reviewed. After initial general data collection phase, we categorized data as "must have" and "good to have." "Must have" variables were defined as data variables that were essential for the study outcomes. "Good to have" variables would not affect the main outcomes of the study if missing. We measured completeness of data using the in-built REDCap data quality check feature. We used several strategies to encourage reduction of missing data. We initially did random data checks but noted that the amount of missing data was substantial and could not be adequately addressed this way. Second, we created excel sheets highlighting missing data for each site and notified sites. This proved onerous to create and made it burdensome for sites to identify easily where data was missing. Third, we built a custom report form in REDCap specifically able to identify which "must have" data points were missing. This could be easily accessed by the principal investigator at each site and made completing the data forms more straightforward. We encouraged all sites to complete their data collection by sending weekly data reports to each site highlighting the patients with missing data. An instructional YouTube tutorial was also created and the link was shared with all sites to demonstrate how to use the custom built report form in REDCap and how to appropriately fill in the missing data. Since this was a global study, we communicated with sites using a variety of locally favored mechanisms including Zoom, FaceTime, WeChat, WhatsApp as well as email. By harnessing the buy-in of local champions our approach was successful. RESULTS/ANTICIPATED RESULTS: The total number of patients recruited for the CERTAIN study is 4843. The rate of all missing variables improved with the efforts described above. Hospital admission dates were missing in 8.4% pre efforts and 4.2% post efforts ($p < 0.01$). ICU admission dates were missing in 5.5% pre and 2.0% post ($p < 0.01$). Documentation of completion of processes of care (including central line review, urinary catheter review, consideration for blood transfusion) improved significantly from pre to post ($p < 0.01$). DISCUSSION/SIGNIFICANCE OF IMPACT: Missing data can be a problem in all types of research studies. This study provides some preliminary evidence for effective approaches that can reduce the problem of missing data when conducting a global study at sites with limited research infrastructure in place. By addressing the concern about missing data, we can be more confident that our results can be accurately analyzed and interpreted, improving the quality of the research.

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Big data approaches in translational science: The influence of psychiatric and trauma history in predicting smoking during pregnancy in a cohort of female like-sex twin pairs

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OBJECTIVES/SPECIFIC AIMS: Smoking during pregnancy (SDP) is associated with negative health outcomes, both proximal (e.g., preterm labor, cardiovascular changes, low birth weight) and distal (e.g., increased child externalizing behaviors and attention deficit/hyperactivity disorder (ADHD) symptoms, increased risk of child smoking). As pregnancy provides a unique, strong incentive to quit smoking, investigating SDP allows analysis of individual predictive factors of recalcitrant smoking behaviors. Utilizing a female twin-pair cohort provides a model system for characterizing genotype × environment interactions using statistical approaches. METHODS/STUDY POPULATION: Using women from the Missouri Adolescent Female Twin Study, parental report of twin ADHD inattentive and hyperactive symptoms at twin median age 15, and twin report of DSM-IV lifetime diagnosis of major depressive disorder, trauma exposure (physical assault and childhood sexual abuse), collected at median age 22, were merged with Missouri birth record data for enrolled twins, leading to 1553 individuals of European ancestry and 163 individuals of African-American ancestry included in final analyses. A SDP propensity score was calculated from sociodemographic variables (maternal age, marital status, educational attainment, first born child) and used as a 6-level ordinal covariate in subsequent logistic regressions. RESULTS/ANTICIPATED RESULTS: For European ancestry individuals, parental report of hyperactive ADHD symptoms and exposure to childhood sexual abuse were predictive of SDP, while a lifetime diagnosis of major depressive disorder, parental report of inattentive ADHD symptoms, and exposure to assaultive trauma were all not significantly predictive of future SDP. For African-American individuals, none of these variables were significant in predicting future SDP. DISCUSSION/SIGNIFICANCE OF IMPACT: Understanding this relationship of risk-mechanisms is important for clinical understanding of early predictors of SDP and tailoring interventions to at risk individuals. Ultimately, the focus of this research is to mitigate risk to pregnant smokers and their children. Additionally, the cohort-ecological approach informs how well research and administrative (vital record) data agree. This allows for evaluation of whether administrative data improve prediction in research cohorts, and conversely if research data improve prediction over standard sociodemographic variables available in administrative data.

