



## American College of Epidemiology Annual Meeting Abstracts, September 7–10, 2019, Pasadena, California

### Oral Presentations

#### Exploring uniformity of gestational diabetes screening and diagnosis using real-world electronic health record data



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**Purpose:** Gestational diabetes (GDM) surveillance frequently relies on International Classification of Disease (ICD) codes to identify cases. GDM diagnoses can be based on several criteria including Carpenter & Coustan (C&C) and International Association of Diabetes in Pregnancy Group (IADPSG). Our objectives were to describe GDM testing patterns within one large health system and evaluate how well diagnostic coding corresponds with laboratory-based GDM criteria.

**Methods:** Data were extracted from electronic health records of women that gave birth in Kaiser Permanente Southern California hospitals. From 2013–2017, 130,146 non-diabetic women with a singleton pregnancy and first trimester entry into prenatal care were identified. All 50-g glucose challenge tests (GCT) and 75-g and 100-g oral glucose tolerance test (OGTT) results were extracted; the last result determined GDM status by standard laboratory criteria. The laboratory-based definition (gold standard) was compared to ICD-9 (648.8)/ICD-10 (O24.8) codes. Diagnostic validity measures and 95% confidence intervals (95%CI) are presented.

**Results:** Number of prenatal GCTs and OGTTs per woman ranged from 0–6. Most had routine testing: 50-g only (39.4%), 100-g after 50-g (15.3%), or 75-g only (10.2%). Other common patterns included two 50-g (16.3%), two 50-g plus one 100-g (6.2%), one 50-g plus two 100-g (2.9%), and two 75-g (1.9%); 4.2% were untested. Test results and ICD-codes yielded GDM prevalence of 9.9% and 14.2%, respectively. Among untested women, 39.0% had GDM codes. Sensitivity (95%CI) was 98.8% (98.6%–99.0%) for the C&C criteria; positive predictive value (PPV) was 58.0% (57.1%–58.7%) due to false positives. Sensitivity (56.6%, 54.9%–58.4%) and PPV (44.6%, 43.1%–46.2%) were low for the IADPSG criteria. Negative predictive value was good for all criteria.

**Conclusions:** GDM testing is based on clinician preference and GDM codes may be applied inconsistently. While most women that met the laboratory criteria had diagnosis codes, codes alone overestimated the true prevalence of laboratory-confirmed GDM.

#### The impact of missing toxicology reports on overdose death surveillance: 2010–2016



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**Purpose:** The classification of overdose deaths is often geographically and demographically inconsistent, leading to misconstrued estimates of drug overdose rates across time and place. We test how demographic and geographic characteristics of drug overdose decedents are associated with incomplete toxicology reporting, and measure changes in missingness rates and their associations with decedent characteristics over time.

**Methods:** We estimated the percentage of overdose deaths reported in the National Vital Statistics System with missing toxicology results from 2010–2016, overall and by decedents' demographic and geographic characteristics. We used a multi-level model to evaluate prevalence of missingness by decedent characteristics, accounting for geographic clustering.

**Results:** One-fifth of 351,345 drug overdose deaths from 2010–2016 did not indicate a specific drug, declining from 24.4% in 2010 to 14.6% in 2016. In a multi-level model controlling for all predictors, deaths were less likely to have missing information if they occurred in metro counties compared to rural counties (aOR: 0.31, 95%CI: 0.24, 0.41) and in counties with medical examiners versus coroners (aOR: 0.57, 95%CI: 0.47, 0.69). Male decedents were less likely to have missing information than females (aOR: 0.73, 95%CI: 0.69, 0.77), and non-Hispanic whites were more likely to have missing information than non-Hispanic blacks (aOR: 1.31, 95%CI: 1.2, 1.4).

**Conclusion:** The percentage of deaths with missing toxicology information has declined over time, but demographic and geographic differences in missingness persist. Ignoring differentially missing data in surveillance reports may adversely affect the validity of inferences. Creative data solutions are necessary to facilitate valid comparisons in drug-specific overdose deaths across populations and time.

#### Risk of viral gastroenteritis associated with continuous use of proton pump inhibitors: a matched retrospective cohort study based on prospectively collected drug dispensing data



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**Purpose:** An increased risk of acute gastroenteritis (AG) of bacterial origin has been associated to proton pump inhibitors (PPI) therapy. The risk of community acquired AG during winter epidemics, mostly of viral origin, has not been studied. The aim of this study was to investigate the association between continuous PPI therapy and AG occurrence during winter epidemics.

**Methods:** A matched retrospective cohort study was conducted using prescribed drug dispensing data prospectively collected during winter 2015/16 in a database covering nearly 30% of French drugstores. Each patient exposed to continuous PPI therapy was matched to three PPI unexposed patients, based on year of birth, gender and main dispensing drugstore. Occurrence of viral AG was the main outcome compared between the two exposure groups. Relative risks (RR) were estimated using a log-binomial model adjusted on age, gender and treatments for chronic conditions, overall and by age groups.

**Results:** There were 233 596 exposed (median age 70 years, 56.3% females) and 626 887 matched unexposed patients (median age 71 years, 55.8% females) included in the study. The risk of AG was significantly higher among exposed patients compared to those unexposed, overall (adjusted RR 1.80, 95%CI 1.71–1.88), and among those aged 45–64 (aRR 1.64, 95%CI 1.52–1.78), 65–74 (aRR 2.19, 95%CI 1.98–2.42) and 75 years and more (aRR 1.98, 95%CI 1.82–2.15).

**Conclusion:** Continuous exposure to PPI was associated with an increased risk of developing AG during periods of highest circulation of enteric viruses, particularly among individuals aged 45 years and over.

## Poster Presentations

### Aging

#### Measures of lower body function as predictors of mortality among Mexican Americans aged 75 and older



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**Purpose:** We expand previous research from the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE) by examining the association between measures of lower body functioning and mortality over eight years. We hypothesize that objective and subjective measures of lower body function will predict mortality.

**Methods:** Data from the H-EPESE were used (2004–2013), which included adults aged 75 and older. The short physical performance battery (SPPB), walking speed, and self-reported lower body activities of daily living (ADLs) were used as measures of objective and subjective reported measures of lower body functioning. Cox proportional hazards models were used to assess the relationship between lower body function and mortality (n=1,657).

**Results:** Cox proportional hazard models show that lower SPPB score, slower walking speed, and ADL disability were associated with increased mortality. The two lowest SPPB score groups had hazard ratios of 2.15 (95% CI: 1.66, 2.79) and 1.56 (95% CI: 1.18, 2.06), the two lowest walking speed score groups had hazard ratios of 2.05 (95% CI: 1.53, 2.76) and 1.44 (95% CI: 1.05, 1.96), and those reporting any ADL had hazard ratios of 1.75 (95% CI: 1.50, 2.04).

