

and notifying medical providers of their study participation. In rare cases we have paid to transport patients from skilled nursing facilities to the clinic, which has reduced dropouts. In addition to the stroke participants, we have enrolled 7 healthy control participants using the EHR screening algorithm. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Performing a longitudinal study in the early recovery phase following stroke is logistically challenging, but feasible. Difficulty in identifying participants with isolated motor impairment requires added effort to eliminate dropouts. Screening the EHR is an effective method to identify matched controls. Future metabolomics analysis of stored blood samples holds promise to identify biomarkers of stroke recovery and neural repair.

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Bone Turnover Biomarkers May Discriminate Low Bone Mineral Density in HIV-Infected Adults

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OBJECTIVES/SPECIFIC AIMS: Persons living with HIV (PLWH) are at increased risk for fragility bone disease. Current osteoporosis screening guidelines do not account for HIV status, and clinical risk assessment tools are not sensitive in PLWH. We examined the value of traditional osteoporosis risk factors, HIV-specific indices, and bone turnover biomarkers in predicting low bone mineral density (BMD) in PLWH. **METHODS/STUDY POPULATION:** Demographic and clinical characteristics, dual energy x-ray absorptiometry (DXA)-derived BMD, HIV indices (viral load, CD4 count, antiretroviral therapy [ART]), and biomarkers of bone turnover (C-terminal telopeptide of collagen [CTx], osteocalcin [OCN]) were evaluated in a cross-sectional analysis of PLWH (n=248) and HIV- controls (n=183). The primary outcome was low BMD, defined as osteopenia or osteoporosis by WHO criteria. Multivariable logistic and modified Poisson regression models were used to assess associations between low BMD and covariates of interest. **RESULTS/ANTICIPATED RESULTS:** Overall, median age was 44 years, 48% were male, 88% were black, median body mass index (BMI) was 28 kg/m², 72% smoked cigarettes, and 53% used alcohol; characteristics did not differ by HIV status. PLWH had a mean CD4 of 408 cells/mm³, 55% were ART-naïve, and 45% had viral suppression on ART. Overall, 25% (109/431) had low BMD, including 31% of PLWH compared to 16% of HIV- controls. In multivariable models, HIV was significantly associated with low BMD (aOR 2.46, 95%CI 1.39-4.34; aRR 1.90, 95%CI 1.18-3.07). Adjusting for HIV, three traditional risks— age, race, and BMI— were independently associated with low BMD in the full cohort. However, bone turnover markers, CTx and OCN, were better able to discriminate low vs. normal BMD in PLWH compared to HIV- controls. In PLWH, mean serum CTx was 23% higher in low vs. normal BMD (mean CTx difference=0.06 ug/mL); in HIV- controls, no association with BMD was observed (mean CTx difference=0 ug/mL). In PLWH, mean serum OCN was 38% higher in those with low vs. normal BMD (mean OCN difference=2.48 ug/mL); in HIV- controls, mean serum OCN was only 16% higher in those with low vs. normal BMD (mean OCN difference=1.08 ug/mL). **DISCUSSION/SIGNIFICANCE OF IMPACT:** In PLWH as opposed to HIV- controls, serum biomarkers reflecting a high bone turnover state, may discriminate individuals with low versus normal BMD. Because changes in biomarkers precede changes in BMD, these markers should be explored further either

alone or in combination with traditional risk assessment tools to improve early screening for osteoporosis in PLWH.

