

both, OR = 2.4 [2.2-2.6], 2.2 [1.8-2.6], 6.0 [4.5-8.3]. DISCUSSION/SIGNIFICANCE OF IMPACT: Census tract-based SES could provide invaluable information to health care providers when associated to the EHR. We found that median income, which is not collected in the EHR, was significantly associated with a higher burden of disease. Census tract SES could serve as a proxy for evaluating SDoH.

4446

Association between treatment of asymptomatic *Trichomonas vaginalis* infection and preterm delivery*

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OBJECTIVES/GOALS: *Trichomonas vaginalis* (TV) has a prevalence of 26% in Baltimore and is associated with preterm delivery (PTD). Yet screening and treatment of TV is not advised due to conflicting data on harms. Our goal is to investigate the association between asymptomatic TV treatment and PTD. METHODS/STUDY POPULATION: This is a retrospective cohort study of women who delivered a child at The Johns Hopkins Hospital between 7/1/16 – 11/19/19. Exclusion criteria included multiple gestation, stillborn, miscarriage, diabetes, hypertension/preeclampsia, HIV, and history of PTD. Chart review and ICD-10 diagnosis codes were used to collect data on demographics, STI test results, lab encounter diagnoses, STI treatment during pregnancy, and labor encounter diagnoses. Preliminary analysis for crude incidence of PTD in asymptomatic and symptomatic women treated for TV was performed using TriNetx, a global research network compiling all de-identified data within the Hopkins system. RESULTS/ANTICIPATED RESULTS: Three hundred and eighty women were tested for TV, 240 (63%) were asymptomatic and 140 (37%) women were symptomatic. Mean ages were 26 (SD:5) and 26 (SD:5) years, respectively. Black women comprised 87% of the asymptomatic cohort and 93% of the symptomatic cohort. Women of Hispanic ethnicity were represented by 4% of the asymptomatic cohort and 7% of the symptomatic cohort. Crude incidence of PTD was 4.1% among asymptomatic women and 7.1% among symptomatic women. Incidence ratio comparing asymptomatic PTD incidence to symptomatic PTD incidence was 0.58 with 95% CI (0.22, 1.56). DISCUSSION/SIGNIFICANCE OF IMPACT: Preliminary data from our study suggests there is no difference in PTD between asymptomatic and symptomatic women treated for TV. Future steps include multiple linear regression using a larger dataset. These preliminary data suggest TV should be considered for screening during pregnancy.

4234

Association of age at menopause with incident heart failure in the Southern Community Cohort Study

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OBJECTIVES/GOALS: Early age at menopause has been linked to increased risk of cardiovascular disease; however, there is limited evidence for a relationship between early menopause and heart failure

(HF). We examined whether early menopause is associated with incident HF among women in the southeastern United States. METHODS/STUDY POPULATION: The Southern Community Cohort Study enrolled ~86,000 low-income black and white adults from 2002 to 2009. Participants for this analysis were 11,948 women who were postmenopausal at enrollment, had no history of HF, and were on Medicaid or Medicare. HF events were ascertained using ICD-9 codes 428.x via linkage of the cohort with CMS Research Identifiable Files through December 31, 2010. Early menopause was defined as self-reported age at menopause less than 45 years. Hazard ratios (HRs) and 95% confidence intervals (CIs) were computed from multivariable Cox regression models, overall and by race, adjusting for demographic, lifestyle, and reproductive factors, including reason for menopause. RESULTS/ANTICIPATED RESULTS: At baseline, mean age was 58±9 years, and 65% of participants were black. Among women with early menopause, 76% (n = 4,836) had menopause due to hysterectomy or oophorectomy. In women with later menopause, 74% (n = 4,102) reported natural menopause. During a median follow-up of 5.0 years (range 3.1-6.7), 2,157 incident HF events occurred. Compared with women with later onset of menopause, those with early menopause had increased HF risk (HR: 1.27, 95% CI: 1.10–1.47). Risk of HF associated with early menopause was similar in white and black women (p-value for interaction: 0.13). DISCUSSION/SIGNIFICANCE OF IMPACT: In this largely low-income population, early menopause was associated with an increased risk of developing HF. Women with early menopause represent a potential target population for future interventions to decrease risk of HF and cardiovascular risk factors.