**Conclusions:** Subjective measures of functioning can provide similar mortality information to objective measures in this population of underserved individuals aged 75 and older. This has clinical implications since information on self-reported ADLs is quicker to obtain than physical batteries.

#### Association among sleep duration with nap and stroke stratified by self-health status among Aging-Chinese health and retirement longitudinal study



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**Purpose:** Although short sleep duration is related to chronic conditions such as stroke, this association is less well-known stratified by health status. We assessed the association between total sleep duration and stroke in different health status among elderly Chinese.

**Methods:** Data were derived from the 2011 China Health and Retirement Longitudinal Study (CHARLS) with 4,729 respondents over 65 years old. Binary logistic regression was used to estimate the odds ratio (AOR) and 95% Confidence Interval (95%CI) of the association between total sleep time and stroke stratified by self-health status adjusting for confounders.

**Results:** After adjusting for demographic characteristics, socioeconomic status, lifestyle, health status and comorbidity, there was an association (AOR=2.05, 95%CI 1.31–3.19) between total sleep duration (less than 7 hours per day) and stroke. Stratifying by self-health status, in those who reported with good health status, there was no significant association between total sleeping time and stroke among those who reported good health status. However, in those reporting poor health status, the total sleeping time (less than 7 hours per day) was 2.11 (95%CI 1.30–3.44) times to report with stroke than those with a normal total sleeping duration. Disability status was associated with stroke in both self-reported good and poor groups (AOR=2.89, 95%CI 1.04–8.07; AOR=2.62, 95%CI 1.84–3.73, respectively). However, residence status was only associated with stroke among individuals reporting poor health (AOR=0.62, 95%CI 0.41–0.94).

**Conclusion:** Stroke is significantly associated with total sleeping time among individuals reporting poor health. Policy should be made targeting this vulnerable population in preventing stroke.

#### The association of ethnicity and Hispanic acculturation status with advance directive completion among older patients in an integrated health system



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**Purpose:** Hispanics have lower Advance Directive (AD) completion than non-Hispanic whites. Few studies have investigated the role of acculturation in end of life planning. We aimed to assess whether acculturation (language preference and needing an interpreter) affected AD completion and hypothesized less acculturated Hispanics would have lower rates of AD completion than English speakers.

**Methods:** This retrospective cohort study analyzed 620,948 electronic medical records from a Northern California integrated health system between 2013 and 2017 to examine AD completion by January 1, 2018 patients aged 55 years or older, and whether acculturation and having an AD among Hispanic patients were associated. Descriptive statistics and bivariate analysis were performed to compare AD completion among non-Hispanic whites, Hispanics, and Hispanic subgroups by acculturation status (English-speaking, Spanish-speaking and needed interpreter). We conducted multivariable logistic regression to determine the relationship between Hispanic acculturation and having an AD while controlling for demographic, clinical and utilization factors.

**Results:** We found 20.3% of non-Hispanic whites (n=512,577) and 10.9% of Hispanics (n=108,371) had completed an AD. Among Hispanics, lower acculturation resulted in lower odds of AD completion. Compared to English speakers, Spanish speakers had 50% lower odds of completing an AD (OR=0.5, 95% C.I. 0.4–0.5) while Spanish speakers needing an interpreter had 60% lower odds (OR=0.4, 95% C.I. 0.3–0.4). Additional predictors of successful AD completion were being female, being older, having more comorbidities, more hospital and Emergency Department visits and higher socioeconomic status.

**Conclusions:** These findings indicate need for more tailored outreach to Hispanics, particularly among less acculturated subgroups, to reduce AD completion disparities.

### Cancer

#### Trends in pediatric cancer mortality and survival in the United States



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**Purpose:** While pediatric cancer mortality and survival has improved in the United States over the past 40 years, disparities exist by age, race/ethnicity, and cancer type. To assess progress, this study examined recent mortality and survival data for individuals aged <20 years.

**Methods:** Age-adjusted death rates were calculated using the National Vital Statistics System during 2002–2016. Average annual percent change (AAPC) was calculated using joinpoint regression. Five-year relative survival was calculated using National Program of Cancer Registries data during 2001–2014. Differences in survival were compared using non-overlapping 95% confidence intervals (CI). Death rate and survival were estimated overall and by sex, 5-year age group, race/ethnicity, and cancer type.

**Results:** Pediatric cancer death rates decreased during 2002–2009 (AAPC=-2.6, 95% CI -3.5--1.6), but plateaued during 2009–2016 (AAPC=-0.4, 95% CI -1.4–0.6). During 2002–2016, death rates decreased among both sexes, all age groups, whites, blacks, Hispanics, leukemia, and lymphoma, but were unchanged for brain, bone, and soft tissue cancers. Comparing 2001–2007 to 2008–2014, survival improved from 81.8% (95% CI, 81.5–82.1) to 84.8% (95% CI, 84.6–85.1). Survival improved for both sexes, all ages, and whites, blacks, and Hispanics, but was highest in both periods among females, ages 15–19 years, and whites. Survival improved for leukemias, lymphomas, and brain cancers, but not for bone and soft tissue cancers.

**Conclusions:** While overall death rates decreased and survival increased, disparities exist by sex, age, race/ethnicity, and cancer type. Future improvements in pediatric cancer outcomes might depend on improving therapies, access to care, and supportive and long-term care.

### Adherence to Children's Oncology Group Long-Term Follow-up Guidelines among high-risk adolescent and young adult cancer survivors



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**Purpose:** Cancer survivors are at risk of late effects from therapeutic exposures, making it essential to screen for early detection of these conditions. We evaluated adherence to the Children's Oncology Group Long-Term Follow-up Guidelines among adolescent and young adult (AYA) cancer survivors to understand gaps in survivorship care for this unique age group.

**Methods:** Kaiser Permanente Southern California members diagnosed with cancer between age 15–39 from 2000–2010 with 5-year survival after diagnosis were included (n=3827). Based on cumulative chemotherapy and radiation exposures, 1019 and 140 survivors were identified as high-risk groups recommended for early cardiomyopathy and breast cancer screening, respectively. For each individual, we calculated the Prevention Index (PI, proportion of person-time covered by preventive services relative to time eligible) for each screening service. We then dichotomized the PI and evaluated predictors for adherence to screening recommendations using multivariable logistic regressions.