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Cancer-Related Pain is a Predictor of In-hospital Opioid Overdose among Postoperative patients

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OBJECTIVES/SPECIFIC AIMS: Our study's primary aim is to determine if there is an association between cancer-related pain among patients who underwent major elective procedures and postoperative opioid overdose. In addition, the relationship between cancer-related pain in this population and inpatient mortality, total hospital charge and length of stay was assessed. **METHODS/STUDY POPULATION:** Our study sample consisted of adults 18 years and older who had at least one of eight elective procedures. Data was obtained from the National Inpatient Sample (NIS). Variables were identified using ICD-9 codes. Our primary predictor was cancer-related pain while our primary outcome was opioid overdose. Secondary outcomes were inpatient mortality, length of stay and total charge. Propensity-matched regression models were employed in assessing the association between cancer-related pain and outcomes of interest. **RESULTS/ANTICIPATED RESULTS:** Among 4,085,355 selected patients, 0.8% (n = 2,665) had cancer-related pain while 99.92% (n = 4,082,690) had no diagnosis of cancer-related pain. All subjects with cancer-related pain (n = 2,665) were successfully matched to subjects with no diagnosis of cancer-related pain in a 1:5 ratio yielding 13,325 controls. Patients with cancer-related pain had significantly higher odds of opioid overdose (aOR 4.82 [95% CI [2.68-8.67]; p-value <0.0001) and inpatient mortality (aOR 1.39 [1.11-1.74]; p-value 0.0043). Patients with cancer-related pain were also likely to stay significantly longer in the hospital (12.76 days vs. 7.88 days) with significantly higher total hospital charges (\$140,220 vs. \$88,316). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Pain is a common complication of cancer pathogenesis, diagnosis or treatment. Though a rare outcome, opioid overdose could lead to undesirable outcomes. Cancer patients undergo invasive diagnostic and therapeutic procedures as part of their cancer management or for conditions not related to their primary cancer diagnosis. Safety measures including alternatives to opioids are recommended to prevent the poor clinical outcomes and higher healthcare utilization indices associated with opioid overdose in this population.

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Cannabis use and risk of H. pylori infection; analysis of inpatients and residents of the US.

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OBJECTIVES/SPECIFIC AIMS: Cannabinoids suppress gastric acid secretion, ameliorate gastric inflammation, and promote gastric ulcer healing, all of which are triggered by H pylori (Hp). Our aim was to determine the relationship between cannabis use and: 1) H pylori infection (HPI) among community residents 2) clinical

peptic ulcer disease (PUD) and its complications among hospitalized patients. **METHODS/STUDY POPULATION:** We performed case-control studies with records from the NHANES III (n=4,556) and HCUP-NIS 2014 (n=4,555,029), and respectively identified subjects with seropositivity for H pylori and clinical PUD, and their cannabis usage status. In the NHANES III, we estimated the adjusted prevalence rate ratio (aPRR) of having HPI with cannabis use, using generalized estimating equations. In the NIS, we propensity-matched cannabis users to non-users in ratio 1:1 (68,073:68,073) and measured the aPRR of having PUD and its complications (SAS 9.4). **RESULTS/ANTICIPATED RESULTS:** In NHANES III, associated with decreased HPI seropositivity were cannabis ever-users (aPRR: 0.79[0.66-0.95]), greater than 10 times lifetime usage (0.65[0.5-0.84]) and recent 31-day usage (0.67[0.48-0.98]), compared to never usage. In the HCUP-NIS, cannabis users had decreased risk for total PUD (aPRR: 0.74[0.61-0.89]), duodenal PUD (0.48[0.35-0.60]) and PUD complications including hemorrhage (0.58[0.37-0.90]), perforation (0.66[0.51-0.87]), but not obstruction (1.75[0.51-5.98]). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Cannabis usage is related to a reduced likelihood of having HPI in the community and also mitigate against having complicated presentations to the hospital. More translational studies are needed to illuminate the details of this relationship, given the high worldwide prevalence of both cannabis use and HPI.

