or following the completion of the HSF course. Of students who expressed moral, ethical, or emotional challenges in relation to dissections, 75% of students identified one or more associated disturbance in their lives. The most common disturbances were dreams related to anatomy and increased anxiety (42.9% each), followed by changes in eating and patterns of communication with loved ones (32.1% each). Less commonly, students reported difficulty sleeping and concentrating (32.1% and 21.4% respectively). Although, challenges were prevalent, most students felt comfortable (76.1%) discussing their anatomy lab experiences, while fewer felt neutral (4.3%) or uncomfortable (19.5%). Furthermore, nearly all students (95.7%) discussed their

experiences with someone outside of the anatomy lab. Most often, students discussed with their peers (97.7%) or friends and family (84.1%). Less frequently, students spoke with members of Medical Humanities & Bioethics (52.3%) and HSF (25%) faculty. Finally, the majority of (84.8%) of students felt they had adequate resources when they struggled in anatomy. For those who didn't, they cited extracurricular assistance, more opportunities for reflections and processing outside of the anatomy lab, and better utilization of resources as potentially beneficial. In conclusion, there are variety of challenges present when working in the anatomy a lab, including those of moral, ethical, and emotional nature. Yet despite the high incidence of challenges students face within the anatomy lab, students' overall impression of their time in the anatomy lab is positive and most felt they had enough resources to support them when they struggled. Further studies may aim to explore resources which helped students to feel most supported during challenges.

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Life Support – A Podcast of Medical Meaning

The goal of my project is to investigate the ways in which physicians find meaning in their work as health care professionals and how the stories they tell about their work can help medical students, who are struggling to find meaning in the midst of medical school. Often I find myself having conversations with my peers about how to cope with both the intellectual and the emotional demands of medical school. One thing I found helpful in the past is hearing doctors share genuine stories about the joys and sorrows of being a physician. My hypothesis is that being able to connect with people who we strive to emulate offers hope and motivation by both normalizing difficulties and highlighting meaningful moments. Nine physicians were selected to be interviewed on various topics including – Building Community, Work-Life Balance, Identity, and Holding Multiple Roles. Each physician was interviewed for an hour and the conversation recorded to subsequently be converted into a podcast. The podcast was released to the public using Spotify and Apple Podcasts. A group of medical students ranging from first year to fourth years were identified to give feedback on the podcast, however, low response rates made it difficult to draw any conclusions about the podcast's impact. Some observations could be made regarding themes that came up in the physician interviews. Some themes included taking time to find a place in medicine, trying to integrate other interests into medical practice, and finding a form of practice that fits with the core aspects of one's identity.

Eiduson, Carly

Preceptor

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Evaluating the perceptions, attitudes, and beliefs of bedside nurses in the NICU and the PICU about the ethical use of renal replacement therapy in pediatric patients

Background

Advances in pediatric dialysis and nutrition have resulted in improved outcomes for patients, but the road remains a long and often challenging one for patients and their families.^{1,2} There is debate whether pediatric dialysis is morally obligatory, which leads to ethical issues surrounding decision making.³ Although the physician may serve as the primary co-partner on the decision-making team for families considering dialysis, bedside Intensive Care Unit (ICU) nurses spend a significant amount of time with the patient and family and play a significant role in patient care. The exploration of the beliefs of nurses both how they are the same and how they are different from the rest of the clinical team and each other warrant exploration and investigation.⁴

Aims

The purpose of the study is to better understand bedside Neonatal Intensive Care Unit (NICU), Pediatric Intensive Care Unit (PICU), and Pediatric Cardiac Intensive Care Unit (PCICU) nurses’ perceptions, attitudes, and beliefs regarding the ethics of pediatric dialysis in critical care settings with scenario-based surveys. We hope to identify the factors that influence the nurses’ opinions of the appropriateness of renal replacement therapy (RRT) for neonatal and pediatric critical care patients and what ethical dilemmas nurses face in these difficult situations. Specifically, we seek to (1) understand some of the demographic factors that may contribute to differences among nurses in their attitudes regarding the use of RRT in pediatric patients and (2) identify differences between nurses’ responses to general questions about the use of RRT and their responses to

scenario-based questions

Methods

This is a single-center case scenario survey study. The survey was initially presented to a group of nurses for feedback before dissemination via email to all NICU (n=270), PICU (n=51), and PCICU (n=57) bedside nurses at Golisano Children's Hospital. The survey was developed using REDCap and included four distinct sections: (1) demographic information, (2) questions regarding decision making and ethics related to advanced therapies such as Extracorporeal Membrane Oxygenation (ECMO) and dialysis, (3) two case-based scenarios with multiple parts and accompanying questions, and (4) additional questions regarding the nurse's role in decision making and desire for further education on pediatric dialysis. The analytic methods utilized will include univariate and multivariate analyses to determine potential statistical significance in responses stratified by demographic information and experience. We will also analyze similarities and differences between responses to the general questions on decision making and responses in the context of case-based scenarios.

Results

62 nurses completed at least one part of the multipart survey. Of the 62 nurses, 35 completed all parts of the survey. The 35 completed surveys included responses from 20 NICU nurses (7.4%), 4 PICU nurses (7.8%), 9 PCICU nurses (15.8%), and 2 nurses who worked in more than one Unit.

Demographics: The 56 nurses who completed the demographics section represented a wide range of years of intensive care experience (6 months to over 20 years), familiarity with caring for patients on dialysis (70%), and variable experience with ethics education (70%). The respondents identified as 91% white; 61% 31-50 years old; 91% with at least 2 years of experience in the ICU, including 21% with at least 20 years of experience; 68% with experience with caring for a child on ECMO; and 70% with experience with caring for a child on dialysis. Approximately half of the nurses reported caring for a child whose family distrusted the medical system and nearly half reported having had disagreements over care decisions. The vast majority (~80%) responded that their role includes explaining diagnoses and providing additional information to the families of their patients.

Theoretical Decisions: When nurses were asked to rank a list of factors that affect their opinions on whether dialysis is appropriate for a patient or not, the three most important factors were quality of life of the patient, prognosis for the patient with dialysis, and severity of co-morbidities for the child. The three least important factors were the financial resources of the family, needs of other family members, and social support for the family. Supporting the wishes of the family was variably ranked as nurses with experience caring for patients on dialysis ranked supporting the wishes of the family as more important than the nurses without experience caring for patients on dialysis.

Case Scenarios: When a family requested dialysis for their neonate with an isolated kidney issue, 89% of nurses would support the family's decision. When presented with the same case scenario modified so the parents now requested comfort care for their baby, 77% of nurses would support the family's decision although 49% of nurses disagreed with the family's decision and believed that dialysis should be initiated. In the case regarding a child with multiple co-morbidities and poor prognosis, although 71% of nurses supported the family's request to initiate dialysis, 66% of nurses disagreed with the family and believed that comfort care would have been more appropriate.

