

Community Engagement

Biostatistics, Epidemiology, and Research Design

A CTS Team Approach to Wastewater-Based Epidemiology of Non-Typhoidal Salmonella in Gainesville, FL

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OBJECTIVES/GOALS: The goal of this project is to apply wastewater-based epidemiology to determine the trends of NTS through analysis of influent wastewater, and to isolate and identify circulating serotypes among samples that are representative of the human population in Gainesville, FL. **METHODS/STUDY POPULATION:** This study is being conducted in Gainesville, FL, a suburban city in North Central Florida with approximately 133,997 residents served by two wastewater reclamation facilities (WRF). Fifty-three weekly influent composite wastewater samples were collected between September 2020 and September 2021 from each WRF. Wastewater samples were processed using an adsorption-based sample concentration method and invA genetic target for NTS DNA detection and quantification via qPCR. The quantified NTS DNA wastewater concentration from each WRF was summed to determine the overall concentration. Bacterial isolation was conducted on stored wastewater of qPCR positive samples using EPA method 1682. Recovered isolate serotypes were identified through whole-genome sequence analysis. **RESULTS/ANTICIPATED RESULTS:** Overall, NTS was positive in Gainesville wastewater in 48/53 weeks between September 2020 – September 2021. 83/106 (78%) samples tested positive for NTS from both WRFs. The mean wastewater concentration from each WRF was 3.53 (Main St.) and 3.31 Log₁₀ invA Genetic Copies/L. The overall mean city concentration was 6.85 Log₁₀ invA Genetic Copies/L. There were sustained periods of NTS in the wastewater during the months of December-February and May-August. There was no observed seasonal trend in NTS wastewater concentrations over the study period. Culture-based methods will provide a comprehensive review of circulating serotypes that are responsible for both clinical and subclinical infections within the community. **DISCUSSION/SIGNIFICANCE:** Florida has an incidence of NTS twice the national average. Clinical surveillance is the current standard for community surveillance of NTS. Only 28% of NTS cases are identified in a clinical setting, leaving a major gap in community surveillance. This project has helped fill this gap and provided a comprehensive community-level assessment of NTS.

**Lisa E. Emerson has been added as an author. An erratum detailing this change has also been published (doi:10.1017/cts.2022.416).

*Blue Ribbon Awardee; ¹Gold Ribbon Awardee

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Characterization of Hub and Spoke Facilities for Study of Surgical Care within United States Health Systems

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OBJECTIVES/GOALS: An increasing number of hospitals and provider groups are consolidating into larger health systems, which hold potential to improve access to and quality of surgical cancer care through clinical integration across sites. In order to study clinical integration, we sought to develop: **METHODS/STUDY POPULATION:** Hospital data from the American Hospital Association were merged with data from the Agency for Healthcare Research and Quality's Compendium of United States Health Systems. For each health system with more than one acute care hospital, the hospital with the highest surgical volume (inpatient and outpatient) was categorized as the hub hospital while all other hospitals were categorized as spokes. We evaluated the concentration of case volumes at hub versus spoke hospitals and compared characteristics of these hospitals and their surrounding communities using univariate and multivariable logistic regression analyses. **RESULTS/ANTICIPATED RESULTS:** Within 624 health systems containing 3,554 hospitals, 355 hospitals were characterized as hub hospitals and had 2,645 affiliated spoke hospitals (median 17 spokes per hub, range 2-151). Hub hospitals performed a median of 68% of all surgical cases (25th-75th percentile 44-87%) and were concentrated in metropolitan (88.5%) and urban areas (11.5%) with none in rural areas; spoke hospitals were located in metropolitan (67%), urban (28%) and rural (5%) areas. On multivariable analysis, spoke hospitals were more often located in rural and small urban counties (OR 9.49, CI 4.57-19.70) and took care of a higher percentage of patients with less than high school education (OR 1.06 for each 1% increase, CI 1.03-1.10) but with lower poverty rates (OR 0.90 for each 1% increase in % poverty, CI 0.86-0.95). **DISCUSSION/SIGNIFICANCE:** For integrated health systems with multiple acute care hospitals, surgical volume is highest at a single hub hospital, supporting use of a hub-spoke taxonomy. Patient populations in counties with hub versus spoke hospitals differ in urban-rural location, poverty rates, and education level, which may impact access to quality care.

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COVID-19 Exposure and Care-Seeking Behaviors Among Vulnerable Urban Adolescents and Young Adults—Baltimore, Maryland USA

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OBJECTIVES/GOALS: This study seeks to determine the relationship between fear of COVID-19 infection and care-seeking behaviors including provider visit and telemedicine utilization among vulnerable adolescent and young adults in Baltimore, Maryland **METHODS/STUDY POPULATION:** Participants enrolled in the COVID-19 Youth study were 13-25 years old and recruited from four existing