**Results:** The mean PI for cardiomyopathy screening was 3.9% (SD=16.49%). For breast cancer screening, the mean PI was 77.5% (SD=25.13%) and 23.5% (SD=30.93%) among survivors of breast cancer and other cancers, respectively. Advanced stage (OR=3.17, 95% CI: 1.57–6.41) and breast cancer diagnosis (OR=3.46, 95% CI: 1.48–8.08) was associated with better adherence to cardiomyopathy screening. Age, race/ethnicity and stage at diagnosis were not associated with adherence to breast cancer screening guidelines.

**Conclusion:** We found a large gap in follow-up care for AYA cancer survivors at high risk for cardiomyopathy and breast cancer late effects. Adherence to recommended screenings was poor and may be influenced by cancer type and stage. Our findings can help guide improvement efforts for survivorship care.

### T-Cell Acute Lymphoblastic Leukemia immunophenotype predicts the survival disadvantage of black children with ALL



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**Purpose:** Acute Lymphoblastic Leukemia (ALL) is the most commonly diagnosed childhood malignancy, despite improved survival. We aimed to assess ALL survival by race and sex, and to determine the exposure function of T-cell immunophenotype in the survival disadvantage of blacks and males.

**Method:** The Surveillance, Epidemiology and End Result (SEER) data of children with ALL, 1973–2015 were examined retrospectively. Survival was assessed using Kaplan Meier, Nelson Aalen cumulative hazard, Log rank, Schoenfeld for proportional hazard assumption, and Cox proportional hazard model for the predictors of survival.

**Results:** There were 18,720 cases of which 11,669 (62.5%) were B-ALL, 1,614 (8.6%) were T-ALL and 5,437(29%) were unspecified. Compared to whites, blacks with ALL were 42.1% more likely to die, hazard ratio (HR) = 1.42, 95% CI= 1.27–1.59. Relative to females, males were 30% more likely to die, HR=1.30, 95% CI= 1.21–1.39. Survival varied by immunophenotype, with T-ALL and ALL-unspecified indicating survival disadvantage relative to B-ALL. Children with T-ALL were 54% (HR=1.54, 95% CI=1.37–1.74), while children with ALL unspecified were 81% (HR= 1.81, 95% CI=1.68–1.94) more likely to die relative to B-ALL. After controlling for confoundings, blacks compared to whites with T-ALL were 61% more likely to die,

adjusted HR (aHR)= 1.61, 99% CI= 1.10–2.39, while for B-ALL, blacks were 31% more likely to die, aHR=1.31, 99% CI= 1.03–1.66. In contrast, after similar adjustment, males with B-ALL were 21% more likely to die (aHR=1.21, 99% CI= 1.05–1.38).

**Conclusion:** T-Cell immunophenotype predicts the survival disadvantage of blacks, while B-lineage correlates with males' survival disadvantage.

**Conflicts of Interest:** All authors (LH, KH, KD and PM) reviewed the abstract and the supplement (methods and results), approved the final draft and have declared no conflicts of interest.

### Stage of diagnosis and mortality among non-alcoholic fatty liver disease liver cancer patients: revision



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**Purpose:** Non-alcoholic fatty liver diseases (NAFLD) are suspected of causing between 15– 50% of hepatocellular carcinomas (HCC). NAFLD is suspected to be one of the main drivers of the increasing HCC rates. The epidemiology of NAFLD-HCC is severely limited because population-based cancer registries do not define precipitating factors (i.e., NAFLD and exclusion criteria like hepatitis). The objective of this research is to overcome cancer registry limitations and to describe NAFLD-HCC patients epidemiologically.

**Methods:** Medicare claims data were linked to the SEER national cancer registry data. Claims data linkages allow identification of NAFLD and exclusion of hepatitis and other HCC etiologies. We identified 1,132 patients with a NAFLD-HCC diagnosed between 1995–2013 aged 68 or older.

**Results:** Relative to symptomatic (severe) cirrhosis, patients without cirrhosis had increased the odds of late-stage NAFLD-HCC, [Adjusted Odds Ratio (AOR): 2.00, 95% Confidence Interval (95%CI): 1.4 – 2.8] and for patients with cirrhosis but who did not have documented symptoms [AOR: 1.26, 95%CI: 0.9–1.7]. Being unmarried increased the odds of late-stage cancer, [AOR 1.35, 95%CI: 1.0,1.7]. The hazard of death was highest among cirrhotic patients without symptoms, [Hazard Ratio (HR) 2.03, 95%CI: 1.1,3.9].

**Conclusions:** The newly identified group of NAFLD-HCC patients without cirrhosis are at a higher risk of late-stage diagnosis, and cirrhotic patients without symptoms are at the highest risk of death. Real world data like cancer registry and claims data are important to inform populations needing biomarker research, especially for NAFLD-HCC, for which a non-invasive diagnostic test does not exist.

### Derivation of anthropometric-based equations to predict lean body mass composition of cancer patients



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**Purpose:** Lean body mass (LBM) of cancer patients is a predictor of chemotherapy-related adverse events. However, there are currently no measures of LBM that can easily be implemented in routine oncologic settings. Therefore, we aimed to derive, test, and validate anthropometric equations to estimate LBM of cancer patients.

**Methods:** Eight cycles of the National Health and Nutrition Examination Survey (NHANES) 1999–2014 were analyzed. A population of participants with self-reported physician diagnosed-cancer and recorded DXA measures was randomly split into training (75%) and testing (25%) sets. The training data was utilized to predict DXA measured LBM using height, weight, and four circumference measures (arm, waist, thigh, and calf). The developed models were utilized to estimate the LBM of the test sample. Differences between DXA measured and predicted LBM were assessed. Last, correlations of predicted LBM with albumin, creatinine, c-reactive protein and mortality were calculated with the validation set. Models were stratified by sex and/or race.

**Results:** Models were derived and tested from a sample of 1591 adult participants with self-reported cancer diagnosis and recorded DXA measurements. The model accurately predicted the LBM composition ( $R^2 = 0.87$ ). Models predicted LBM better among males ( $R^2 = 0.92$ ) than females ( $R^2 = 0.88$ ). Predicted LBM (C-statistic: 0.59) discriminated death to similar magnitudes as body mass index (C-statistic: 0.56) and body surface area (C-statistic: 0.55).



**Conclusions:** Anthropometric measures can be used to accurately estimate LBM of cancer patients. Future research should apply these derived equations to measure LBM thresholds associated with chemotherapy adverse event risk.

### Breast biopsy patterns and findings among older women undergoing screening mammography: what is the impact of age and comorbidity?



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**Purpose:** The goal of this project is to assess rates of biopsy and biopsy findings among older women undergoing screening mammography by age and comorbidity.

**Method:** We included 171,636 women ages 66–99 years with at least one screening mammogram from the Medicare-linked Breast Cancer Surveillance Consortium (BCSC) during 1999–2010. We calculated percentage of screens followed by biopsy within 90 days by age and comorbidity. Further, we assessed trends in biopsy rates using the Cochran–Armitage trend test.