Additional Questions: 89% of nurses reported that if they disagreed with a family's decision, they would say nothing and take care of their patient to the best of their ability. 86% of respondents believed there is a moral obligation to *offer* RRT to patients that meet medical criteria for therapy, and 34% believe there is a moral obligation to *initiate* RRT for the patient. 77% of the nurses would like further training on medical ethics and 63% would like additional training on RRT.

Discussion

Although analysis is still ongoing, nurses ranked quality of life of the patient and the prognosis for the patient as the most important factors for both the theoretical and case scenario questions and the least important factors were consistently financial resources of the family and social support. This may suggest that nurses are generally more concerned with the patient factors rather than family or environmental factors. Moreover, nurses with experience caring for patients on dialysis ranked the wishes of the family as more important than the nurses without experience. This may indicate that nurses who have experience caring for patients on dialysis recognize the impact this complex therapy has on the family. Most nurses, but not all, believe that if a patient meets medical criteria there is a moral obligation to offer dialysis; however, only just over one-third believe that there is a moral obligation to initiate dialysis. The data suggest that the decision to treat with RRT is not merely limited to medical eligibility, rather, the wholistic circumstances of the patient are important as well. Future investigation is needed regarding specific trends among the nurses and to identify differences between the various nursing subgroups.

Conclusion

Although the data are limited and analysis is still preliminary, our data suggest that the opinions of pediatric critical care nurses vary and may be crucial to team-based care for a patient and their family. The role of families in challenging ethical situations as well as educational opportunities for nurses regarding medical ethics in the setting of pediatric and neonatal intensive care are avenues requiring further investigation.

References

1. Askenazi, D. J., Ambalavanan, N., & Goldstein, S. L. (2009). Acute kidney injury in critically ill newborns: what do we know? What do we need to learn?. *Pediatric nephrology*, 24(2), 265.
2. Bagshaw, S. M., Darmon, M., Ostermann, M., Finkelstein, F. O., Wald, R., Tolwani, A. J., ... & Gaudry, S. (2017). Current state of the art for renal replacement therapy in critically ill patients with acute kidney injury. *Intensive Care Medicine*, 43(6), 841-854.
3. Rees, L. (2017, April). Renal replacement therapies in neonates: issues and ethics. In *Seminars in Fetal and Neonatal Medicine* (Vol. 22, No. 2, pp. 104-108). WB Saunders.
4. Teh, J. C., Frieling, M. L., Sienna, J. L., & Geary, D. F. (2011). Attitudes of caregivers to management of end-stage renal disease in infants. *Peritoneal dialysis international*, 31(4), 459-465.

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Themes in Medical Schools' Definitions of Professionalism

Problem

There is a need to define professionalism in a manner that addresses the concerns of society and our patients, is consistent across the profession, and is teachable as well as assessable. There is much debate over what professionalism means nevertheless it is applied in many different contexts. This study sought to collect the definitions that all medical schools have established as a part of their LCME accreditation with the goal of providing more awareness between medical schools of what the current definitions are and foster more awareness as definitions are reworked.

Approach

Definitions from 119 of 132 LCME accredited medical schools in the United States were compiled. The author completed word counts and used these to guide a search across the full text of all the statements, in order to identify the various contexts that the most frequently used words appeared. These contexts were then compiled in order to identify the most commonly presented themes.

Outcomes

The authors identify and discuss the varying contexts across which recurring vocabulary appears in order to assess which features are shared among a majority of these schools' definitions of professionalism and find which elements are unique to a single school. Some of the preliminarily identified themes are as follows: constant pursuit of knowledge as a life-long learner; willingness to admit mistakes; clear, skillful, and honest communication; adaptability to complex and changing environments; and understanding of, and appreciation for, the contributions of various members of the medical team.

Next Steps

The data analysis for this research is still ongoing so no official conclusions can yet be drawn, however, ideally the results will provide a useful grounding point for medical schools as they redefine professionalism for both their LCME accreditation and their culture.

Further next steps for this research will be revealed in the analysis, including possibilities such as points of disagreement between different schools' definitions, how the definitions match up with current research on what is important in medical practice and medical education, how the definitions match up with the needs and expectations of patients and further.

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ROC with WISH DPP: An Interim Analysis of Outcomes, Barriers and Facilitators Among a Unique Population

Introduction: ROC with WISH is a partnership between the Women’s Initiative Supporting Health - Transitions Clinic (WISH-TC), which provides non-judgmental primary care treatment for women who have been recently incarcerated, and Exercise Express, the only Black owned Home and Community Based Services (HCBS) funded community program in Rochester. To support the health and wellness of people who are formerly incarcerated as well as the Rochester community at large, ROC with WISH includes a Diabetes Prevention Program (DPP), a national research-based curriculum focusing on healthy eating and physical activity that showed people with prediabetes who take part in a structured lifestyle change program can cut their risk of developing type 2 diabetes by 58% (71% for people over 60 years old). However, to date no studies have been conducted on diabetes prevention for women who are formerly incarcerated, a unique patient population that faces substantial barriers to care. The purpose of this study is to analyze the implementation of and interim outcomes from the ROC with WISH DPP in a heretofore understudied population.

Methods: The mixed methods interim study will yield 1) a quantitative analysis of weight, HbA1c levels, and self-reported validated measures of social determinants of health, physical and mental health, and substance use; and 2) a qualitative analysis using the consolidated framework for implementation research (CFIR). Fifteen patients from the WISH clinic were enrolled in the ROC with WISH DPP based on pre-diabetic HbA1c levels (5.7 to 6.5%). All 15 individuals are eligible for this study.

Results: To date, 5 patients have been consented and enrolled in the study. The team completed and transcribed interviews for the 5 individuals enrolled in the study. Interviews will be analyzed using the CFIR model, specifically identifying subthemes within the “characteristics of individuals” theme. HbA1c levels and weight will be the primary outcomes analyzed, with a benchmark of 3.5% reduction in weight for DPP participants, representing half of the target weight loss (7%) in the initial DPP study due to the interim nature of this study. These changes in HbA1c and weight will be mapped onto patient vignettes, which will include information provided by DPP patients during the intake process, including Short Form-12 (SF-12), Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE), and substance use data.

Discussion: Changes in HbA1c and weight combined with participant feedback will provide information regarding the potential efficacy of a DPP implemented for women who are formerly incarcerated and unique challenges faced by this patient population.

YEAR-OUT RESEARCH

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Developing graphic messages for vaping prevention among Black and Latino adolescents: A participatory research approach

Abstract:

Adolescence (ages 10 to 17) is a period characterized by tobacco use initiation, experimentation, and progression to long-term addicted use. According to the U.S. National Youth Tobacco Surveys, in 2018, 27.1% of high school students (an estimated 4.04 million) and 7.2% of middle school students (an estimated 840,000) reported current use of any tobacco product. E-cigarettes were the most commonly used tobacco products among high school (20.8%) and middle school (4.9%) students. While e-cigarettes may deliver fewer harmful chemicals than cigarettes and support cessation, there is robust evidence that e-cigarette use during adolescence is associated with increased rates of future initiation of cigarette, alcohol, and marijuana use.

