excellent response to the PD-L1 checkpoint inhibitor Pembrolizumab. DISCUSSION/SIGNIFICANCE OF IMPACT: This work highlights the potential utility of CTCs in the management of bladder cancer. It may be the case that this assay in conjunction with current methods of patient selection for immunotherapy may allow for better response prediction than either method alone.

2323

Large patient volume is associated with adverse patient outcomes among those requiring maintenance renal replacement therapy

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OBJECTIVES/SPECIFIC AIMS: We set out to describe important associations and outcomes among those requiring maintenance renal replacement therapy with the patient volume per provider. METHODS/STUDY POPULATION: Through the combination of several large administrative datasets, including the United States Renal Data System (n = 237,485), the American Medical Association Master file (n = 6249), and Medicare data limited to 2012, we compared characteristics of patients, by quintile of patient/provider volume. χ^2 and logistic regression, adjusted for various patient and provider factors for categorical and continuous variables, was used for baseline comparisons, respectively. Cox regression, adjusted for patient, provider, and socio-economic variables, was used to calculate risks for important clinical outcomes such as kidney transplant listing, transplant receipt, and all-cause mortality. RESULTS/ANTICIPATED RESULTS: There is a threshold patient volume at which important clinical outcomes, including kidney transplantation and all-cause mortality, may be influenced. Higher patient volume is associated with adverse patient outcome. Those receiving care from providers with the highest patient volumes are less likely to receive kidney transplantation, live in a more rural area, and be non-White. DISCUSSION/SIGNIFICANCE OF IMPACT: There is a need to identify novel and potentially modifiable factors associated with patient outcome among those with end-stage kidney disease on maintenance renal replacement therapy. Provider level variables, such as patient volume, is one such variable. As nephrologists are often tasked with the care of variable numbers of patients on dialysis, a better understanding of this association is an unmet need.

2481

A collaborative neurology-emergency medicine rapid outpatient clinic for the management of TIA and minor stroke in the emergency department

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OBJECTIVES/SPECIFIC AIMS: Current practice frequently dictates hospitalization for TIA and minor stroke (TIAMS) in order to obtain comprehensive evaluation of stroke risk factors and mechanism. Inpatient hospitalization is often done to expedite workup and to coordinate care although may be associated with nosocomial risks and increased healthcare cost. However, a subset of these patients who do not have debilitating deficits may not require inpatient hospitalization. We conducted a pilot study to assess the feasibility of conducting rapid outpatient stroke evaluations in low risk patients with TIAMS without disabling deficits. METHODS/STUDY POPULATION: The rapid access clinic was initiated at a single-site urban tertiary care facility for outpatient evaluation of TIAMS within 24 hours of emergency department (ED) evaluation. Patients were selected using a decision tool identifying presumed low-risk TIAMS seen in the ED. Criteria included medical (e.g., no disabling deficit, no thrombolytic agent given, negative CT for hemorrhagic stroke) as well as social criteria (e.g., patient ability to follow-up as an outpatient). We evaluated rates of noncompliance with post-ED follow-up, need for hospitalization from clinic, and 90 day stroke and health outcome data. RESULTS/ANTICIPATED RESULTS: Between December 2016 and December 2017 a total of 93 TIAMS patients seen in the ED were recommended for the rapid access clinic utilizing the decision tool. Of these patients, 94.5% (86) were evaluated within 24 hours of ED discharge. Only 2 patients (2.4%) who received outpatient evaluation required hospitalization; 61 (71.8%) patients had TIAMS on final evaluation in clinic. DISCUSSION/SIGNIFICANCE OF IMPACT: Our pilot data suggests that for a subset of patients, rapid outpatient evaluation may be a feasible and safe strategy for TIAMS management. Future work exploring such strategies may help improve TIAMS outcomes and reduce ED crowding and unnecessary hospital admissions.

2437

A prospective study of cancer clinical trial availability and enrollment among adolescents/young adults treated at a Children's Hospital or Affiliated Adult Cancer Specialty Hospital

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OBJECTIVES/SPECIFIC AIMS: Low cancer clinical trial (CCTs) enrollment may contribute to the poor survival improvement for adolescents and young adults (AYAs, aged 15–39 years) with cancer. Treatment site is thought to exacerbate this problem. This study evaluated whether differences in CCT availability explain lower CCT enrollment depending on treatment site for AYAs. METHODS/STUDY POPULATION: This prospective, observational cohort study was conducted at an academic children's hospital and an adult cancer hospital, 2 affiliated sites within a NCI-designated Comprehensive Cancer Center over 13 months. In consecutive AYA patients newly diagnosed with cancer at both site, it was determined whether an appropriate CCT existed nationally, was available locally, and if enrollment occurred. The proportions of AYAs in these categories were compared by site using the χ^2 test. RESULTS/ANTICIPATED RESULTS: Among 152 consecutive AYA patients, 68 and 84 were treated at the children's hospital and adult cancer hospital, respectively. AYAs treated at the children's hospital had similar CCT existence nationally compared with AYAs treated at the adult hospital [36/68 (52.9%) vs. 45/84 (53.6%), $p = 0.938$]. However, a significantly higher percentage of children's hospital treated AYAs than adult hospital treated AYAs had an available CCT [30/68 (44.1%) vs. 14/84 (16.7%), $p < 0.001$]. Enrollment percentages were similarly low in both groups [8/68 (11.8%) vs. 6/84 (7.1%), $p = 0.327$]. DISCUSSION/SIGNIFICANCE OF IMPACT: Significantly fewer AYAs treated at the adult hospital had a CCT available, but national existence was similar at both sites. This suggests that institutional barriers to opening CCT have more importance at adult centers.

2378

Addressing challenges from missing data in a global quality improvement study

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OBJECTIVES/SPECIFIC AIMS: Missing data is a common problem in research studies that may lead to inconclusive or inaccurate results. It may even lead to harm secondary to wrong research conclusions. The purpose of this ancillary study is to measure the differences in missing data following implementation of a variety of mechanisms to improve data quality and documentation in a global quality improvement study. Many of the sites involved in the study were in low-income or middle-income countries with minimal research infrastructure. Missing data is defined as "values that are not available that would be meaningful for analysis if they were observed" (The prevention and treatment of missing data, *New Engl J Med* 367; 14, nejm.org, October 4, 2012). METHODS/STUDY POPULATION: All study sites used REDCap software to enter various data points including hospital and ICU admission and discharge dates as well as whether items on a Checklist relevant to processes of care in the ICU were

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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.

2266

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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