**Results:** Among 527,254 screening mammograms, 6587 (1.2%) were followed by biopsy within 90 days. Whereas the proportion of screens followed by any biopsy did not vary significantly by age (ages 66–74: 1.3%, ages 75–84: 1.2%, ages 85–99: 1.2%;  $p_{\text{trend}}=0.07$ ), the proportions increased with increasing Charlson Comorbidity score (CCS) for women ages 66–74 and 75–84 (ages 66–74: CCS0: 1.2%, CCS1: 1.3%, CCS $\geq$ 2: 1.6%;  $p_{\text{trend}}<0.001$  and ages 75–84: CCS0: 1.2%, CCS1: 1.3%, CCS $\geq$ 2: 1.3%;  $p_{\text{trend}}=0.01$ ) but not ages 85–99 (CCS0: 1.1%, CCS1: 1.2%, CCS $\geq$ 2: 1.4%;  $p_{\text{trend}}=0.16$ ). The proportion of screens followed by benign biopsy increased with increasing CCS for women ages 66–74 and 75–84 (ages 66–74: CCS0: 0.77%, CCS1: 0.88%, CCS $\geq$ 2: 0.94%;  $p_{\text{trend}}<0.001$  and ages 75–84: CCS0: 0.62%, CCS1: 0.75%, CCS $\geq$ 2: 0.78%;  $p_{\text{trend}}=0.001$ ) but not ages 85–99 (CCS0: 0.48%, CCS1: 0.57%, CCS $\geq$ 2: 0.61%,  $p_{\text{trend}}=0.23$ ). The proportion of biopsies with a result of invasive cancer did not vary significantly by CCS in any age group ([ages 66–74: CCS0: 28.4%, CCS1: 25.5%, CCS $\geq$ 2: 30.8%;  $p_{\text{trend}}=0.93$ ]; [ages 75–84: CCS0: 37.2%, CCS1: 36.0%, CCS $\geq$ 2: 32.0%;  $p_{\text{trend}}=0.15$ ]; [ages 85–99: CCS0: 46.8%, CCS1: 43.5%, CCS $\geq$ 2: 43.8%;  $p_{\text{trend}}=0.60$ ]).

**Conclusions:** Proportion of screens followed by biopsy and the proportion of screens with a benign finding increased with comorbidity burden among women ages 65–74 and 75–84 years, highlighting potential harm from high rates of benign findings among older women undergoing screening mammography.

### Socioeconomic differences in depression among breast cancer survivors



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**Purpose:** Socioeconomic status (SES) affects access to quality health care and morbidity in breast cancer survivors, but little data exists if survivors from lower SES groups experience greater psychological distress. Our analysis examined how SES affects depression occurrence in a cohort of survivors.

**Methods:** We studied 8,717 insured female ( $\geq 18$  years) breast cancer survivors from Kaiser Permanente Southern California diagnosed from 2010–2012 (stages 0–IV) and followed through December 2017. Data elements were identified from comprehensive electronic health records. Depression diagnoses post-breast cancer were identified using ICD9/10 codes. Geocoded median household income quartiles were used to determine SES based on the 2010 census. We calculated the association between SES and depression using odds ratios and 95% confidence intervals.

**Results:** Depression post-breast cancer by SES varied within each race/ethnic group. Compared to Black women in the top 25% SES group, Black women in the lowest 25% SES group were 67% more likely to have depression (OR 1.67, 95% CI: 1.05–2.65) as were those in the middle SES group ( $>25$ –50% OR: 1.72, 95% CI: 1.04–2.83). In non-Hispanic White women, those in the lowest SES group were 32% more likely to have a depression diagnosis than those in the top 25% SES group (Lowest 25% OR: 1.32, 95% CI: 1.11–1.58).

**Conclusion:** Even in this insured population, survivors in the lowest SES group were generally more likely to have depression than those in the highest SES group. Our next steps include conducting multivariable analyses to disentangle the effects of SES, race/ethnicity and clinical factors.

### Race/ethnic disparities in depression occurrence in a diverse cohort of breast cancer survivors



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**Purpose:** For many of the 3 million U.S. female breast cancer survivors, approximately 5–20% experience major depression following diagnosis, but sparse data exist about psychosocial distress in minority patients. The goal of this study was to explore whether race/ethnicity is associated with depression occurrence in breast cancer survivors.

**Methods:** We conducted a nested cross-sectional analysis within a cohort study of 8,717 breast cancer survivors. Subjects were identified from the Kaiser Permanente Southern California health plan. Inclusion criteria: Women 18 years and over, diagnosed from 2010–2012 (stages 0–IV), followed through December 2017 for depression occurrence post breast cancer diagnosis. Demographic, clinical and tumor characteristics were identified from the cancer registry and electronic medical records. Depression was identified using ICD9/10 codes and examined percentages and odds ratios by race/ethnicity.

**Results:** Overall, depression occurrence was 33.3% in survivors, but varied substantially by race/ethnicity, with the lowest occurrence in Asian/Pacific Islander (PI) (1.95%). White women had the highest odds of depression (OR 3.49 [95% CI, 2.93–4.15]), followed by Hispanic (OR 3.02 [95% CI, 2.50–3.65]) and Black (OR 2.05 [95% CI, 1.66–2.53]) compared to Asian/PI women.

**Conclusions:** An implication is that depression occurrence is similarly high in Hispanic and Black as in White women compared with Asian/PI women. Reasons for lower depression occurrence in the Asian/PI group is unclear; possibly more culturally sensitive assessments are needed. Promoting awareness may help the group to appropriately identify and manage depression. Next steps include conducting multivariable analyses to determine associations with depression in the different race/ethnic groups.

### Cardiovascular and Chronic Disease

#### Diabetes prevalence among U.S. adults with disabilities: National Health and Nutrition Examination Survey, 2013–2016



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**Purpose:** Research indicates a higher prevalence of self-reported diabetes among U.S. adults with disabilities compared to those without. We estimated the prevalence of self-reported diagnosed and total (diagnosed and undiagnosed) diabetes by disability status to inform care.

**Methods:** We analyzed the 2013–2016 National Health and Nutrition Examination Survey data for noninstitutionalized U.S. adults aged 18 years and older. This study included 5,471 adults without and with self-reported disabilities (cognition, hearing, mobility, vision, independent living, or self-care). Diagnosed diabetes was self-reported diagnosed diabetes, and total diabetes was defined as diagnosed and undiagnosed diabetes by the American Diabetes Association criteria of fasting glucose/A1c/2-h plasma glucose. We compared the prevalence of diagnosed and total diabetes by disability status, types, and demographics.