Even if young adults who use e-cigarettes do not progress to other tobacco products or substances, early nicotine exposure puts them at risk for a lifetime of vaping addiction as well as unknown health risks of long-term e-cigarette use. Chemical and heavy metal exposure from e-cigarettes and risk of acute injuries and toxicity are a public health concern. Vaping has been connected to 2,807 lung injury cases and 68 deaths in the US (as of February 2020). Community-based participatory research (CBPR) is an approach that has been used successfully among adolescents. For tobacco prevention, environmentally oriented, youth-led programs have been identified as particularly effective in engaging youths in tobacco control efforts. However, to the best of our knowledge, no CBPR approach has been conducted for vaping prevention among Black and Latino adolescents.

The aim of this study is to develop theoretical-based messages to prevent e-cigarette use among Latino and African American adolescents. We recruited a group of sixteen (16) Black and Latino adolescents (ages 12-17) to participate in focus groups via Zoom. By using a CBPR approach and user-centered design model, we tested and refined the text and imaging formats based on three theoretical-based constructs: **reward, self-efficacy, and social norms**. These messages were

iteratively tested on design, style, length, and content. In the end, we demonstrated that it is feasible and practical to build CBPR among Black and Latino adolescents focused on vaping prevention.

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Surviving Medical School During a Pandemic: Experiences of New York Medical Students During the Height of SARS-CoV-2

Background

The COVID-19 pandemic changed the landscape of medicine and medical education in the United States. As COVID-19 patients overwhelmed hospital systems, lockdowns and social distancing recommendations took priority, pushing clinical and preclinical medical education online. Here, members of the Medical Society of the State of New York (MSSNY) present the results of a survey regarding the impact of the pandemic on students attending medical schools in New York state (NYS).

Methods

A six-question survey composed of closed and open-ended questions assessed the impact on and facilitated advocacy for NY medical students by MSSNY. The survey was disseminated from April to May 2020. Questions evaluated changes in stress levels, academic performance, and board preparation efforts. Open-ended data was analyzed using a modified grounded theory approach.

Results

488 NYS medical students across 12 medical schools were included in the study. Major themes in open-ended responses include: standardized test related stressors (23%), study related changes (19%), concerns about education and training (17%), financial stressors (12%), additional family obligations (12%), COVID-19 fear (8%), and COVID-19 illness (4%). 2% of respondents reported a more favorable academic experience. Class of 2022 reported more stress or anxiety than other years 2022-95.9%, 2023-73.8%, 2021-82.6% , 2020-66.7% (p-value < 0.00001). Differences in stress or anxiety reported by students from "Downstate" (New York City and surrounding counties) vs. "Upstate" were: Downstate 88.8%, Upstate 81.1% (p-value=0.016629). Reported impact on standardized exams preparation: Downstate 65.4%, Upstate 61.4% (p-value=0.000269). Students reporting the belief they would be able to maintain their academic performance from the previous semester: Downstate 38.1%, Upstate 52.6%. (p-value=0.001258).

Conclusion

The COVID-19 pandemic placed a significant strain on NY medical students, who reported academic difficulties, significant stress caused by uncertainty related to licensure examinations, and high level of personal/family stressors. In a population with established higher rates of psychological distress, the concern becomes how to best support these physicians-in-training and what considerations should be made as these cohorts apply to residency. Current literature shows how some schools addressed the pandemic which should be considered for future emergency planning. The survey being designed for another purpose and response rate are both limiting factors of this study.

Gayin, Lee

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SMASH: Perceived stigma and social health in patients with chronic skin disease

Background: Patient-reported outcome (PRO) measures are important tools used to assess the psychosocial burden of disease in research and clinical settings. There are currently no validated measures for stigma and social health that can be used in routine clinical care across dermatological diseases.

Objective: The purpose of this study was to evaluate the validity and utility of the new StigMA and Social Health (SMASH) PRO across five chronic skin diseases to evaluate the burden of skin disease on patient's well-being.

Methods: This was a two-phased, observational cohort study to validate a new patient-reported outcome measure for perceived stigma and health. We constructed the StigMA and Social Health questionnaire (SMASH), a 12-item instrument, referencing the validated Perceived Stigma Questionnaire (PSQ) and Social Comfort Questionnaire (SCQ). We combined selected items from the PSQ (8 items) and SCQ (4 items) into one questionnaire with two subscales (i.e., Perceived Stigma subscale; Social Health subscale). In Phase 1, we administered the SMASH questionnaire and the PSQ and SCQ at one visit. In Phase 2, SMASH, Dermatology Life Quality Index (DLQI), and Patient Global Impression of Severity (PGIS) were administered at two visits and the provider completed the Investigator Global Assessment (IGA).

Results: SMASH subscales strongly correlated with PSQ and SCQ across all diagnoses ($r = 0.902$ and 0.858 ; $p < 0.0001$) and within diagnoses ($r \geq 0.681$; $p < 0.050$). The test-retest reliabilities of

SMASH stigma ($r=0.69$; $p<0.0001$; $ICC=0.980$) and SMASH social health ($r=0.677$; $p<0.0001$; $ICC=0.977$) subscales between two clinic visits were strong. SMASH strongly correlated with DLQI and PGIS whereas it did not correlate with the IGA.

Limitations: We were not able to obtain the 2nd IGA for many subjects due to time constraints.

Conclusion: SMASH is a valid and reliable social health PRO that captures the emotional burden of chronic skin disease.

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Post-Stroke Aphasia Severity and Response to Combined rTMS and Speech-Language Therapy

ABSTRACT

Introduction

Speech-language therapy (SLT) currently constitutes the mainstay form of language recovery treatment for patients with post-stroke aphasia. Repetitive transcranial magnetic stimulation (rTMS) uses noninvasive magnetic pulses at specific frequencies and wavelengths to stimulate nerve cells in brain regions that are hypothesized to enhance the effectiveness of SLT. The primary goal of our study was to examine whether active SLT combined with active rTMS results in clinically significant improvement in language testing outcomes compared to active SLT combined with sham rTMS. A secondary goal was to explore whether baseline aphasia severity would affect response to placebo versus experimental intervention.

Methods

Four participants with left-sided ischemic stroke resulting in chronic aphasia, defined as > 6 months since stroke, were included in this analysis. Participants A1 and A2 received active rTMS-SLT, while participants S3 and S4 received sham rTMS-SLT. A1 had Broca's aphasia (WAB-AQ: 76.7;

more severe), and A2 had Conduction aphasia (WAB-AQ: 84.3; less severe). S3 had Broca's aphasia (WAB-AQ: 34.0; more severe), and S4 had Anomic aphasia (WAB-AQ: 85.4; less severe).

