CCSRs could be identified using the novel HGLR method, which improved model performance given a heterogeneous population in IQI 11 with a mix of high and low event rates, unlike the more homogeneous patient population in IQI 09. DISCUSSION/SIGNIFICANCE: Standard implementations of regression models fail to address critical issues that arise in healthcare data – (a) quadratic explosion of potential interactions that cannot be manually identified, and (b) categorical variables with multiple levels or values (e.g., age categories). We propose innovative use of HGLR to robustly address these issues.

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## Neonipple Formation After Implantation Of Acellular Ovine Xenograft

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OBJECTIVES/GOALS: To determine if decellularized costal cartilage (DCC), which could theoretically be obtained "off the shelf," would provide similar results to autologous cartilage grafts previously studied in this lab, thereby widening the application of our novel nipple engineering approach to all patients undergoing nipple reconstruction. METHODS/STUDY POPULATION: PLA scaffolds (diameter: 1.0 cm, height: 1.0 cm) were printed using a PRUSA 3D printer and sterilized. Lamb costal cartilage was minced (1 mm3) or zested (<0.2 mm3) and then decellularized. The quality of decellularization was assessed using DNA quantification and histological analysis. DCC was then packed into PLA scaffolds and implanted subcutaneously into immunocompetent Sprague Dawley rats using a CV flap technique. The constructs were explanted and evaluated up to 6 months after implantation. RESULTS/ANTICIPATED RESULTS: All nipple reconstructions showed well-preserved diameter and projection due to persistence of the external scaffolds at 1, 3, and 6 months. Mass and volume of engineered tissue was well-preserved over all timepoints. Compared to implantation values, engineered zested nipples demonstrated a 12% mass increase and a 22% volume increase at 6 months. Minced nipples illustrated a similar mass and volume gain with a 21% increase in mass and a 13% increase in volume at 6 months secondary to infiltration of fibrovascular tissue and growth through scaffold wall pores, respectively. Histologic analysis demonstrated a mild inflammatory infiltrate 1 month after implantation which was replaced by fibrovascular tissue by 3 months that remained stable through 6 months. The processed DCC structure remained unchanged over time. DISCUSSION/SIGNIFICANCE: Using acellular ovine xenograft within bioabsorbable scaffolds, we have engineered neonipples that maintain their volume for at least 6 months. DCC architecture is well-preserved with minimal evidence of immune-mediated degradation. By using DCC, this novel approach to nipple engineering may be applied to any patient requiring reconstruction.

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## Search Solutions: Investigation into CTSA Hubs COVID-19 Vaccine Information

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OBJECTIVES/GOALS: While CTSA hubs have contributed to the successes in COVID-19 clinical research, understanding the role of the CTSA consortium in translating vaccine efficacy and availability to awareness and implementation. The goal of this study is to quantitatively assess the use of social media in the dissemination of COVID 19 vaccine content across 60+ CTSA Hubs. METHODS/STUDY POPULATION: Structured search terms in the CTSA Search Solutions database were used to identify CTSA Hub website pages highlighting "COVID-19 Vaccination Information." Each link identified was manually reviewed for vaccination content. The links and content identified by CTSA Search Solutions were then validated by advanced Google search operator "vaccine site" and manual review of CTSA Hub websites. Official CTSA Hub social media platforms were searched for vaccine proliferation content from January 1, 2020 to November 11, 2021. Data points collected included Community Targeted Vaccine Content, Vaccine Awareness, Vaccine Distribution, Vaccine Clinical Trial, Vaccine Related Media, Social Media Presence, and Social Media Vaccine Proliferation. RESULTS/ANTICIPATED RESULTS: In examining content, of the 64 listed CTSA Hubs, 52 of (67.2%) hosted one or more categories of COVID-19 vaccine information, and 16 (25%) hosted three or more categories. The most common category was "Community Targeted Information" with 27 (42.2%) hubs; the least common category was "Vaccine Distribution" with 5 (7.8%) hubs. Examining social media for vaccine proliferation, 41 (64.1%) hubs had connected social media and 23 (35.9%) hubs had vaccine proliferation posts. The most common platform was Twitter with 37 hubs; the least common platform was Instagram with 5 hubs. DISCUSSION/SIGNIFICANCE: Our investigation demonstrated varying Phase 4 translational efforts via social media among the CTSA Hubs for COVID-19 vaccine implementation. These novel findings identify promising opportunities for enhancement while emphasizing proven strategies from CTSA hubs nationwide. Further research will elucidate granular trends among CTSA hubs.

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## A Longitudinal, Multi-Method, Pilot Triangulation of Family Intensive Care Unit Syndrome

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OBJECTIVES/GOALS: The objectives of this study are to: 1) Examine the feasibility of using concurrent multi-methodology to quantify the affective, decisional, physical symptom domains of Family Intensive Care Unit Syndrome. 2) Describe the associations between the Family Intensive Care Unit Syndrome symptom domains (affective, decisional, physical). METHODS/STUDY POPULATION: Using a repeated-measures, correlational design, we recruited surrogate decision makers of incapacitated, mechanically ventilated patients within four adult intensive care units at a tertiary medical center in northeast Ohio. We collected baseline data (T1) after obtaining informed consent and follow-up data three (T2) and seven (T3) days post-baseline. We used self-report instruments, behavioral tasks, and accelerometry to measure affective (anxiety & depression), decisional (working memory ability & decision fatigue), and physical (sleep quality & sleep disturbance), symptom domains. For objective 1, we computed completion percentages of each time-point and overall compliance with wearing the accelerometer device. For objective 2, we inspected Spearman correlations. RESULTS/ANTICIPATED RESULTS: We recruited and collected baseline data (T1) for 33 participants. Nineteen participants completed the T2 interview and twenty participants completed T3. Eight participants wore the accelerometer device for less than 72 hours and 15 wore the accelerometer for the full study period.