4347

Bimodal Visual-Olfactory Training for Post-Surgical or Post-Traumatic Olfactory Dysfunction (VOLT Trial)*

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OBJECTIVES/GOALS: 1) Assess the patient-reported, perceived change in olfactory function after bimodal visual-olfactory training (OT) 2) Assess change in olfactory function after bimodal visual-olfactory training with a smell identification test 3) Assess which scents are most important to people with olfactory dysfunction (OD) METHODS/STUDY POPULATION: The participants are adults with subjective or clinically diagnosed OD with post-surgical or traumatic etiologies within the last 5 years. At the first of two study visits, participants complete the University of Pennsylvania Smell Identification Test (UPSIT) and complete general health (SF-36) and olfactory-related quality-of-life questionnaires. From a list of 34 scents, participants chose the 4 scents most important to them and smelled the scents twice daily for 3 months. Olfactory testing and the quality-of-life questionnaires were repeated at the final visit. RESULTS/ANTICIPATED RESULTS: 10 participants have enrolled in the study. There was one screen fail and one withdrawal. Six participants are currently undergoing OT and two have completed the study. Seven participants have post-surgical etiology and three have post-traumatic etiology of their OD. Of the two participants who have completed the study, one had an UPSIT score improvement from 25 to 33 out of the 40 questions correct. The minimally clinically important difference on the UPSIT is 4. She reports improvement subjectively. The second participant had a UPSIT score change from 25 to 24 and reports ability to smell is neither better nor worse. DISCUSSION/SIGNIFICANCE OF IMPACT: Traumatic and post-

surgical, particularly post-transphenoidal hypophysectomy, are common etiologies of OD and no effective treatments exist. The results from our pilot study will help better inform the best way to undergo OT, how effective it is, and the planning of future studies.

4569

Burden of illness in idiopathic pulmonary fibrosis: A real-world cohort

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OBJECTIVES/GOALS: Studying IPF associated health care utilization (HRU) in real world settings, provides the opportunity to produce generalizable results that can directly inform models of care delivery. The objective of this study was to examine real-world differences in the natural history of annual HRU and treatment trends associated with IPF in a large, community-based population of patients with IPF, compared to matched non-IPF controls. **METHODS/STUDY POPULATION:** Cases of IPF were identified using case validated algorithms in the Kaiser Permanente Northern California adult population from 2000 to 2014. Each case was matched to at least one and no more than five non-IPF controls by age, sex, race/ethnicity and length of enrollment. The date of the first occurrence of the IPF-specific diagnostic code was considered the index date for cases and matched controls. Comorbidity burden and HRU was assessed in the five years pre- and post-index date, including hospitalizations, outpatient visits, use of diagnostic and monitoring studies and medications. Poisson generalized estimating equations models with robust standard errors were used to estimate adjusted case-control differences in HRU, accounting for clustering within matched sets. **RESULTS/ANTICIPATED RESULTS:** 691 patients were identified with incident IPF during the study period and matched to 3,452 control subjects. Demographics were well balanced between cases and controls due to matching. Patients with IPF had a higher burden of all selected co-morbidities and higher HRU compared to controls. In the pre-index period, IPF members had significantly higher rates of all diagnostic procedures ($p < 0.001$) and health care visits, with the exception of skilled nursing facility care ($p < 0.001$). The greatest relative difference was observed with use of Chest CT (RR = 245.94, 95% CI 117.04, 516.82). In the post-index period compared to controls, patients with IPF had higher rates of serial testing ($p < 0.001$) and inpatient and outpatient care including, all-cause hospitalization (1.55), emergency room visits (1.19), outpatient visits (1.18), and skilled nursing facility stay (1.35). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Patients with idiopathic pulmonary fibrosis experience increased co-morbidity and healthcare resource utilization compared to controls. This increased burden extends beyond the index-period as previously documented and is true for a large real-world cohort. **CONFLICT OF INTEREST DESCRIPTION:** NA