**Results:** Prevalence of diagnosed diabetes was 20.9% (95% CI: 18.7, 23.2) and 6.9% (95% CI: 6.1, 7.9), respectively, in adults with and without disabilities. Prevalence of total diabetes increased to 30.7% and 12.4% among adults with and without disabilities, respectively. More than 9% of adults with disabilities had undiagnosed diabetes. The estimated prevalence of total diabetes was highest among adults with at least two types of disabilities (53.7%; 95% CI: 49.3, 58.0) followed by those with only mobility disability (17.5%; 95% CI: 14.3, 21.1).

**Conclusions:** We found that 9.8% and 5.5% of adults with and without disabilities, respectively, had undiagnosed diabetes. These results highlight the importance of

increasing awareness and knowledge among people with disabilities and their health care providers to support the need for testing and diagnosis of diabetes.

### Urinary phthalates and metabolic syndrome in U.S adults (NHANES 2005-2014): examining potential differences by sex and race



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**Purpose:** Phthalates, plasticizers ubiquitous in household and personal care products, are associated with metabolic disturbances including diabetes and obesity. This study assessed whether the association between urinary phthalate concentrations and metabolic syndrome (MetS) varies by race and sex.

**Methods:** Using 2005-2014 National Health and Nutritional Examination Survey (NHANES) data, a cross-sectional analysis of eleven urinary phthalates in relation to MetS was conducted among 10,924 adults ages  $\geq 18$  years. Phthalates were analyzed in quartiles (individually and DEHP metabolites). MetS (dichotomous) was defined as having at least three of five criteria. Race was analyzed as White (W), African American (AA), and Mexican American/Hispanics (MA). Prevalence odds ratios (POR) and 95% Confidence Intervals (CI) were estimated using weighted sex and race stratified multivariable logistic regression.

**Results:** Overall, the prevalence of MetS was 25%. Higher MCOF levels were significantly associated with increased odds of MetS among women (POR<sub>Q4vsQ1</sub>=1.45, 95%CI: 1.12,1.87; p-trend=0.01) but not men. In race-stratified analyses, this association was observed only among W females (POR<sub>Q4vsQ1</sub>=1.73, 95%CI:1.24,2.41; p-trend=0.001). Significant associations were observed between MiBP levels and MetS among AA males (POR<sub>Q4vsQ1</sub>:1.93, 95% CI:1.04, 3.58; p-trend=0.01) and MA females (POR<sub>Q4vsQ1</sub>= 1.95, 95% CI: 1.04, 3.65; p-trend=0.12). DEHP metabolites were associated with increased odds of MetS among men only (POR<sub>Q4vsQ1</sub>= 1.46, 95% CI:1.07, 1.98; p-trend=0.04) with no differences by race.

**Conclusions:** Select urinary phthalate metabolites may be differentially associated with MetS when sex and race are considered. Assessing such associations provides insight into racial disparities, such that more targeted interventions can be developed.

### Oral health service use among U.S. adults aged 18 to 64 years by disability status and state Medicaid expansion status



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**Purpose:** Given operation of Health Insurance Marketplaces and Medicaid expansion following enactment of the Patient Protection and Affordable Care Act, adults may have increased access to dental benefits through health insurance plans that include dental benefits or stand-alone dental plans. We estimated the prevalence of oral health service use among adults by disability status and state Medicaid expansion status.

**Methods:** We used the 2016 Behavioral Risk Factor Surveillance System to assess prevalence of oral health service use by disability status (hearing, vision, cognition, mobility, self-care, or independent living) and state Medicaid expansion status (n = 271,256). We used weighted, log-binomial regression to estimate prevalence ratios (PR) and 95% confidence intervals (CI) while adjusting for socioeconomic and health-related characteristics.

**Results:** The age-adjusted prevalence of a dental visit was lowest among adults with disabilities residing in nonexpansion states (49.3%) and highest among adults without disabilities residing in Medicaid expansion states (70.7%). After full adjustment, compared to adults without disabilities in nonexpansion states, oral health service use was more prevalent among adults without disabilities in expansion states (PR 1.04, 95% CI: 1.03–1.05) and less prevalent among adults with disabilities in nonexpansion states (PR 0.87, 95% CI: 0.85–0.90). Moreover, adults with disabilities residing in Medicaid expansion states were more likely to report a dental visit compared to adults with disabilities residing in nonexpansion states (PR 1.13, 95% CI: 1.10–1.16).

**Conclusion:** Disparities in oral health service use exist for adults with disabilities compared to those without disabilities, and are larger for adults in non-expansion states.

### Trends in utilization of metabolic and bariatric surgery procedures by race-ethnicity: A state-wide analysis



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**Purpose:** Trends in metabolic and bariatric surgery (MBS) procedure utilization have changed over the last two decades in the United States. This analysis examined patterns of MBS utilization by procedure type and race-ethnicity in Florida.

**Methods:** Secondary analysis of 2006 - 2017 Florida hospital inpatient records collected via the Agency for Health Care Administration (AHCA) data was performed. Using the International Classification of Diseases 9th or 10th edition codes, MBS recipients  $\geq 16$  years old of 4 groups (non-Hispanic White [NHW], non-Hispanic Black [NHB], Hispanic, and Other) who had (1) Sleeve Gastrectomy (SG), (2) Laparoscopic Roux-en-Y Gastric Bypass (RYGB), or (3) Laparoscopic Adjustable Gastric Banding (LAGB) were included.

**Results:** A total of 87,193 records were included in the analytical sample. In 2006 (n=4,220), 66.4%, 24.8%, and 8.8% were RYGB, LAGB, and SG recipients, respectively. In 2017 (n=11,340), 78.5%, 21.1%, and 0.3% were SG, RYGB, and LAGB recipients, respectively. RYGB was the most common procedure (range: 48.4-66.4%) from 2006 to 2012 (n=5,941). Since 2013 (n=6,597), the most common procedure was SG (range: 59.0-78.5%). While 24.8% received LAGB in 2006, they only represented 0.3% of procedures in 2017. Regardless of the procedure type, NHWs received the highest proportion of MBS in all years. In general, more NHBs received LAGB compared to Hispanics. Conversely, more Hispanics received RYGB than NHBs.

**Conclusions:** Etiological investigation of the secular trend in MBS procedure by race-ethnic groups warrants further analysis, particularly given that ethnic minority groups are disproportionately affected by severe obesity-related comorbidities versus NHWs.

**Conflict of Interest:** None.

### Cardiovascular disease, risk factor profile and self-reported health in Arizona



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**Purpose:** Despite decline in cardiovascular mortality trend in the United States, cardiovascular disease still accounts for nearly 40 percent of the leading causes of death in Arizona. This study aimed to determine the cardiovascular profile and self-reported health status of adults aged 18 years and older in Arizona.

