

Solutions has proven an excellent tool and can be used by any hub to understand how they compare and implement changes to improve their programs.

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Independent and Combined Effectiveness of Multiple Micronutrient Supplementation and Responsive Caregiving Interventions to Support Early Child Development in Southwest Guatemala

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OBJECTIVES/GOALS: The objective of this study is to examine the independent and combined effectiveness of a multiple micronutrient supplementation and responsive caregiving intervention on early child development in southwestern Guatemala. **METHODS/STUDY POPULATION:** We conducted a double blind, 2 x 2, cluster randomized controlled trial combining micronutrient supplementation and responsive caregiving treatments. We enrolled 309 infants (6-18 months) and 387 preschoolers (36-52 months) at nutritional risk (height-for-age z-score < -1) (51% male; 17% indigenous ethnicity; 76% of caregivers completed a primary school). The supplementation arm received a maize-soy product fortified with 21 micronutrients for 6 months; the control was fortified with B2. The responsive caregiving intervention was adapted from the UNICEF Care for Child Development program and delivered over 6 home visits. We examined changes in early child development from baseline (2015) to endline (2017) using the Bayley Scales of Infant and Toddler Development III and Bracken Scales of School Readiness. **RESULTS/ANTICIPATED RESULTS:** Among infants, age standardized Bayley cognitive development scores declined over time in each treatment arm. Infant Bayley motor development scores significantly increased in the combined multiple micronutrient supplementation + responsive caregiving arm ($\hat{\Delta} = 3.67$ [95% CI: 0.17, 7.17], $p = 0.04$). Among preschoolers, school readiness decreased over time in each treatment arm. The rates of change in infant development and preschooler school readiness did not differ between treatment arms. Further analysis will explore effect modification of the intervention by pre-specified child and household factors. **DISCUSSION/SIGNIFICANCE:** Combined multiple micronutrient supplementation and responsive caregiving supported motor development while cognitive and school readiness were not impacted by the intervention. These findings will inform the effectiveness and beneficiaries of multisectoral interventions to promote early child development in adverse environments.

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Automation of Home Food Inventory Scoring to Standardize Reporting, Enhance Clinical Utility, and Operationalize Delivery of Personalized Behavioral Targets

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OBJECTIVES/GOALS: The Fulkerson Home Food Inventory (HFI) is widely used to assess the home food environment, a key target of behavioral weight loss trials. However, no standardized report is

available. We created publicly available procedures to automate and standardize HFI reporting, yielding a personalized report to enhance this measure's clinical utility. **METHODS/STUDY POPULATION:** Parents in the TEENS adolescent behavioral weight loss trial complete the HFI at 0-, 2-, 4-, 8-, and 12m and receive personalized reports at each timepoint. In REDCap, participants identify foods available in their home. HFI syntax is applied to calculate the obesogenic home food availability score. Categories of foods found are identified, with specific guidance provided to enhance their home food environment. Prior to automation, procedures were time intensive and error prone. To address this, HFI data are exported into Excel by a PowerShell (v7.2) command-line script using Python (v3.10) with the REDCap API. Results are calculated with F# (v6.0) using Microsoft Excel Interop API and inserted into a report template with F# using the Microsoft Publisher Interop API. This process is repeated at each timepoint. **RESULTS/ANTICIPATED RESULTS:** The new automated procedures significantly reduce time to generate reports and enhance accuracy. Procedures yield a 2-page individualized report that includes the obesogenic home food environment score and identifies categories of healthy items found (e.g., fruits, vegetables, whole grains) as well as areas of improvement (e.g., high-fat dairy products, processed meats). Specific items found in each category are identified. The report identifies food found in the home (e.g., chicken nuggets) with suggested healthier substitutions (e.g., lean chicken breast). This syntax and commands will be made publicly available for use in the scientific and clinical community. **DISCUSSION/SIGNIFICANCE:** These publicly available procedures optimize, automate, and standardize reporting for the HFI. Procedures improve efficiency within large-scale clinical trials and yield a personalized report to enhance the clinical utility of this measure and empower participants to make informed decisions about their health behaviors.

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Patient and physical therapist experiences with integrating an eHealth pain self-management program into clinical care

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OBJECTIVES/GOALS: eHealth programs centered on cognitive behavior therapy (CBT) can be supported by physical therapists to feasibly deliver psychologically-informed physical therapy (PIPT). This study assessed patient and physical therapist (PT) perspectives of adding a CBT-based eHealth program to physical therapy. **METHODS/STUDY POPULATION:** In our uncontrolled pilot study, PTs were trained in motivational interviewing (MI) to support patient engagement with a 7-module eHealth CBT-based pain self-management program that accompanied a course of PT. Interviews were conducted with a convenience sample of 13 patients with chronic back and/or neck pain and 9 PTs to evaluate experiences with the eHealth program, perceived benefits, barriers and facilitators to integration, and future recommendations for implementation from both perspectives. Interview data were recorded, transcribed, and analyzed using qualitative content analysis for core themes. **RESULTS/ANTICIPATED RESULTS:** Patients benefited from the eHealth program, especially relaxation (69% of respondents) and meditation/mindfulness (62%). Time and technology