2216

Characterizing physician trust and healthcare-based discrimination among long-term HIV viral trajectory groups in Washington, DC

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OBJECTIVES/SPECIFIC AIMS: Discrimination within the healthcare system and physician distrust have been associated with adverse clinical outcomes for people living with HIV; however, many studies do not link these variables to biological data. We hypothesize that perceived healthcare discrimination and physician distrust associates with higher longitudinal viremia among HIV-positive women. METHODS/STUDY POPULATION: A 2006 cross-sectional survey assessed healthcare-based discrimination and physician trust in 92 HIV-positive and 46 high-risk HIV-negative women from the Washington DC Women's Interagency HIV Study (DC-WIHS). In addition, we identified HIV viral load trajectories and demographics from the HIV-positive women who contributed ≥ 4 semi-annual visits from 1994 to 2015. Viral suppression was defined by assay detection limits (<80 to <20 copies/mL). Group-based probability trajectory analyses grouped women based on longitudinal viral load patterns, and identified 3 groups: sustained viremia (n = 32) with low-viral suppression over time, intermittent viremia (n = 27) with varying suppression over time, and non-viremia (n = 33) with high-longitudinal viral suppression. Ordinal logistic regression models assessed trajectory group and discrimination variables, controlling for demographics, using stepwise selection with significance level of $\alpha = 0.05$. RESULTS/ANTICIPATED RESULTS: Most women were African American (60%), insured at the time of visit (89%) and nonsmokers (56%). While physician trust did not differ by HIV viral trajectory group, trust was lower among HIV-negative women compared with HIV-positive women ($p = 0.03$). Over 1 in 5 HIV-positive women reported discrimination in the healthcare system based on HIV status (21.3%). Report of discrimination based on drug/alcohol use was higher among HIV-negative participants (19.2% vs. 6.5%, $p = 0.01$). Among women with longitudinal sustained viremia, report of discrimination based on race ethnicity (29%, $p = 0.004$) and sexual orientation (15.6%, $p = 0.008$) were higher than within the nonviremic and intermittent trajectory groups. DISCUSSION/SIGNIFICANCE OF IMPACT: Physician trust did not associate with increased longitudinal viral suppression among HIV-positive women in Washington, DC. Lack of physician trust among high-risk HIV-negative women could have implications for uptake of prevention methods. Reports of discrimination vary between HIV-positive and HIV-negative women in the Washington, DC area. The findings of healthcare system distrust among HIV-negative women has implications outside the realm of HIV, as this lack of trust may impact risk for other disease states among similar populations of women.

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Cognitive and behavioral side effects in patients treated with droxidopa for neurogenic orthostatic hypotension

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OBJECTIVES/SPECIFIC AIMS: To describe adverse behavioral symptoms attributed to droxidopa therapy for neurogenic orthostatic hypotension (nOH). METHODS/STUDY POPULATION: BACKGROUND: Droxidopa, a norepinephrine (NE) precursor, improves symptoms of nOH by replenishing NE levels. Central NE effects are poorly described but may offer potential benefits given the pathophysiologic progression of α-synuclein-related disorders. Here we report a series of cognitive and behavioral side effects linked to droxidopa therapy. METHODS: We identified 5 patients treated at Vanderbilt University who developed behavioral symptoms including mania, irritability, and disorientation shortly after the initiation of droxidopa for nOH. Comprehensive chart reviews were performed for all patients, including analysis of droxidopa titration schedule and dosing, medical comorbidities, clinical course,

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and outcome. All patients had symptoms of synucleinopathy, manifesting with autonomic failure, REM behavior disorder, and parkinsonism. Four met criteria for idiopathic PD, and one was diagnosed with pure autonomic failure but had concomitant symptoms of parkinsonism and REM sleep behavior disorder. RESULTS/ANTICIPATED RESULTS: Our patients had no significant cognitive or behavioral symptoms before the initiation of droxidopa. The average decrease in blood pressure upon standing was 27 mmHg systolic and 17 mmHg diastolic. Behavioral disturbances were observed early in the titration period and at relatively low doses of droxidopa (total daily doses ranging from 300 to 800 mg/day; droxidopa therapeutic dose range 900–1800 mg/d). The most common symptoms reported were mania, irritability, and confusion. Symptoms resolved with dose reduction in 4 patients, and droxidopa was discontinued in 1 patient due to persistent irritability. No other medical comorbidities or alternative etiologies were identified to explain these effects. DISCUSSION/SIGNIFICANCE OF IMPACT: Droxidopa is a prodrug designed to act peripherally, but may also have important, yet poorly described, central effects. We hypothesize that these behavioral manifestations result from an "overdose" of key NE networks linking orbitofrontal and mesolimbic regions. Further studies are warranted to better characterize central NE effects in patients treated with droxidopa.

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Delirium and catatonia: Age matters

