and 94 hospital-onset), while 44 (9%) were community-associated. 279 (55%) patients had a urinary catheter within the two days prior to the CRE culture. The analysis of patients who progress to an invasive CRE infection, including the results of the univariable and multivariable analyses assessing risk factors for progression is in progress and will be reported in the future. DISCUSSION/SIGNIFICANCE OF IMPACT: In metropolitan Atlanta, the annual incidence of CRE first isolated in urine was estimated to be 1.1 cases per 100,000 population between 2011 and 2017, with the majority of the cases being K. pneumoniae. Most patients had prior healthcare exposure and more than 50% of the patients had a urinary catheter. Our anticipated results will identify risk factors associated with progression from CRE bacteriuria to an invasive infection with a specific focus on having a urinary catheter, as this is a potentially modifiable characteristic that could be a target of future interventions.

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EXAMINING THE EFFECTS OF CHILDHOOD TRAUMA ON ADULT ALCOHOL CONSUMPTION: DOES RACE AND/OR SEX MATTER?

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OBJECTIVES/SPECIFIC AIMS: There has been substantial research showing that there are race and sex differences on alcohol use. Similarly, race and sex disparities are also seen in a variety of different factors that impact drinking behaviors and other health outcomes. One of these factors of interest is Adverse Childhood Experiences (ACEs) which is associated with an increased risk for excessive alcohol use and the harmful effects of drinking. Several studies have shown that racial minorities and females have a greater risk of ACEs, which may be partly related to various structural factors (i.e. poverty) and social norms. Although there has been a substantial amount of research done on ACEs, very few studies have looked at how their interaction with race and sex can influence alcohol-related behaviors. METHODS/STUDY POPULATION: 1,509 participants who self-identified as either Black or White were recruited through a screening protocol at the NIAAA where they completed a series of questionnaires. We categorized the participants into two groups based on the Structured Clinical Interview for DSM-IV disorders: Alcohol Dependent individuals (N=921) with either a past and/or current diagnosis and Non-dependent individuals (N=588). ACEs exposure was assessed using the Childhood Trauma Questionnaire (CTQ). We looked at both total score and the 5 subscales: emotional abuse, physical abuse, sexual abuse, physical neglect, and emotional neglect. Drinking behaviors were assessed using a 90-day Timeline Followback interview and the Alcohol Use Disorder Identification Test (AUDIT). The non-dependent sample was 63% White and 55% male while the alcohol dependent sample was 47% White and 70% male. We tested the interaction effects using ANOVA. RESULTS/ANTICIPATED RESULTS: In the ND sample, there were significant race*sex*ACEs effects for average drinks per day with CTQ total score ($P = 0.007$), physical abuse ($P = 0.005$), and physical neglect ($P = 0.003$). There was also a 3-way interaction with physical neglect on heavy drinking days ($P = 0.039$) and a 2-way race*ACEs interaction on AUDIT total with physical abuse ($P = 0.048$). In the AD sample, there were significant 2-way race*ACEs interactions for three drinking outcomes: heavy drinking days with physical neglect ($P = 0.009$), AUDIT-Harmful Use subscore with CTQ total score ($P = 0.028$) and physical neglect ($P = 0.001$), AUDIT-Total score with CTQ total score ($P = 0.007$), physical abuse ($P = 0.042$), sexual abuse ($P = 0.024$), and physical neglect ($P = 0.003$). There were also 3-way interactions for AUDIT-Harmful use ($P = 0.013$) and AUDIT-Total scores ($P = 0.011$) with emotional abuse. DISCUSSION/SIGNIFICANCE OF IMPACT: Our results indicate that there are both 2-way (race*ACEs) and 3-way (race*sex*ACEs) interaction effects on alcohol consumption and the related negative effects for both non-dependent and dependent samples. There were no sex*ACEs interaction effects in either sample implying that race may play a bigger role in differentiating drinking outcomes by ACEs across males and females. However, contrary to our expectations, race seemed to be protective factor for Black participants against both alcohol consumption and the negative effects despite having higher rates of ACEs exposure. Future analyses will explore personality measures as potential mediators of the relationship between ACEs and alcohol use. Also, analyses will look to see if there are any behavioral factors that may contribute to resiliency among minority populations.