All participants underwent baseline language testing with the principal outcome measures being (1) performance on the Western Aphasia Battery Quotient (WAB-AQ), in which higher language performance corresponded with a higher score; and (2) SLT standardized item performance. Participants underwent ten sessions of low-frequency (active) rTMS or sham rTMS targeting the right hemispheric Broca's area homologue. Each session was directly followed by 60 minutes of SLT. SLT was administered in a one-to-one setting with a trained speech-language therapist through multiple rounds of a pictorial card-matching game. A stepwise approach was used to advance SLT; participants first began with naming nouns and verbs describing what they saw in the picture, with the goal of progressing towards communicating in complete sentences. Participants were tested on both treated and untreated SLT items at ≤ 10 days (T0), 3- (T3) and 6-months post-treatment (T6) to measure response to therapy. Clinically meaningful changes in language outcomes were defined as an improvement of ≥ 5 points on the WAB-AQ, and by a statistically significant improvement in SLT item performance.

Results

A1's WAB-AQ showed clinically meaningful improvement at T6. They also had improvement in SLT item performance (nouns, verbs, sentences) at T0, which was maintained at T6 for nouns but not for untreated items. A2's WAB-AQ remained stable throughout the testing period, but a treatment effect on SLT nouns, verbs, and sentences was observed during the testing period and generalized to untreated nouns and sentences at T3 and T6. S3 did not improve on WAB-AQ or SLT items at any point during the testing period. S4's WAB-AQ showed improvement at T6 and improvement on items (nouns, verbs and sentences) at T0, which was maintained at T6 for verbs and sentences but did not generalize to untreated items.

Conclusions

Between treatment groups, we found that the addition of rTMS to SLT may positively impact the degree by which people with post-stroke aphasia improve with behavioral language therapy, particularly in the setting of being able to generalize improvement to untreated items. Within treatment groups, however, we found that patients with more severe baseline aphasia (A1 and S3) may have less language improvement overall compared to patients with less severe baseline aphasia (A2 and S4, respectively).

Basic Science, Clinical & Translational Research

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Title: A Visit to the Pediatrician as a Part of Comprehensive Prenatal Care?

ABSTRACT

Background: The American College of Obstetricians and Gynecologists recommends that expectant parents have a preventive visit with a pediatrician in the prenatal period (a pediatric prenatal visit). However, only 22% of expectant parents have these visits, and there are significant disparities by race and income.

Objective: To assess the current knowledge, attitudes, and practices regarding referral of pregnant patients for a pediatric prenatal visit.

Study Design: A 2-minute online survey was emailed to 367 obstetric providers in Rochester, NY. Of these, 304 were currently eligible to take the survey. Simple descriptive statistics and chi-square analysis were applied to survey responses.

Results: Ninety obstetric providers completed the survey. Among respondents, 73% (66/90) reported awareness of the pediatric prenatal visit and 50% (45/90) reported referring patients for a pediatric prenatal visit. However, responses to open-ended questions revealed confusion between the pediatric prenatal visit and a "meet and greet" with a pediatrician. Some respondents provided information to patients only if they ask about pediatricians. Attitudes toward the visit among providers who had received one as a parent were positive. Patient lack of knowledge and resources were cited to be the most common perceived barriers to a pediatric prenatal visit. Some respondents also believed that the pediatric prenatal visit is not covered by insurance, even though these visits are covered by Medicaid and marketplace insurance.

Conclusions: These findings indicate that unfamiliarity with the pediatric prenatal visit is one barrier to referral. This suggests that educating both patients and providers about the guideline recommendations, evidence, and insurance coverage for these visits could increase referrals, and reduce disparities in utilization and health outcomes.

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Assessing Antibiotic Adherence and Improving Antibiotic Stewardship in Common Interventional Radiology Procedures

Abstract:

Purpose

In 2018, Journal of Vascular and Interventional Radiology (JVIR) updated its guidelines regarding peri-procedural antibiotics. However, many institutions are slow to adopt these new guidelines. Antibiotic-resistant bacteria and sepsis are serious concerns, due in part to incorrect usage of antibiotics. Here, we assess institutional adherence to 2018 JVIR guidelines for the purpose of improving antibiotic stewardship. We also evaluated the necessity of antibiotic prophylaxis in preventing post-procedural sepsis.

Materials and methods

800 cases over a 10-month time period were retrospectively identified and chart following the release of guidelines. Inclusion criteria for the study was adults aged 21 years or older undergoing mediport placement, tunneled central line (TCL) placement – hemodialysis (HD) and non-hemodialysis (non-HD), nephrostomy tube exchange, percutaneous biliary drain or cholecystostomy tube exchange. Exclusion criteria included immunocompromised and pregnant individuals as 2018 guidelines may not fit this patient populations. Guideline adherence for each procedure was recorded as a percentage; timing of the antibiotic usage was also recorded and compared to the guidelines (within 60 minutes prior to incision). Incidence of post-procedural sepsis was compared between patients with or without antibiotics in a chi-squared analysis. Effect of antibiotics timing was also be evaluated across all procedures via one-tailed t-test.

Results

In total, 49 mediport placements, 118 TCL placements (44 HD and 74 non-HD), 100 nephrostomy exchanges and 82 biliary or cholecystostomy tube exchanges were included. Antibiotics were used

in 83.6% (41/49) of mediport patients, 11.3% (5/44) of non-HD TCL patients, 20.5% (15/74) of HD TCL patients, 55% (55/100) nephrostomy tube changes, and 65.4% (55/84) of biliary procedures. Out of those given prophylaxis, guideline recommended antibiotics were used in 100% (41/41) of mediport, 100% (20/20) of TCL (both HD and non-HD catheters), 9% (5/55) of nephrostomy tube exchanges, and 1.8% (1/55) of biliary procedures. Guideline-recommended timing was followed in 75.3% across all cases, ranging from 72.2% in mediports to 79.3% in biliary exchanges. No significant differences were observed in incidence of post-procedural sepsis between patients given antibiotics and those withheld for biliary procedures ($p=0.399$). Across all procedures, timing of the antibiotics did not predict development of post-procedural sepsis ($p=0.490$).

Conclusion

This study of antibiotic practices at our institution revealed that antibiotic usage and timing is not fully up to date with 2018 guidelines. For mediports, non-HD TCL placements, and nephrostomy tube changes institutional changes should be made to reduce peri-procedural antibiotic use. For HD TCL and biliary and cholecystostomy tube changes, proper adherence to recommended prophylactic antibiotics should be followed. There were no significant differences in incidence of post-procedural sepsis in biliary procedures, and timing did not impact development of sepsis.

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Attitudes, Perceptions, and Experiences Toward COVID-19 Among Undergraduate and Graduate Students

Abstract

The emergence of the Severe Acute Respiratory Coronavirus 2 (SARS-CoV-2), has disrupted lives of people around the world, imposed a significant public health crisis, and exposed injustices. The intersection between structural racism, social risk factors, and health has been validated and exacerbated by the SARS-CoV-2 pandemic. Black, Indigenous, and People of Color (BIPOC) have been some of the most vulnerable populations affected. Compared to their non-Hispanic White counterparts, BIPOC individuals are more likely to contract SARS-CoV-2, be hospitalized, and die from infection. Over three hundred years of injustices, including slavery, Jim Crow, redlining, voter suppression, and police brutality, it is evident that BIPOC individuals face an amalgam of civil and human rights violations affecting housing, employment, health, and education outcomes. The educational system has been severely affected by the current pandemic. SARS-CoV-2 has disrupted in-person learning (e.g., research, fellowships, internships), student employment and housing. This sudden disruption has exacerbated financial hardships creating a generational human-power catastrophe. BIPOC students have been the most affected group by these

challenges, expanding the gap of inequities among racial and ethnic groups. To date there has been a paucity of research done among BIPOC students and the impact of SARS-CoV-2. Education is a human right and an empowering tool to close the gap of race and social inequities. We believe a call for action to provide asset-based understanding and policy solutions for BIPOC students is critical, otherwise, SARS-CoV-2 will become the significant factor to perpetuate and expand social injustices among minoritized students.