**Methods:** A cross-sectional secondary data analysis of 5665 study participants from the Arizona Behavioral Risk Factors Surveillance System was done. This was a state-wide telephone survey of randomly selected adults sorted based on area codes. Input variables were cardiovascular profile and sociodemographic characteristics, and the outcome variable was self-reported health. The  $\chi^2$  test was used to find an association between the cardiovascular profile and self-reported health. A binary logistic regression model was used to explain the relationship between population characteristics and self-reported cardiovascular events.

**Results:** Prevalence of cardiovascular disease was 53.3%: hypertension (38.8%), myocardial infarction (9.7%), and stroke (4.8%). Male and female prevalence of diabetes, tobacco use was (16.0%, 14.5%) and (2.2%, 1.4%), respectively. Overall poor self-reported health was 49.0%. Hypertension was significantly associated with poor self-reported health [1.67 (1.5, 1.8)]. Education [0.7 (0.49; 0.99)]; never married [1.25 (1.03; 1.26)]; diabetes [0.85 (0.72; 0.98)]; male sex [1.13 (1.01; 1.26)] were significant predictors of cardiovascular health.

**Conclusion:** Hypertension is a major contributor to cardiovascular disease burden in Arizona. There is a slight gender disparity in the prevalence of cardiovascular disease/risk factors. The relationship between cardiovascular disease and self-reported health should be further explored in measuring cardiovascular disease related morbidity and quality of life.

## Recurrent Pericarditis Epidemiology in the United States



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**Purpose:** Recurrent pericarditis [RP] occurs when a second episode of pericarditis is experienced  $\geq 4$ -6 weeks following the initial episode. Published incidence rates are highly variable, and RP prevalence data are limited. To better understand disease burden, this study evaluated RP epidemiology in the US.

**Methods:** Retrospective claims analysis of the PharMetrics Plus database (Jan\_2013 to Mar\_2018). Patients (inpatient/ER/outpatient) with  $\geq 1$  ICD-9/10 code for pericarditis were included; newly diagnosed cohort [ND]: no claims in 12 months preceding and  $\geq 36$  months continuous enrollment post-diagnosis; recurrence: defined as 2 events separated by  $\geq 28$  days. Epidemiology was calculated extrapolating age-adjusted incidence to the US Census. Complicated pericarditis [CompP] was defined as  $\geq 2$  recurrences or  $< 2$  recurrences with a serious complication (e.g. cardiac tamponade or constrictive pericarditis).

**Results:** Of 2,248 ND patients, 27% experienced recurrence (mean age 47.9 years, 52% female); 15% developed CompP including 14% with  $\geq 2$  recurrences and  $< 1\%$  with serious complications.

Recurrence persisted 2 years in 41% of patients and  $\geq 3$  years in 22%. US RP population is estimated at 36,500 with 19,500 incident cases annually equating to 6.0/100,000 incidence and 10.9/100,000 prevalence. Of the prevalent population, ~17,000 (47%) have CompP.

**Conclusions:** Recurrent pericarditis affected one-fifth of patients for  $\geq 3$  years. First and second recurrence rates coincided with reports from prior studies (15-30% and 50%, respectively). Patients developed CompP 2-3 times more frequently than previously reported suggesting a higher disease burden. Limitations inherent to database studies apply (e.g., coding accuracy, etc.).

There is a need for approved therapies to reduce recurrence risk.

**Funding:** This study was funded by Kiniksa Pharmaceuticals Ltd.

## Hepatitis B vaccine and risk of acute myocardial infarction among patients with diabetes



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**Purpose:** HepB-CpG (HEPLISAV-B, Dynavax) is a new licensed adjuvanted hepatitis B vaccine. In a prelicensure trial, the rate of acute myocardial infarction (AMI) was higher (but not statistically significant) in HepB-CpG recipients compared to recipients of another hepatitis B vaccine (ENGERIX-B, GlaxoSmithKline). Hepatitis B vaccination is recommended for patients with diabetes, who are also at higher risk of AMI. To determine if there was an association between AMI rates and ENGERIX-B in individuals with diabetes, we conducted nested case-control study at Kaiser Permanente Southern California.

**Methods:** The study was nested in a cohort of individuals with diabetes ages  $\geq 40$  years. AMI cases from 2012 to 2017 identified by primary discharge diagnosis were matched to controls without prior AMI by year, race, sex, birthdate, smoking, cholesterol, systolic blood pressure, and health plan enrollment length. Adjusted odds ratios (aOR) for ENGERIX-B vaccination were compared for cases and controls using conditional logistic regression adjusted for prior healthcare utilization and diabetes duration.

**Results:** There were 8138 matched pairs, of which 17.4% of AMI cases and 15.0% of controls had received  $\geq 1$  ENGERIX-B dose and 9.1% and 7.6%, respectively, had received  $\geq 3$  doses. The aOR for receipt of  $\geq 1$  dose versus no doses was 1.06 (95% CI: 0.96, 1.18), and the aOR for receipt of  $\geq 3$  doses versus  $< 3$  doses was 1.08 (95% CI: 0.94, 1.23).

**Conclusions:** There was no significant difference in receipt of ENGERIX-B between AMI cases and controls. More study will be required to determine whether this is true for HEPLISAV-B.

## Environmental Health

### Air pollution exposure monitoring among pregnant women with and without asthma



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**Purpose:** To characterize exposure to fine particulates (PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), and ambient temperature for pregnant women with and without asthma.

**Methods:** Women (n=40) from the B-WELL-Mom Study (Breathe – Well-being, Environment, Lifestyle, and Lung Function, 2015-2018) were enrolled during pregnancy and assessed for 2-4 days. Daily PM<sub>2.5</sub>, NO<sub>2</sub>, and ambient temperature were estimated using personal air monitors and Environmental Protection Agency's stationary monitors based on GPS-tracking of their local mobility and home address. Categorical variables were compared with Fisher's exact tests and time-varying continuous data were analyzed with mixed linear models to account for within-subject variation.