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Feasibility, Acceptability, and Appropriateness of an Insertable Vaginal Cup to Manage Urinary Incontinence Among Women with Obstetric Fistula in Ghana: A Mixed Methods Study

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OBJECTIVES/SPECIFIC AIMS: 1. To assess feasibility (efficacy, safety, acceptability) of the menstrual cup for managing urinary incontinence among women with obstetric fistula 2. To examine pre-implementation facilitators and barriers (including appropriateness) among additional stakeholders METHODS/STUDY POPULATION: Sequential explanatory mixed methods study whereby repeated measures clinical trial results are explained by subsequent interviews with additional women with OF on coping and stigma and other stakeholders on perceptions of fistula self-management. RESULTS/ANTICIPATED RESULTS: Of the 32 patients screened, 11 were eligible (100% consent rate). At baseline, mean (±SD) leakage in ml was 63.2 (±49.2) (95% CI: 30.2-96.3) over two hours, while the mean leakage over two hours of use of the cup was 16.8 (±16.5) (95% CI: 5.7-27.9). The mean difference of 46.4 (±52.1) ml with use of the cup (95% CI: 11.4-81.4) was statistically significant ($p = 0.02$). With the cup, women experienced an average 61.0% (±37.4) (95% CI: 35.9-86.2) leakage reduction, a difference 10/11 users (91.0%) perceived in reduced leakage. One participant, reporting four previous surgical attempts, experienced a 78.7% leakage reduction. Acceptability was high–women could easily insert (8/11), remove (8/11), and comfortably wear (11/11) the cup and most (10/11) would recommend it. No adverse effects attributable to the intervention were observed on exam, although some women perceived difficulties with insertion and removal. Data collection tools were appropriate with slight modification advised. Interviews highlighted that women were already using various active coping and resistance strategies but lacked access to tools to support coping. Additional stakeholders reported the innovation was a simple, low-cost device that is an appropriate fit with ongoing fistula programming. Pre-implementation facilitators include the clear relative advantage to existing self-management strategies, the potential to build upon existing partnerships to implement, and a tension for change to

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address surgical gaps. Barriers included additional stakeholder's perceptions of low user acceptability and appropriateness in some cases and the need for additional study data to inform decision making for practice and policy. DISCUSSION/SIGNIFICANCE OF IMPACT: The innovation is efficacious, acceptable, adds to current coping strategies, and fits within existing fistula programs. Stakeholders' pre-implementation perceptions highlight the importance of partnerships and the need for an evidence base related to effectiveness, acceptability, and cost. Challenges to address include access to resources within these contexts (water, soap, and safe space to empty cup) and development of a culturally appropriate counseling message. Future research warranted.

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Developmental Outcomes of Aicardi Goutieres Syndrome

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OBJECTIVES/SPECIFIC AIMS: Metachromatic leukodystrophy (MLD) is a rare, lysosomal storage disorder caused by decreased enzymatic activity of arylsulfatase A. This can be the result of mutations in the ASA gene, or in rare cases PSAP. Historically, MLD has been subdivided into 3 forms based on age of onset: late infantile, juvenile, and adult. These subtypes were defined decades ago, prior to the appreciation of the full clinical spectrum of this lysosomal storage disorder and the advent of genetic testing. As a consequence, these empiric age-based historical definitions do not fully account for the spectrum of disease and are not founded in evidence-based analysis of phenotypic cohorts. Additionally, the antiquated definitions do not fully predict presenting features or disease course, and they fail to stratify outcomes in the few therapies currently available to treat this disease. As novel targeted therapeutics are developed, it is essential to have a clear understanding of the clinical presentation and natural history of MLD. Without properly defined sub-populations, it is difficult to design a therapeutic clinical trial that can demonstrate efficacy in a heterogeneous group. METHODS/STUDY POPULATION: In this project, we collected the retrospective natural history of over 50 individuals from around the world. We created an electronic database in REDCap to able to longitudinally collect clinical information. Using this retrospective natural history approach to understanding the disease course of individuals affected by MLD, we were able to characterize age of onset, delay to diagnosis, and common presenting features. RESULTS/ANTICIPATED RESULTS: Our results suggest distinct clinical phenotypic subgroups, with distinct presentations. DISCUSSION/SIGNIFICANCE OF IMPACT: With a better understanding of the natural history of MLD, we will be able to better counsel families and to design clinical trials with more coherent cohorts and more appropriate clinical endpoints.