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Project Title: Revisiting Hypochromic Vitiligo: A case series proposing a new clinical entity, Seborrheic Patterned Macular Hypopigmentation

Abstract

Background: In 2014, a case series was published highlighting a unique clinical presentation of patterned hypopigmentation coined *hypochromic vitiligo*. This was described as near symmetric, scattered hypopigmented macules in a seborrheic distribution in patients with darker skin types. It was proposed that this may be a new form of vitiligo. We have similarly identified a cohort of patients, all of Black descent and majority middle-aged, with an identical presentation of hypopigmented macules and patches in a seborrheic distribution affecting the scalp, nose, face, chest and back.

Objectives: To further characterize this disorder and distinguish it from other disorders of depigmentation and hypopigmentation.

Methods: This is a case series including data from three dermatology departments, specifically New York University School of Medicine, Henry Ford Hospital, and Henri Mondor University Hospital. Patients with the unique clinical phenotype of hypopigmented macules and small patches in a seborrheic distribution were included.

Results: Fourteen cases were identified. Eleven were male and three were female. The average age at time of consultation was 51 years (range 29-73). All patients were of Black descent with Fitzpatrick skin types ranging from IV and VI. The pattern of distribution was similar amongst all participants, with a majority of the hypopigmented macules predominating along the head and neck area in a seborrheic distribution. Histopathologic findings demonstrated presence of melanocytes, with most biopsies demonstrating no decrease in melanocyte density.

Conclusion: Histopathologic findings do not appear to support a diagnosis of vitiligo, given the persistence of melanocytes in the biopsies taken. We suspect this is an under-recognized disorder of hypopigmentation in adult skin of color patients for which etiology, pathogenesis, and treatments will need further evaluation and characterization. We propose renaming of this entity to *Seborrheic Macular Hypopigmentation*.

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Clinical Insights Derived from 3D Printed Heterogenous Aortic Dissections Phantoms

Objective: Surgical intervention of Acute Type B Aortic Dissection includes modification of the proximal and/or distal tear. Optimal intervention is limited by our lack of understanding of the aortic tissue properties and dissection hemodynamics. Here, we establish the relationship of material properties and flow dynamics on wall strain using heterogenous 3D printed aortic dissection phantoms.

Methods: Two lumen aortic phantoms with varied wall stiffnesses are created using 3D printed injection molds filled with polyvinyl alcohol (PVA). In all models, the right sidewall is composed of 10% PVA to replicate the elastic true lumen. The left wall stiffness is increased (i.e. 10% [control], 15%, 20% or 25% PVA) to reflect the inelastic false lumen. The phantoms are attached to a pulsatile flow simulator and imaged with ultrasound under five experimental conditions: No flow restriction, 50% false lumen inflow restriction, 50% false lumen outflow restriction, 50% true lumen inflow restriction, and 50% true lumen outflow restriction. Mean and regional principal strain is determined across the cardiac cycle using our ultrasound elastography technique.

Results: Parametric imaging shows marked differences in peak regional wall strains (Fig1.) which was consistent across the entire cardiac cycle (Fig.2). Without flow restriction, as false lumen stiffness increases, mean regional principal strains increase by $.11\% \pm .37\%$, $.23\% \pm .05\%$, and $.46\% \pm .15\%$ in the fifteen, twenty, and twenty-five percent phantoms, respectively. With true lumen outflow restriction, principal strain exponentially increases with false lumen stiffness ($.66\% \pm .29\%$, $.81\% \pm .15\%$, $1.7\% \pm .15\%$). No such changes in strain were observed while modulating inflow or false lumen outflow.

Conclusion: Our results demonstrate increased mean peak principal strain of the true lumen due to increased stiffness of the false lumen. Notable strains are markedly increased in the true lumen with true lumen outflow restriction. These experiments suggest that inflow restriction alone (proximal stent-graft coverage) may not be sufficient for the treatment of aortic dissections. Ideal management must include maximal true lumen outflow resistance reduction with stenting (PETTICOAT) and modulation of systemic vascular resistance.

Figures:

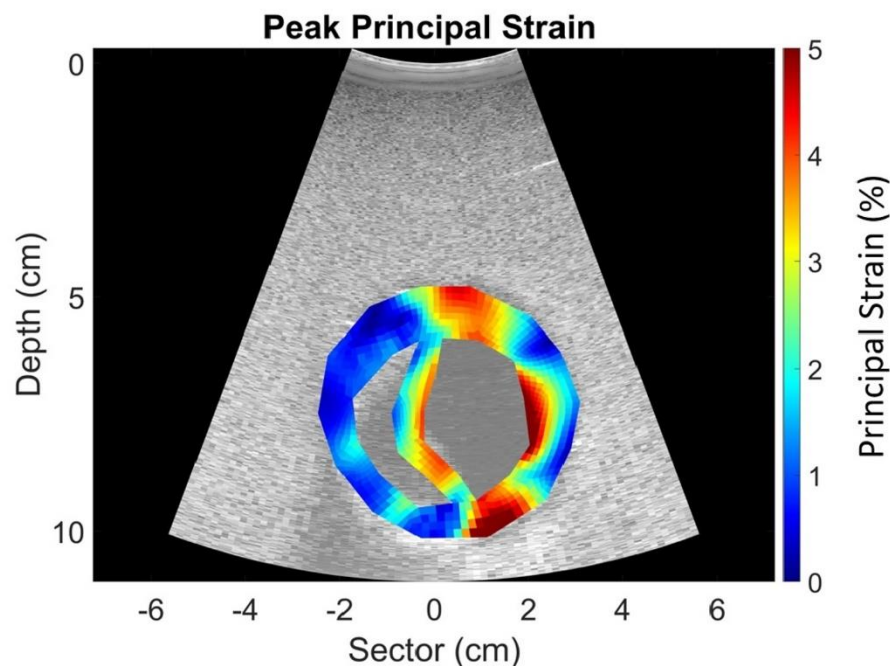


Figure 1. Parametric imaging of mean principal strain within a heterogeneous cryo-hydrogel dissection model at peak pressure. Parametric imaging shows regional difference in wall biomechanics with the right vessel wall (true lumen) comprised of 10% cryo-hydrogel and the left vessel wall (false-lumen) comprised of 25% cryo-hydrogel