**Results:** At baseline, 9 women (22.5%) had no asthma, 19 (47.5%) had well-controlled, and 12 (30.0%) had poorly controlled asthma. Mean personal-monitor PM<sub>2.5</sub> exposure was higher (18.0  $\mu\text{g}/\text{m}^3$ ) compared to GPS-based or home-based estimation (9.2  $\mu\text{g}/\text{m}^3$ ) (p=0.06). Poorly controlled (9.2  $\mu\text{g}/\text{m}^3$ ) and no asthma participants (10.5  $\mu\text{g}/\text{m}^3$ ) had higher GPS-based PM<sub>2.5</sub> exposure compared to well-controlled participants (8.3  $\mu\text{g}/\text{m}^3$ ) (p=0.08). Personal-monitor NO<sub>2</sub> exposures were lower (4.9 ppb) compared to the other methods (15.3 and 16.1 ppb) (p<0.01). Average personal-monitor temperature was 24.3°C, but 11°C by the other methods (p<0.01). Most participants (73%) wore their air monitor  $\leq 50\%$  of the times with no significant difference in compliance by asthma status. Low compliance was associated with higher rates of wheezing, exercise activities, smoking, and being around smokers; and lower rates of missed work days.

**Conclusions:** Exposure to common pollutants differ by assessment method and asthma status. Personal monitors may be more accurate but non-compliance merits attention.

### Air pollution, poverty, and cardiometabolic dysfunction among United States adolescents



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**Purpose:** Double jeopardy of residence in high poverty areas and exposure to pollutants may render pathogens more virulent with worse health outcomes. Double jeopardy is an unexamined determinant of cardiometabolic health among adolescents. We hypothesized the association between air pollution and cardiometabolic dysfunction would be strongest in high poverty areas.

**Methods:** Data were from 10,651 adolescents aged 12-19 in the National Health and Nutrition Examination Survey (1999-2012), linked with area-level poverty (percent population living in poverty, high poverty  $\geq 15.6\%$ ), and ambient ( $\mu\text{g}/\text{m}^3$ ) volatile organic compounds (VOCs): benzene, chloroform, acrolein, and butadiene. VOCs were summed and categorized into quartiles (quartile 1 = low VOCs). Cardiometabolic dysfunction was parameterized by summing z-scores of six cardiometabolic biomarkers, grouped into quintiles. Hierarchical ordinal models estimated association between VOCs and cardiometabolic dysfunction, and VOC\*poverty interaction terms estimated association between VOCs and cardiometabolic dysfunction in high poverty areas.

**Results:** Overall, compared to VOC quartile 1, residence in third (OR: 1.17 95% CI: 1.02, 1.34) and fourth (OR: 1.22 95% CI: 1.04, 1.42) VOC quartiles had elevated odds of cardiometabolic dysfunction. Interaction terms suggest the association between exposure to highest levels of VOCs and cardiometabolic dysfunction is stronger in high poverty areas (VOC quartile 4 OR: 1.33 95% CI: 1.06, 1.68) than in low poverty areas (VOC quartile 4 OR: 1.04 95% CI: 0.83, 1.29).



**Conclusion:** Among a nationally representative sample of U.S. adolescents, we found a dose-response association between VOC and cardiometabolic dysfunction. This association was driven by high poverty areas, no association was observed in low poverty areas.

## Infectious Disease

### Association of neighborhood characteristics with pertussis diagnosis in a retrospective cohort of children born in Philadelphia, Pennsylvania



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**Purpose:** For decades, Hispanic/Latino infants have experienced higher rates of pertussis than infants from other racial/ethnic groups, yet evidence to explain this disparity is inconclusive. Sociodemographic disparities in pertussis vaccination coverage and delay have also been recognized. Understanding contextual risk factors may provide insights into the mechanisms underlying observed disparities. We investigate neighborhood-level, individual-level, and cross-level effects on disease risk to optimize immunization program outreach. We hypothesize that neighborhood-level characteristics will be associated with pertussis diagnosis.

**Methods:** A retrospective cohort study of children born January 1, 2010–December 31, 2017 was conducted to evaluate the association between neighborhood disadvantage score and percent Hispanic/Latino residents, and the dependent variable of pertussis diagnosis. We utilized generalized estimating equations accounting for correlated neighborhood-level errors to estimate the adjusted odds of pertussis. Covariates included child, maternal, and neighborhood characteristics. We evaluated pre-specified neighborhood- by individual-level interactions.

**Results:** Among 174,986 children, there were 235 pertussis cases. We detected an association between neighborhood disadvantage and pertussis in bivariable models (OR=1.15; 95% CI 1.01–1.30), but we did not observe an association in multivariable models adjusting for child and maternal sociodemographic characteristics and child vaccination status (aOR=0.83; 95% CI 0.59–1.17). We did not detect an association between neighborhood-level percent Hispanic/Latino residents and pertussis (OR=1.00; 95% CI 0.99–1.01), nor did we observe cross-level interactions.

**Conclusion:** Child and maternal characteristics were the primary drivers of pertussis in our cohort, suggesting neighborhood characteristics are not predictive of disease. Future work should continue to investigate the Hispanic/Latino disparity to inform immunization program planning.

### Real world incidence estimation methodologies used for surveillance of HIV in repeat blood donors



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**Purpose:** Retrospective incidence estimates (IR) for transfusion-transmitted infections (TTI) in repeat blood donors is a standard method to assess safety of the blood supply and often influences policy decisions. These rates should be comparable across jurisdictions, but epidemiologists within the blood community have adapted traditional IR calculation methods in multiple ways to address challenges of measuring IR where there is no control over the time of donor presentations. Caution must be taken when comparing study results if different IR methods were used. Here we evaluate HIV IR using two common methods.

**Methods:** In the “Conventional” method (CM), a donor contributes to person-time if at least two blood donations exist within a specified estimation interval (EI). With the “Extended Lookback” method (ELM), the history of each repeat donor is traced back the same length of time as the EI to look for prior negative donations; their previous negative can occur before the EI.

**Results:** While ELM captures more incident donors than CM (n=398 versus n=225) during this 12-year study, we see no appreciable differences in IR between the two Methods.

Both show a significant decreasing trend in HIV IR (CM:  $R^2=0.85$ ,  $p=0.01$ ; ELM:  $R^2=0.74$ ,  $p=0.03$ ).

**Conclusions:** Estimating TTI incidence in blood donor populations is uniquely challenging. Though the estimates from these two methods were approximately equal, there are other methods in use. When choosing a preferred method, it is important to apply various methods to real data to identify possible bias that may influence real-world policy.

### The effect of neighborhood concentrated disadvantage on the association between hospital-associated infections and survival in people living with HIV



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**Purpose:** Louisiana has an overwhelmingly large number of neighborhoods with high concentrated disadvantage (CDI), which may be affecting the number of hospital-associated infections (HAIs) and the mortality among people living with HIV (PLWH). This study aimed to determine the association between HAIs and mortality in PLWH while considering the potential confounding effects of neighborhood CDI.