were barriers for eHealth engagement (23% and 15%). Most (92%) patients reported their therapist reviewed eHealth progress, although one-third of patients wanted more discussion and feedback on eHealth content. PTs felt the eHealth program was valuable (67%), user-friendly (56%), and took minimal effort to support (78%). Some (44%) therapists felt more confident after MI training to support patient engagement. PTs recommended offering patients tablets (i.e., iPads) for clinic or home use and additional therapist training in MI. **DISCUSSION/SIGNIFICANCE:** PTs and patients valued a clinician-supported eHealth program, suggesting an acceptable option for PIPT. Future implementation work aims to identify optimal therapist training in MI and additional strategies to overcome time or technology barriers.

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Towards Obtaining One Billion Recordings Per Cubic Millimeter for the Validation of Focused Ultrasound Transducers: How Can Robust Systems Help With Translational Activities?

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OBJECTIVES/GOALS: The first aim was to construct a controlled and high resolution FUS water tank characterization system with 1 micron step-sizes. The second aim was to create two unique standardized protocols for mapping the generated acoustic field from FUS transducers; protocol one maps the full 3D field while protocol two rapidly detects changes to the original plot. **METHODS/STUDY POPULATION:** To accomplish aim one, the focused ultrasound mapping platform was constructed with a water conditioning unit for water degassing and temperature control, a three-axis stage with 1 micron step-size capabilities, and a data plotting software. To measure the outcomes of aim one, the water temperature was monitored, and axis step sizes were measured through ten independent axis translation recordings. To accomplish aim two, FUS acquisitions were executed at different resolutions. For FUS localization at the cellular level, a 1-5 micron step size is required. Once the initial scan was performed, duplicate scans were executed to detect inherent perturbations or errors in the system. Once calculated, the best methods of detecting true changes to FUS signals are proposed. **RESULTS/ANTICIPATED RESULTS:** The FUS characterization system maintained water temperature and performed 1 micron step-sizes. While pre-existing platforms have demonstrated a resolution of one thousand recordings per cubic millimeter, the proposed system (time and computing power willing) can record one billion recordings per cubic millimeter. In practice, a resolution of 20 micron was sufficient for non-cellular level FUS characterizations. Successive 2D scans were reliably stacked to form a 3D rendering of the generated acoustic field with the average focal point intensity yielding a 1% coefficient of variation between identical scans. This inherent variation can be used as the threshold of significance for true change detection; to rapidly detect changes to the FUS signal, sampling can be performed at regions of high baseline values. **DISCUSSION/SIGNIFICANCE:** Focused ultrasound medical devices are gaining popularity for treatments including tumor ablation, neuromodulation, and drug delivery; however, the field lacks a standardized method to characterize these FUS transducers. The presented platform and protocols enable a rigorous and high quality translation through verification and validation.

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Using text mining approaches to identify research trends – an exploratory analysis of Miami Clinical and Translational Science Institute publications from 2013-2021

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OBJECTIVES/GOALS: The goal of this project was to perform an exploratory analysis of the research themes of scientific publications from the Miami Clinical and Translational Science Institute using text mining techniques and using bibliometric characterization and network analysis to further assess research trends. **METHODS/STUDY POPULATION:** Publications were identified from the Web of Science database using Miami CTSI grant numbers as search criteria for the period 2013–2021 and KL2 scholar publications. Following data pre-processing, topic modeling was performed using the Latent Dirichlet Allocation algorithm and cluster analysis in the R programming language. The resulting themes will be further analyzed by employing a citation-based impact assessment approach to identify trends over time. Network analysis of publications will be performed using the VOSviewer package to visualize publication networks using citation and co-authorship relations within each major theme and their evolution over time. Findings will be evaluated for alignment with institutional research strategy. **RESULTS/ANTICIPATED RESULTS:** About 400 CTSI publications from 2013-2021 to date were used for analysis. Twenty topics and five major research themes were identified among the Miami CTSI publications – neuroscience, cancer, community and public health, metabolics, and HIV/infectious diseases. Top keywords within each topic were aligned with the most frequent author-assigned keywords for that topic. The CTSI research themes were also well-aligned with the institutional vision for research and focus areas. Trends using citations and networks for each research theme are currently being analyzed and results will be included in the overall findings post analysis. **DISCUSSION/SIGNIFICANCE:** Text mining was successfully used in identifying topics and research themes for clinical and translational research publications of the Miami CTSI, and in combination with bibliometric characterization, will be helpful in shaping CTSI strategy and alignment with the university's research priorities.

Health Equity and Community Engagement

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Development of an online intervention prototype for gestational weight management in rural women

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OBJECTIVES/GOALS: Despite the importance of addressing maternal weight to promote healthy pregnancies, previous gestational weight management programs have overlooked rural women. Accordingly, this study used an optimization framework to develop and refine a prototype for an online gestational weight management intervention targeting rural women. **METHODS/STUDY POPULATION:** Methods were guided by the Obesity-Related