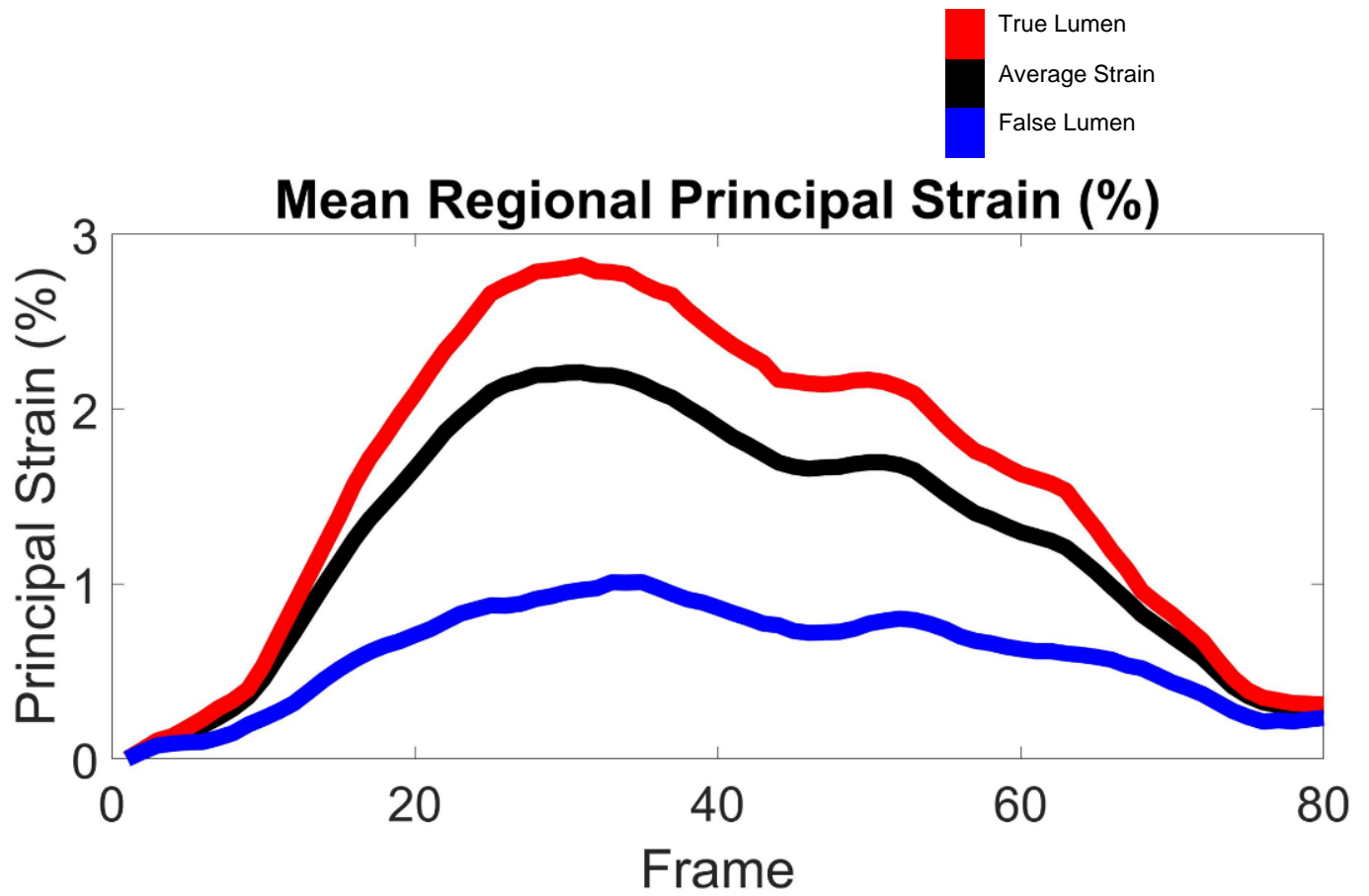


Figure 2. Mean principal strain per frame, over one cardiac cycle of a heterogeneous cryo-hydrogel dissection model

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Role of Social Networks in Prognostic Understanding of Older Adults with Advanced Cancer

Background: Up to 60% of older adults with incurable cancer and their caregivers differ with their oncologists when reporting chances that the cancer is curable. These patients often rely on social networks for information, support and advice regarding their cancer. However, little is known about how patients' social networks influence prognostic understanding.

Methods: In a pilot study of adults 65+ with incurable cancer who were considering treatment options, patients were asked to complete surveys, social network maps and semi-structured interviews exploring with whom they prefer to communicate about their illness; and to invite network members to participate in interviews exploring similar themes. Transcribed interviews were analyzed using open-coding by 2 coders, and

discrepancies were identified and resolved with help of a third . Codes were categorized into emergent themes. To explore associations between network structure and communication patterns, network maps were reviewed and 3 case examples with diverse network characteristics were selected to juxtapose with communication patterns. Because gender influences communication, same-gender patients were chosen. Using a joint display, themes were integrated with quantitative structure scores developed using social network analysis of the maps.

Results: The case examples were males, 65+ with incurable cancer. Inadequate communication was prominent in each social network; however, network structures dictated differences in communication dynamics and influenced prognostic understanding. Patient A expressed prognostic understanding but tended to withhold information about his illness, selectively sharing with one core member of his star-shaped network. Patient B's cohesive network collaborated to bear the weight of prognostic information, supporting the patient's preference to disengage from the topic. Minimal information sharing between segregated clusters of Patient C's network impeded prognostic understanding.

Conclusions: All case examples illustrated opportunities for improved communication within social networks, and how interventions to foster prognostic understanding might be optimally tailored to different patient network structures.

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The relationship between teen reported nocturnal asthma symptoms and daily functioning

Background:

Asthma is one of the most common chronic childhood conditions, and many children with asthma experience worsening symptoms at night that may disrupt their sleep. About half of kids with severe asthma have at least 1 night of inadequate sleep per week. Few studies have explored how sleep disruptions due to asthma may impact daily functioning in teens.

Objective:

To identify associations between nocturnal asthma awakenings and functional health outcomes such as physical activity, mood, school attendance, and quality of life in a cohort of teenagers with asthma.

Design/Methods:

We analyzed baseline data from School-Based Asthma Care for Teens (SB-ACT), an NIH-funded RCT conducted from 2014-2018 in Rochester, NY. During an at-home baseline survey, teenagers (ages 12-16) with asthma answered questions about demographics, recent asthma symptoms, and functional health outcomes. We conducted bivariate and multivariate regression analyses to explore the relationship between persistent nocturnal asthma symptoms (>2 nights of nocturnal asthma awakenings in the past 14 days) and functional health measures.

Results:

Data were collected and analyzed from 430 teens (Table 1). More than ¼ (30%) of teens reported persistent nocturnal asthma symptoms. Compared to teens with intermittent nocturnal asthma symptoms, teens with persistent nocturnal asthma were more likely to report activity physical limitation during strenuous activities (58% vs 41%, $p < 0.01$) moderate activities (32% vs 19%, $p < 0.01$), and school gym (36% vs 19%, $p < 0.01$). These teens were also more likely to report depressive symptoms (41% vs 23%, $p < 0.01$), more asthma related school absenteeism in the past 14 days (0.81 vs 0.12, $p < 0.01$) and poorer quality of life (4.6 vs 5.9, $p < 0.01$). These findings remained significant when controlling for daytime asthma symptoms, weight status, race, ethnicity, gender, age, and smoke exposure (Table 2).