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At baseline, the physical symptoms (sleep quality & disturbance) were strongly correlated with the affective (anxiety & depression) symptoms, all of which were moderately correlated with one decisional symptom (decision fatigue). One cognitive symptom (working memory dysfunction), was weakly associated with the affective and physical symptom domains, and moderately correlated with the other cognitive symptom (decision fatigue) These associative trends were maintained within and between each time point. DISCUSSION/SIGNIFICANCE: This study identifies potential opportunities for examining the various symptom domains of Family Intensive Care Unit Syndrome. The associations between the domains are consistent with the extant literature, and highlights the need for supportive interventions that mitigate affective and physical symptoms that can compromise decision-making.

## *Evaluation*

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### Cost and Benefit Tradeoffs of Preconception Fibroid Treatment with Myomectomy on Obstetric Outcomes: A Cost-Effectiveness Analysis

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OBJECTIVES/GOALS: Fibroids during pregnancy are associated with worse obstetric outcomes. However, theres no recommendation to guide counseling. We aimed to assess the cost-effectiveness of (1) treating prevalent fibroids before pregnancy and (2) screening and treatment of fibroids against the outcomes of postpartum hemorrhage (PPH) and fetal malpresentation. METHODS/STUDY POPULATION: A decision tree model was used to compare (1) preconception myomectomy for prevalent fibroids, without treatment and (2) preconception myomectomy for prevalent cases and universal ultrasound screening with subsequent myomectomy for incident cases. Probabilities and costs, calculated from the U.S. healthcare sectors perspective, were derived from the literature. Effectiveness was measured in incident PPH or malpresentation cases per 1,000 in the population. The incremental cost-effectiveness ratio (ICER) was measured in incremental cost per case averted. One-way and probabilistic sensitivity analyses were conducted to identify influential parameters and assess the impact of parameter uncertainty. RESULTS/ANTICIPATED RESULTS: Treating known fibroids prior to pregnancy averted 65.7 PPH cases at the cost of $8,773,094 and 91.08 malpresentations at the cost of $8,163,315 (ICERs, $133,532 vs $89,628 per case averted, respectively). Universal fibroid screening with treatment of incident and prevalent cases averted 7.34 PPH cases at the cost of $3,725,619 and 2.7 malpresentations at the cost of $3,477,033 (ICERs, US$507,450 vs US$1,335,771 per case averted, respectively). Sensitivity analyses showed cost-effectiveness improved with decreased cost of myomectomy and increased proportion of prevalent and incident cases. DISCUSSION/SIGNIFICANCE: Treatment alone costs $133,532 per PPH averted and $89,628 per malpresentation averted. Likewise, screening with treatment costs $507,450 per PPH averted and $1,335,771 per malpresentation averted. Additionally, ICERs may decrease when focusing on populations where fibroid incidence and prevalence is higher, for example, among Black women.

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### Bilirubin Oxidative Products as Predictive Biomarkers of Cerebral Vasospasm: A Pilot Study

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OBJECTIVES/GOALS: Our aim is to understand the role bilirubin oxidation products play in the development of cerebral vasospasm in patients with subarachnoid hemorrhage. We aim to evaluate the time course of bilirubin, HO-1, and SOD1 in relation to the subsequent development of vasospasm in to establish predictors of vasospasm development. METHODS/STUDY POPULATION: Prospective cohort observational study involving collection of CSF samples of pts admitted to KU NeuroICU with SAH and placement of EVD. CSF will be extracted from the EVD of patients on the day of placement of the EVD, and then each subsequent day for a total of 10 days. Bilirubin concentration will be determined by means of spectrophotometry. HO-1 will be measured using a commercially available ELISA kit. Cu/Zn-Superoxide Dismutase will be measured using a commercially available ELISA kit. A review of patients chart will then be performed following discharge from hospital to determine if a diagnosis of vasospasm was made, details of the vasospasm (i.e. symptoms, severity), as well as to obtain demographic data and events occurring during patients admission that could confound statistical analysis. RESULTS/ANTICIPATED RESULTS: First: we will investigate the feasibility of collecting serial CSF samples and processing them for target analyte quantification. We predict that the protocol will yield quality data that will result in insight on the pathophysiology of cerebral vasospasm. Second: we will characterize the changes in target CSF bilirubin breakdown analytes over 10 days. From this we hypothesize that as bilirubin oxidation increases, the propensity for cerebral vasospasm will also increase. DISCUSSION/SIGNIFICANCE: If there is a clear correlation between formation of bilirubin and increase in HO-1, and SOD1, with the clinical signs of vasospasm, this could be used as a biomarker for not only identifying patients at risk for developing these complications but also a means to follow the effectiveness of potential therapies.

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