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OBJECTIVES/SPECIFIC AIMS: Background: Delirium is a well described form of acute brain organ dysfunction characterized by decreased or increased movement, changes in attention and concentration as well as perceptual disturbances (i.e., hallucinations) and delusions. Catatonia, a neuropsychiatric syndrome traditionally described in patients with severe psychiatric illness, can present as phenotypically similar to delirium and is characterized by increased, decreased and/or abnormal movements, staring, rigidity, and mutism. Delirium and catatonia can co-occur in the setting of medical illness, but no studies have explored this relationship by age. Our objective was to assess whether advancing age and the presence of catatonia are associated with delirium. METHODS/STUDY POPULATION: Methods: We prospectively enrolled critically ill patients at a single institution who were on a ventilator or in shock and evaluated them daily for delirium using the Confusion Assessment for the ICU and for catatonia using the Bush Francis Catatonia Rating Scale. Measures of association (OR) were assessed with a simple logistic regression model with catatonia as the independent variable and delirium as the dependent variable. Effect measure modification by age was assessed using a Likelihood ratio test. RESULTS/ANTICIPATED RESULTS: Results: We enrolled 136 medical and surgical critically ill patients with 452 matched (concomitant) delirium and catatonia assessments. Median age was 59 years (IQR: 52–68). In our cohort of 136 patients, 58 patients (43%) had delirium only, 4 (3%) had catatonia only, 42 (31%) had both delirium and catatonia, and 32 (24%) had neither. Age was significantly associated with prevalent delirium (i.e., increasing age associated with decreased risk for delirium) ($p = 0.04$) after adjusting for catatonia severity. Catatonia was significantly associated with prevalent delirium ($p < 0.0001$) after adjusting for age. Peak delirium risk was for patients aged 55 years with 3 or more catatonic signs, who had 53.4 times the odds of delirium (95% CI: 16.06, 176.75) than those with no catatonic signs. Patients 70 years and older with 3 or more catatonia features had half this risk. DISCUSSION/SIGNIFICANCE OF IMPACT: Conclusions: Catatonia is significantly associated with prevalent delirium even after controlling for age. These data support an inverted U-shape risk of delirium after adjusting for catatonia. This relationship and its clinical ramifications need to be examined in a larger sample, including patients with dementia. Additionally, we need to assess which acute brain syndrome (delirium or catatonia) develops first.

2439

Depression, anxiety, and planning for the future: Associations with advance care planning

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OBJECTIVES/SPECIFIC AIMS: Millions of diverse, older adults live with serious and chronic illness for which they will face complex, ongoing medical decisions. Advance care planning (ACP) has been conceptualized as a health behavior that supports adults in understanding and sharing their values, goals, and preferences for future medical care. Depression and anxiety are known barriers to participation in health behaviors. It is unknown whether depression and anxiety are associated with ACP participation or with patients' values for future medical care. Understanding whether depression and anxiety are associated with ACP would be important to tailor ACP interventions. METHODS/STUDY POPULATION: In total, 908 English-speaking and Spanish-speaking participants ≥55 years of age were recruited from a San Francisco county hospital. We measured depression (Patient Health Questionnaire 8-item scale) and anxiety (Generalized Anxiety Disorder 7-item scale), dichotomized into none-to-mild Versus moderate-to-severe. We measured ACP engagement using a validated survey of Behavior Change Processes (e.g., knowledge, self-efficacy, readiness; 5-point Likert) and Action Measures (e.g., ask, discuss, and document one's wishes; yes/no). We elicited values concerning life extension categorized as "life is always worth living no matter the health situation" Versus "some health situations would make life not worth living." To explore associations, we used χ^2, Mann-Whitney tests, linear and logistic regressions. RESULTS/ANTICIPATED RESULTS: Mean participant age was 64 years ± 6, 80% were non-White, 40% had limited literacy, 45% were Spanish-speaking, and the prevalence of depression and anxiety was 12% and 10%, respectively. Depression and anxiety were not associated with ACP Engagement, $p > 0.05$. However, participants with depression had an increased odds of reporting "some health situations would make life not worth living" than those not depressed, $p = 0.02$. In multivariate linear and logistic regression, controlling for age, gender, literacy, and health status, having depression increased the odds of not valuing life extension OR 2.9 (CI: 1.7–4.9). Anxiety was not associated with values concerning life extension, $p > 0.05$. DISCUSSION/SIGNIFICANCE OF IMPACT: Depression and anxiety were not associated with prior ACP engagement suggesting engaging patients in ACP does not increase these conditions. However, depression was associated with an increased odds of not valuing life extension and, therefore, may influence treatment choices. Longitudinal randomized controlled trials of an ACP intervention are currently underway to investigate these associations further.

2166

Development of a statin risk communication tool for use in cancer survivors: A pilot

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OBJECTIVES/SPECIFIC AIMS: There are currently over a million survivors of childhood, adolescent, and young adult cancer in the United States, many of whom were treated with radiation therapy. Chest radiation with fields including the coronary arteries is a risk factor for cardiovascular disease. Of note, survivors are often unaware of this increased cardiovascular disease risk or, if they are aware, do not know how to mitigate the risk. Visual aids and communicating risk in terms of absolute risk reductions are shown to improve patients' understanding. The Institute of Medicine recommends use of decision aids to optimize patient discussions of benefits and harms of therapies. Our goal is to develop and pilot test a statin therapy risk communication tool for use in high-risk cancer survivors to improve shared decision making and patient knowledge of coronary artery disease risk. METHODS/STUDY POPULATION: Participants were recruited from the adult long-term follow-up clinic at Sloan Kettering Cancer Center into 2 arms, usual care Versus

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