Conclusions:

Persistent nighttime asthma symptoms were associated with poor functional health outcomes among teens, independent of day-time symptoms. Although causation cannot be inferred from this cross-sectional study, these findings suggest that night-time symptoms disrupt sleep and may play a role in daily activities and wellness. Identifying nighttime symptoms and improving asthma control at night may positively impact daily functioning for these teens.

Table 1. Demographic information of study population

	N = 430
Age	Mean = 13.4 yrs
% Male	56%
% African American	56%
% Hispanic	32%
% Medicaid Insurance	84% (n=429)
% Overweight or Obese	57% (n=429)
% Severe persistent Asthma	58% (n=428)
% Persistent Nocturnal Asthma	30%

Table 2. Multivariate Regression Analysis: Persistent Nocturnal Asthma Symptoms and Functional Outcomes.

Teen Reported:	Adjusted Odds Ratio	95% Confidence Interval	p-value*
Feeling limited in strenuous activities	1.9	1.3-3.0	0.049
Feeling limited in moderate activities	1.9	1.2-3.1	0.047
Feeling limited in gym	2.4	1.5-3.8	0.014
Depressive symptoms	2.3	1.5-3.6	0.016
	β	95% Confident Interval	p-value
School Absences	h	(0.4, 0.8)	<0.001
Quality of life	-0.92	(-1.1, -0.7)	< 0.001

*Regression models include: Daytime asthma symptoms, weight status, race, ethnicity, gender, age, and smoke exposure.

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Sex Differences in the Risk of Ventricular Tachyarrhythmia among Patients Receiving Primary Implantable Cardiac Defibrillator Therapy

Background: Current guidelines for primary implantable cardioverter-defibrillator (ICD) therapy may not account for sex differences in arrhythmic risk in this population.

Methods: Aggregate data from all MADIT trials (N=4,506; 24% female) were analyzed. Primary endpoints were any sustained ventricular tachycardia/fibrillation (VT/VF), VT/VF \geq 170 bpm, VT/VF \geq 200bpm, appropriate ICD shocks, and all-cause mortality.

Results: Mean age (64 \pm 11 years) and LVEF (25%) was similar between females and males, but females exhibited a higher frequency of non-ischemic cardiomyopathy (74% vs. 42%). The 3-year cumulative probability for all VT/VF endpoints was significantly lower among females vs. males (Figure 1A-D). Multivariate analysis consistently showed a lower risk of all VT/VF endpoints among females: sustained VT/VF (HR=0.60, p<0.001), VT/VF \geq 170bpm (HR=0.60, p<0.001), VT/VF \geq 200bpm (HR=0.52, p<0.001), appropriate ICD shocks (HR=0.58, p<0.001), whereas mortality was not significantly different between females and males (HR=0.96, p=0.58). Subgroup analysis by cardiomyopathy-type (ischemic/non-ischemic) and device-type (ICD/CRT-D) showed consistent findings.

Conclusions: Our aggregate data from landmark primary prevention trials show that women have a lower risk of life-threatening VT/VF events than men, with no difference in adjustment for confounders and the competing risk of death. These findings suggest a need for sex-specific risk stratification for primary ICD implantation.

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Neighborhood-Based Socioeconomic Determinants of Cognitive Impairment in Zambian Children With HIV: A Quantitative Geographic Information Systems Approach

Background: Place-based inequalities, such as exposure to violence and access to nutritious food and clean water, may contribute to human immunodeficiency virus (HIV)-associated cognitive impairment. In this study, we investigated neighborhood effects on cognition in children and adolescents with HIV in Lusaka, Zambia.

Methods: We conducted a prospective cohort study of 208 children with perinatally acquired HIV (ages 8-17) and 208 HIV-exposed uninfected controls. Participants underwent neuropsychological testing and interviews assessing socioeconomic status. Geographic regions with clusters of participants with HIV and cognitive impairment were identified using quantitative geographic information systems (QGIS) and SaTScan. Associations between location of residence and cognitive function were evaluated in bivariable and multivariable regression models. Mediation analysis was performed to assess direct and indirect effects of location of the residence on cognitive impairment.

Results: Residence in Chawama, one of the poorest neighborhoods in Lusaka, was significantly associated with cognitive impairment in participants with HIV (odds ratio 2.9; $P = .005$) and remained significant in a multivariable regression model controlling for potential confounders. Mediation analysis found that 46% of the cognitive effects of residence in Chawama were explained by higher rates of malnutrition, lower school attendance, and poorer self-reported health.

Conclusions: Place-based socioeconomic inequality contributes to cognitive impairment in Zambian children and adolescents with HIV. Neighborhood effects may be mediated by concentrated poverty, malnutrition, limited access to education and health care, and other yet unknown environmental factors that may be potentially modifiable.

Keywords: HIV; Zambia; child health; global health; infectious diseases.

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Interest and Feasibility of Implementing a Virtual Positive Parenting Program in Santiago, Chile

Project description:

One of the greatest, preventable public health issues is substance use. For example, the number of opioid overdose deaths in San Francisco in 2020 was over double the number of deaths due to the Corona Virus Disease-19 (COVID-19) (Fuller, 2020). One approach that has proven successful in preventing substance use is targeting adolescents and their families. This age is an appropriate time for intervention as childhood characteristics predict health outcomes later in life, including substance use (Moffitt et al., 2011). Parenting programs have been shown as a successful intervention to decrease risky behaviors, including substance use, in teens and implementation of parenting programs in a school setting has also shown particularly high success rates (Allen et al., 2016)

In Chile, adolescents have a notably high prevalence of tobacco, alcohol and drug consumption (SENDIA, 2018). Of particular concern is the high prevalence of risky behaviors and large quantities of consumption in Chile. Of students who reported consuming alcohol in the last month, 61.7% had drunk more than 5 drinks at one time on at least one occasion. The average age of initiation of smoking cigarettes was 13.8 years and by 12th grade 8.8% of students reported daily smoking (SENDIA, 2018). Efforts to adapt and implement externally-developed parenting programs in Chile have proven to be unsuccessful due to low participation rates (Cova et al., 2020; Errázuriz, Cerfogli, Moreno, & Soto, 2016; Sánchez, 2018), failure to show significant effectiveness (Corea V, Zubarew G, Valenzuela M, & Salas P, 2012), and have been complicated to implement in the local context (Correa, 2018; Delva, López, & Muñoz-Guzmán, 2018; Sánchez, 2018).