4180

CD4 count is a prognostic marker in persons living with HIV and non-small cell lung cancer in the Bronx

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OBJECTIVES/GOALS: There is a high burden of lung cancer in persons living with HIV (PLWH). The role that HIV status, by levels of

immune function and viral load, has on survival from lung cancer is not fully understood. The study's objectives were to assess 1) the association of HIV with survival in non-small cell lung cancer (NSCLC) and 2) prognostic factors in PLWH with NSCLC. **METHODS/STUDY POPULATION:** Participants were from a cohort of lung cancer patients diagnosed between 2004-2017 in the Bronx, NY, with vital status ascertainment at least annually. We compared survival from NSCLC diagnosis between HIV-negative patients (HIV-, N = 2881) and PLWH (N = 88), using Cox regression, accounting for clinical and sociodemographic factors including smoking status. In three separate comparisons to HIV-, PLWH were dichotomized by CD4 count (<200 vs. ≥ 200 cells/ μ L), CD4/CD8 ratio (median, <0.43 vs. ≥ 0.43) and HIV viral load (VL) suppression (<75 vs. ≥ 75 copies/mL). In PLWH only, we assessed the relationships of CD4 count, CD4/CD8 ratio, and VL at diagnosis with survival adjusting for age, sex, and cancer stage. CD4 count and CD4/CD8 ratio were also examined as time-varying variables using a counting process approach. **RESULTS/ANTICIPATED RESULTS:** PLWH were younger (median 56 years, IQR 51-52 vs. 68, IQR 60-76) and more likely to be current smokers (58% vs. 37%) at diagnosis than HIV- patients. Median survival was lower in PLWH [1.1 years, 95% confidence interval (95%CI): 0.6-1.3] than in HIV- [1.6 (1.5-1.7)]. Survival comparing PLWH with higher CD4/CD8 to HIV- was similar [hazard ratio (HR), 95%CI: 0.63 (0.37-1.07)], but those with lower CD4/CD8 experienced worse survival (HR = 1.74, 95%CI: 1.07-3.89). Among PLWH, having a CD4 count <200 cells/ μ L was associated with over twice the risk of death compared to those with CD4 ≥ 200 cells/ μ L (HR = 2.37, 95%CI: 1.14-4.92). VL and CD4/CD8 ratio were not associated with survival. Lower time-updated CD4 count was also associated with worse survival (HR = 2.19 for CD4 <200 vs. > 200 cells/ μ L, 95%CI: 1.16-4.13). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Among persons with NSCLC, CD4/CD8 ratio nearest diagnosis was shown to distinguish mortality risk in PLWH compared with HIV- patients. In addition, PLWH with low CD4 had worse prognosis than PLWH who had higher CD4 counts. These results suggest HIV immune status to be an essential component influencing survival in lung cancer.

4223

Changes in positive predictive value of cervical cytology following HPV vaccination

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OBJECTIVES/GOALS: To determine if current U.S. HPV vaccination rates have decreased dysplasia prevalence enough to decrease the positive predictive value (PPV) of abnormal cervical cytology. **METHODS/STUDY POPULATION:** This retrospective cohort study comprised a chart review of all patients 21-35 years of age who had at least 1 Pap test result within MHealth/Fairview 2016-2018. HPV vaccination data, cervical cancer screening data and dysplasia results were abstracted. Vaccinated was defined as receiving at least 1 dose of HPV vaccine, with subgroup analyses performed for those completing vaccination per ACIP guidelines and by age of initiation dichotomized as 21+ years versus <21 years. **RESULTS/ANTICIPATED RESULTS:** 49,764 patients meeting study criteria were identified. Among the entire study population, 10% had abnormal cytology results during the study period. Among the 4,928 patients with abnormal cytology, PPV for CIN2+ was lower among vaccinated individuals (13% vs. 18%; $p < 0.0001$). Among vaccinated