sexual health studies based in Baltimore, MD which focused on 1) PID, 2) HIV, 3) emerging sexually transmitted infections, and 4) a dyadic STI prevention, respectively. Participants agreed to be re-contacted for future studies and completed a telephone survey developed to inquire about the impacts of COVID-19 on care seeking behaviors. Bivariate analyses tested for correlations between fear of COVID-19 infection, demographic variables, and care-seeking behaviors. Multivariable logistic regression modeled associations between fear of COVID-19 infection and care-seeking behaviors. RESULTS/ANTICIPATED RESULTS: Adjusted multivariable logistic regression revealed a statistically significant association between fear of COVID-19 infection and having a provider visit; AYA who feared COVID-19 were at greater than two times increased odds of a provider visit compared to AYA who did not fear COVID-19 infection (OR: 2.37, 95%CI: 1.02, 6.15). Among those with a provider visit, fear of COVID-19 infection was associated with two-fold increased odds of having a telemedicine visit vs. an in-person visit (OR: 2.23, 95%CI: 1.09, 4.51), however this was not statistically significant in the adjusted model. There were however significant associations detected in the adjusted model for HIV status, insurance type and telemedicine utilization respectively. DISCUSSION/SIGNIFICANCE: This study demonstrates the ongoing need for health services during the recent pandemic and overall willingness of AYA to utilize telemedicine. Given the sexual health disparities faced by AYA, who bear more than half of the 50 million STI cases in the US, optimizing services for AYA is essential and consistent with new laws expanding telehealth use.

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Cumulative Cancer Location Incidence and Cancer Progression in an Active Surveillance Cohort

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OBJECTIVES/GOALS: Prostate cancer is the 2nd most common cancer among men. 1/3 of these men have a slow-growing disease that can be managed without intervention. Instead of treatment, they can enter an active surveillance program. The goal of this study is to examine if cumulative cancer location can predict one's disease progression and be used as a clinical marker. METHODS/STUDY POPULATION: This is a retrospective cohort study consisting of men with Gleason Grade 1 prostate cancer enrolled in the Active Surveillance Program at Johns Hopkins. The cohort includes men who were enrolled in the program from 2007 to 2015 before prostate biopsies incorporated multiparametric MRI as of the prostate. We will assess if cumulative cancer location (CCLO), a sum of the total number of histological cancer-positive locations on diagnostic and confirmatory biopsy, can predict grade progression, adverse findings on radical prostatectomy findings, or protocol-based discontinuation. Kaplan Meier survival analyses and multivariable Cox regression will be used to determine if stratifying by CCLO can predict these outcomes. RESULTS/ANTICIPATED RESULTS: We included 1298 men in this study. The study will analyze variables that will be used in multivariable regression. Some variables of interest include age at diagnosis, PSA, PSA density, race/ethnicity, and number of positive cores. We expect that greater variability of tumor location, a higher CCLO score, will lead to more grade progression, protocol-based discontinuation, shorter time on active surveillance and adverse findings after radical prostatectomy. This hypothesis is based on a 2018 study that determined cancer location as a significant predictor of progression at the time of biopsy. Results will be discussed in full at the conference. DISCUSSION/SIGNIFICANCE: Finding a predictive marker of progression at the time of biopsy is clinically significant and can lead to adjusted patient observation and testing

while on active surveillance. This will better stratify men on active surveillance, determine who would benefit from genetic testing, and better counsel patients as to how long they will be on surveillance.

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Environmental Exposure to Metals Mixtures and the Outcome of Cognitive Function in Adolescents

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OBJECTIVES/GOALS: Exposure to arsenic, cadmium, manganese, and lead have been linked to adverse neurocognitive outcomes in adults/children, but effects in adolescents are not fully characterized. This study aims to examine the association between exposure to a mixture of metals (As, Cd, Mn, Pb, Se) and cognitive function in adolescents. METHODS/STUDY POPULATION: The Metals, Arsenic, & Nutrition in Adolescents Study (MANAS) is a cross-sectional study of 572 Bangladeshi adolescents. Blood levels of As, Cd, Mn, Pb, and Se were measured via ICP-MS. An abbreviated Cambridge Neuropsychological Test Automated Battery (CANTAB) was administered, with subtests assessing cognitive function and executive function tasks. Linear regression and Bayesian kernel machine regression (BKMR) were used to examine associations between individual metals, the overall mixture of metals, and cognitive function as measured by the CANTAB. RESULTS/ANTICIPATED RESULTS: Linear regression showed that As (B=-2.40) and Mn (B=-5.31) were negatively associated with Spatial Working Memory (p<0.05). Negative associations were also observed between Cd and Spatial Recognition Memory (SRM) (B=-2.77, p<0.05), and between Pb and Delayed Match to Sample (DMS), a measure of visual recognition and memory (B=-3.67, p<0.05). Se and Spatial Span Length (B=0.92, p<0.05) were seen to be positively associated. BKMR showed no overall effect of the mixture but indicated that Pb was negatively associated with DMS, and that Cd was negatively associated with SRM. Se was positively associated with Planning, Reaction Time, and Spatial Span. Posterior inclusion probability consistently rated Se as the most influential mixture component. DISCUSSION/SIGNIFICANCE: Se was positively associated with cognition, while Mn and As were linked to poorer working memory, and Cd and Pb were associated with poorer visual recognition and memory. We saw agreement between linear regression and BKMR in analyzing metal mixture exposures. Findings suggest interventions aimed at adolescents might influence lifelong cognition.

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Chronic cadmium exposure is associated with cognition among adults over age 60 in a representative US sample*

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OBJECTIVES/GOALS: To examine the relationship between chronic cadmium exposure and cognitive function in later life, we estimated the association of urinary cadmium concentration on composite cognitive score, an important marker of progression toward dementia, while accounting for diet and key co-pollutants tobacco use and lead exposure. METHODS/STUDY POPULATION: After excluding those missing cognitive data (141) or covariate data (190), we included 760 persons