The ¡Vamos por Mas! (¡VxM!) program is a community-developed, school-based, positive-parenting program to strengthen family relations and reduce substance use among Chilean

adolescents. Key components of the program include 1) school partnership, 2) in-person workshops, 3) virtual engagement, 4) family support, and 5) external supervision. The ¡VxM! program evaluation was completed during the COVID-19 pandemic, in which familial contexts and needs changed. Changes in adolescent behavior during the pandemic have been observed, including increases in the frequency of alcohol and marijuana use and worsening mental health (Dumas, Ellis, & Litt, 2020; Golberstein, Wen, & Miller, 2020).

Virtual positive-parenting programs offer an alternative mode for addressing these changes and have shown to be promising interventions (Allen et al., 2016). Virtual programs also reduce barriers due to limited parental time and resources, a limiting factor for this pilot project and other in-person parenting programs (Allen et al., 2016). Thus, in the final qualitative assessment of the program, we evaluated the potential interest and feasibility of a virtual version of the ¡VxM! program to address these new and persistent barriers.

Objectives/purpose: The purpose of the poster is to report perceptions related to a potential virtual version of the ¡VxM! program.

Methodology:

Thirteen focus groups (FGs) were conducted, including different stakeholders involved in the delivery of the ¡VxM! program: school leadership (n=3 FGs, 7 participants), teachers (n=3 FGs, 19 participants), parents (n=6 FGs, 36 participants), and researchers (n=1 FGs, 4 participants). All FGs were divided by school, and parents were further divided by grade as in program delivery. Semi-structured, audio recorded focus groups were conducted by a researcher with experience in qualitative methods. Focus groups lasted 1.5 – 2 hours and were conducted in Spanish. Focus groups were transcribed verbatim and analyzed using NVivo (QSR International, v.12). Independent analysts used an inductive-deductive coding process following the procedures of Content Analysis. Once data were coded, codes were further classified according to the participant's role and school where these emerged. Representative quotes were translated to characterize participant's perceptions. All names within the transcription were changed to preserve anonymity.

Results:

Parents emphasized that the pandemic had changed their current context: they had more time to focus on familial relationships and experienced increased stress in their homes. All participant groups reported a need for and interest in a completely virtual format of the ¡VxM! program. Parents and the research team predicted this would increase participation due to increased schedule flexibility. School staff believed the current program content and materials would translate easily to a virtual format. The research team was concerned that loss of in-person workshops could dilute the effectiveness of the program. All participants reported that Whatsapp® text or media messages was their preferred platform of communication. Researchers

were interested in a website to increase access. Some school staff were concerned about the variability of access to the internet and technology among families at their school.

Conclusions/discussion:

Overall, participants expressed a need for and an interest in a virtual version of the ¡VxM! program. There is no doubt that the impacts of the pandemic on families will persist long beyond the pandemic itself. Additional factors, such as economic hardship and previous traumas are also likely to play a role on how families fare (Prime, Wade, & Browne, 2020). These changing family circumstances demand that practitioners and researchers understand the impact of these factors on traditional in-person parenting interventions. In order for these interventions to successfully prevent substance use, alternative formats for positive parenting interventions must be developed and evaluated.

External Research

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Title: CACHES-US: Child and Adolescent Chronic Hand Eczema Study - United States

Chronic hand eczema (CHE) is an inflammatory dermatitis of the skin of the hands with significant disease implications as evidence demonstrates that progression of this disorder can result in difficulties in employment, decreased quality of life, and high use of medical resources. Most of the data on CHE epidemiology, work-up, and therapeutics has been based on adult patients. While many adults report a history of hand eczema onset in childhood, few studies have looked at the characteristics and management of this disease in the pediatric population. Early recognition and treatment of this disease in childhood can allow for overall improved quality of life through greater engagement in leisure activities such as sports and the arts, less restrictions in future job opportunities, and decreased cost of individual healthcare. This is especially important given the development of new therapeutic agents targeting hand eczema including topical Janus-kinase (JAK) inhibitors which are being considered for this condition in the pediatric population. We are currently performing a survey investigation querying pediatric dermatologists through the Pediatric Dermatology Research Alliance and Society for Pediatric Dermatology. Investigators are being asked their perspectives on the evaluation, diagnostic testing, and therapeutic choices in treating pediatric chronic hand eczema (P-CHE) patients. They are also being presented with patient vignettes of children presenting with P-CHE, asking how they would manage each potential patient. We hypothesize that 1. Utilization of systemic therapeutics for P-CHE is more often associated with children ages 12-20 years old and those with concomitant atopic dermatitis, 2. Providers' first line therapy for P-CHE includes topical corticosteroids with topical calcineurin inhibitors being a secondary adjunct, and 3. Contact allergy patch testing is the most common testing considered for P-CHE but most providers do not utilize such in 75% or more patients. Performing a general assessment of how pediatric dermatologists see CHE in their

practice as well as how they approach management can allow the medical community to gain insightful perspectives on the disease and lay the foundations for future clinical studies and guideline development. This work is an initial, but important step, in studying P-CHE in the United States, and refining the clinically important issues for further research to improve the categorization of hand eczema and evolve best practices for comprehensive management.

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Radiographic and clinical findings associated with Klippel-Feil Syndrome: A case series

Introduction: Klippel-Feil Syndrome (KFS), a congenital disorder involving the fusion of two or more cervical vertebrae, has historically been described with a prevalence of 1 in 40,000. However, a recent study from the University of Rochester evaluating CTs of the cervical spine in emergency department patients noted a higher prevalence of congenital cervical fusion at 1 in 172. KFS involves a short neck, restricted mobility of the upper neck, and often a low hairline at the back of the head because of improper segmentation of the cervical vertebrae during development.

Objective: The primary objective of this study is to describe the distribution of sex, race, cervical level, Samartzis classification, the prevalence of scoliosis, and previous surgeries within the Klippel-Feil patient population.

Methods: The UR CTSI TriNextX was used to identify patients that may have Klippel-Feil Syndrome. RSRB approval was obtained. The sample from TriNextX was further narrowed down by confirming the Klippel-Feil diagnosis through imaging in patient records. The final 40 patient database was then analyzed and classified by the Samartzis guidelines. Samartzis type 1 include those with a single congenitally fused cervical segment, Type 2 multiple noncontiguous fused cervical segments and type 3 and multiple contiguous fused cervical vertebrae.

Results: In our cohort of patients KFS, there were more female than males (57.5% vs 42.5%). Within the Samartzis classification, Type I was the most common followed by Type III then Type II (57.5% vs 25% vs 17.5%). While scoliosis affects 2-3% of the general population, those in the

Klippel-Feil cohort had a 30% prevalence of scoliosis. 27.5% of Klippel- Feil patients had a previous cervical spine surgery. A majority of the KFS cohort were Caucasian and African American (70% and 12.5% respectively). 5% of the cohort were Hispanic and 2.5% were Asian. The remaining 10% were of unknown ethnicity. Finally, the most common levels of fusion were C2-C3 (30%) and C5-C6 (20%).

Conclusions: KFS was more common in females than males. Type I (single fused cervical segment) was the most common variety of KFS and the most common fusion level was C2-C3. A majority of the KFS cohort were Caucasian. The KFS cohort had a prevalence of scoliosis of 30% and 27.5% had a previous surgery.