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Cardiac Replacement Fibrosis in Cancer Treatment Related Cardiotoxicity

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OBJECTIVES/SPECIFIC AIMS: Our goals were to understand the pattern, location, and extent of cardiac replacement fibrosis seen as late gadolinium enhancement on cardiovascular magnetic resonance imaging in a large cohort of cancer patients treated with anthracyclines and/or trastuzumab. **METHODS/STUDY POPULATION:** We performed a retrospective cohort study of consecutive adult cancer patients treated with anthracyclines and/or trastuzumab from 2004 through 2017. CMRs were analyzed for the presence, location, and pattern of LGE. **RESULTS/ANTICIPATED RESULTS:** Of 238 patients, 220/(92.4%) had no LGE. Among the 18/(7.6%) patients with LGE, 13/(72.2%) were ischemic in pattern (myocardial infarctions); 10 of these had known coronary artery disease (CAD). Of 5/(27.8%) patients with non-ischemic LGE, the etiologies were known for 4 – myocarditis, cardiac sarcoidosis, eosinophilic myocarditis, and acute myocardial calcification. Only 4/(1.7%) patients had unexpected LGE, of which 3 were unrecognized myocardial infarctions. **DISCUSSION/SIGNIFICANCE OF IMPACT:** The assessment of fibrosis helps to diagnose the cause of LVSD in cancer patients treated with potentially cardiotoxic medications. This is necessary because currently, the cause of LVSD in cancer patients cannot be established conclusively even though the cause is closely linked to patient outcomes. Our results demonstrate that cancer treatment-related LVSD is not associated with fibrosis. A minority of cancer patients with LVSD have fibrosis related to other reasons, most commonly CAD. Identification of the correct cause of LVSD in cancer patients treated with cardiotoxic medications allows for appropriate treatment. This, in turn, could improve patient outcomes.

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Catatonia, Delirium and Coma: Implications for Mortality

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OBJECTIVES/SPECIFIC AIMS: Delirium, a form of acute brain dysfunction, characterized by changes in attention and alertness, is a known independent predictor of mortality in the Intensive Care Unit (ICU). We sought to understand whether catatonia, a more recently recognized form of acute brain dysfunction, is associated with increased 30-day mortality in critically ill older adults. **METHODS/STUDY POPULATION:** 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. Coma, was defined as a Richmond Agitation Scale score of -4 or -5. We used the Cox Proportional Hazards model predicting 30-day mortality after adjusting for delirium, coma and catatonia status. **RESULTS/ANTICIPATED RESULTS:** We enrolled 335 medical, surgical or trauma critically ill patients with 1103 matched delirium and catatonia assessments. Median age was 58 years (IQR: 48 - 67). Main indications for admission to the ICU included: airway disease or protection (32%; N=100) or sepsis and/or shock (25%; N=79). In the unadjusted analysis, regardless of the presence of catatonia, non-delirious individuals have the highest median survival times, while delirious patients have the lowest median survival time. Comparing the absence and presence of catatonia, the presence of catatonia worsens survival (Figure 1). In a time-dependent Cox model, comparing non-delirious individuals, holding catatonia status constant, delirious individuals have 1.72 times the hazards of death (IQR: 1.321, 2.231) while those with coma have 5.48 times the hazards of death (IQR: 4.298, 6.984). For DSM-5 catatonia scores, a 1-unit increase in the score is associated with 1.18 times the hazards of in-hospital mortality. Comparing two individuals with the same delirium status, an individual with a DSM-5 catatonia score of 0 (no catatonia) will have 1.178 times the hazard of death (IQR: 1.086, 1.278), while an individual with a score of 3 catatonia items (catatonia) present will have 1.63 times the hazard of death. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Non-delirious individuals have the highest median survival times, while those who are comatose have the lowest median survival times after a critical illness, holding catatonia status constant. Comparing the absence and presence of catatonia, the presence of catatonia seems to worsen survival. Those individual who are both comatose and catatonic have the lowest median survival time.

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Colonization of Pregnant Women with Group B streptococcus in Latin America and Infant Outcomes

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OBJECTIVES/SPECIFIC AIMS: The primary objective of this study is to determine the prevalence of maternal GBS colonization and demographic risk factors associated with maternal GBS colonization