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First in Man

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OBJECTIVES/SPECIFIC AIMS: A mimic of congenital infections and a rare genetic cause of interferon overproduction, Aicardi Goutières Syndrome (AGS) results in significant neurologic disability. AGS is caused by pathogenic changes in the intracellular nucleic acid sensing machinery (TREX1, RNASEH2A, RNASEH2B, RNASEH2C, SAMHD1, ADAR1, and IFIH1). All affected individuals exhibit neurologic impairment: from mild spastic paraparesis to severe tetraparesis and global developmental delay. We hypothesize that genotype influences the heterogeneous developmental trajectory found in AGS. METHODS/STUDY POPULATION: To characterize this spectrum, age and symptoms at presentation and longitudinal developmental skill acquisition was collected from an international cohort of children (n=88) with genetically confirmed AGS. RESULTS/ANTICIPATED RESULTS: We found that individuals present at variable ages, with the largest range in SAMHD1, ADAR, and IFIH1. There are 3 clusters of symptoms at presentation: altered mental status (irritability or lethargy), systemic inflammatory symptoms, and acute neurologic symptoms, with variability across all genotypes. By creating Kaplan-Meier curves for developmental milestones, we were able to create genotype-based developmental trajectories for the children affected by the 5 most common genotypes: TREX1, IFIH1, SAMHD1, ADAR, and RNASEH2B. Individuals with AGS secondary to TREX1 were the most severely affected, significantly less likely to reach milestones compared to the other genotypes, including head control, sitting, and nonspecific mama/dada (p-value <0.005). Individuals affected by SAMHD1, IFIH1, and ADAR collectively attained the most advanced milestones, with 44% of the population achieving a minimum of a single word and 31% able to walk independently. Three retrospective scales were also applied: Gross Motor Function Classification System, Manual Ability Classification Scale, and Communication Function Classification System. Within each genotypic cohort, there was pronounced heterogeneity. DISCUSSION/SIGNIFICANCE OF IMPACT: Our results demonstrate the influence of genotype on early development, but also suggest the importance of other unidentified variables. These results underscore the need for deep phenotyping to better characterize subcohorts within the AGS population.

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Healthy eating, physical activity, sleep and cognitive function in elderly population: Data from National Health and Nutrition Examination Survey 2011-2014

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OBJECTIVES/SPECIFIC AIMS: To examine the relationship between healthy eating, physical activity (PA), sleep problem and hours of sleep and cognitive function among elderly population and the racial/ethnic differences in this relation. METHODS/STUDY POPULATION: We analyzed data from National Health and Nutrition Examination Survey 2014-2016 for 882 population 60 years and older. Cognitive status was measured by the Digit Symbol Substitution (DSS) exercise score and the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) total score. Healthy eating index (HEI), PA, and sleep problem and hours of sleep were assessed by questionnaire. The association between cognitive function and HEI, PA, sleep problem and hours of sleep were assessed by linear regression after adjusting for age, gender, race/ethnicity, poverty level, lipid profile, fasting glucose level, alcohol, body mass index, stroke and education. Data were analyzed using Stata 14 considering design and sample weight and $p<0.05$ is statistically significant. RESULTS/ANTICIPATED RESULTS: CERAD total score was associated with HEI (Adjusted $B = 0.07$, 95% Confidence Interval

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