**Methods:** This retrospective cohort study used the 7,207 records of the PLWH patients in the Louisiana Hospital Inpatient Discharge Database (LAHIDD) from 2011–2015. The main exposure was diagnosis with a HAI during their hospital stay, the main confounder of interest was neighborhood CDI and the main outcome was vital status by the end of the study period. The data was analyzed using generalized linear mixed models with a binary distribution and a random intercept, Cox proportional hazards mixed models, and geographically weighted least squares regressions.

**Results:** Results of the any-cause of death model showed that the factor most strongly associated with death was having a comorbidity (OR=4.51; CI:3.14, 6.49). The cause of death model predicting HIV-associated mortality indicated that CDI displays a stronger and significant effect on HIV-associated mortality (OR=1.18; CI:1.05, 1.33). The spatial mapping indicated that a greater number of deaths were occurring in census tracts with higher levels of disadvantage. The spatial regressions showed that an increase in HAIs results in a significant increase in deaths in any given census tract (0.83; CI:0.45, 1.20).

**Conclusions:** Although HAIs are not statistically significant in the mixed models, higher CDI is significantly associated with HIV-associated mortality.

### Patterns of consistent retention in HIV care and viral suppression among cis-gender women living with HIV in Florida, 2014–2017: a latent class analysis



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**Purpose:** The objective was to identify patterns of consistent retention in HIV care and viral suppression among women newly diagnosed with HIV and factors associated with these patterns.

**Methods:** Surveillance data from the Florida Department of Health’s electronic HIV/AIDS Reporting System on women diagnosed with HIV in 2014 and living in Florida through 2017, were retrospectively analyzed. Latent class analysis was used to classify women by patterns of change in retention in HIV care (greater than or equal to 2 HIV care visits at least 3 months apart) and viral suppression (less than or equal to 200 copies/ml) over three years. Multinomial regression was used to examine factors associated with class memberships.

**Results:** Data from 809 women were analyzed. Four classes were selected based on model fit parameters: (Class 1) consistently retained and suppressed (greater than 90% probability of being retained and suppressed), (Class 2) not consistently retained or suppressed (less than 20% probability of

being retained and suppressed), (Class 3) increasingly retained and suppressed, and (Class 4) decreasingly retained and suppressed. The proportion of women in each class was 54%, 18%, 15%, and 13%, respectively. Higher odds of belonging to Class 3 was observed among ages 13–24 (adjusted Odds Ratio–1.89; 95% Confidence Interval–1.07–3.30), history of injection drug use (4.06; 1.95–8.41), US-born (1.62; 1.10–2.38), having an AIDS diagnosis (1.74; 1.13–2.68), and non-linkage to care 3-months post-diagnosis (3.46; 1.96–6.09), compared to Class 1.

**Conclusion:** These patterns should be considered in tailoring interventions to improve retention in HIV care outcomes.

### Syphilis surveillance in Fulton County, GA 2013–2015: selective participation in case interviews and implications for control efforts



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**Purpose:** Fulton County, Georgia ranks third nationally for syphilis rates. Disease Intervention Specialists interview case-patients for risk factor and partner information, and have noted that interviewees differ from non-interviewees, with implications for data interpretation and syphilis control. We describe factors associated with interview completion.

**Methods:** Using surveillance data, we identified primary and secondary syphilis cases in Fulton County with a first diagnosis in 2013–2015. The distribution of demographic (age, sex, race) and clinical (syphilis, gonorrhea, chlamydia, and HIV status) characteristics were compared between those interviewed and not interviewed using chi-squared tests for proportions and t-tests for means.

**Results:** There were 1,067 first syphilis diagnoses. Overall, the mean age was 32 years (SD=9.8), 94.5% were male, 73.9% were black; 4.9% and 3.8%, respectively, had recent gonorrhea and chlamydia infections, 55.1% were HIV-positive, and 12.2% had a repeat syphilis infection within 2 years. Compared to non-interviewees (n=369), interviewees (n=698) were younger (mean age: 31 vs. 34 years,  $p<0.001$ ), and more likely to be female (7.0% vs. 2.7%,  $p=0.003$ ) and black (78.7% vs. 64.8%,  $p<0.001$ ). Interviewees were less likely to have a recent chlamydia diagnosis (2.7% vs. 5.7%,  $p=0.015$ ). Proportions with gonorrhea (5.4% vs. 3.8%,  $p=0.234$ ), repeat syphilis infection (11.3% vs. 13.8%,  $p=0.235$  all men), and HIV (55.0% vs. 55.3%,  $p=0.932$ ) were similar.

**Conclusions:** Interviewees differed notably from non-interviewees. While men comprised the majority of cases—including all repeat infections—they were less likely to interview. We encourage other health departments to conduct similar assessments to improve interview participation by high-risk patients.

### Prevalence of *Escherichia coli*, *Salmonella*, and *Campylobacter spp.* on retail chicken, turkey, pork, and beef in the United States: a literature review



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**Purpose:** *Escherichia coli* (*E. coli*), *Salmonella*, and *Campylobacter* species are common bacteria that contaminate animal meats and cause human food-borne illnesses in the United States. This literature review summarizes and compares studies and federal reports to provide an overview of existing research of bacterial prevalence on retail meat in the U.S.

**Methods:** We selected articles on PubMed, MEDLINE, Elsevier, Ovid, Cochrane Library, and Google Scholar that reported the prevalence of *E. coli*, *Salmonella*, and *Campylobacter spp.* on fresh retail chicken, turkey, pork, and beef in the U.S. We compared prevalence estimates to those published by the National Antibiotic Resistance Monitoring System (NARMS).

**Results:** Twenty-six articles published between 1983–2018 were included in this study. On poultry meat, the pooled *E. coli* prevalence was 26.7% (95% CI: 25.5–27.8%) and *Campylobacter* was 38.9% (95% CI: 35.9–41.9%). *Campylobacter* prevalence was lower for pork (0.37%; 95% CI: 0.23–0.51%) and beef

(1.3%; 95% CI: 0.05–0.20%). *Salmonella* prevalence was low on beef (0.69%; 95% CI: 0.39–0.98%) and pork (4.7%; 95% CI: 3.14–6.3%), which was roughly consistent with the NARMS range of 0.5–2.1%. Studies differed in collection and laboratory methods, such as utilizing culture and/or amplification techniques.

**Conclusion:** This is the first extensive comparison of studies that delineates bacterial prevalence on retail meat across the U.S. These findings build upon growing public health concerns regarding food safety, environmental practices, and food animal ethics that may help in developing future policy interventions. Furthermore, our paper advances the field by facilitating access to information comparing various articles for future studies.

### National estimates of antibiotic availability for treatment of gonorrhea and primary and secondary syphilis in US physician offices



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**Purpose:** Reported cases of gonorrhea and primary and secondary syphilis are on the rise. Recommended treatments for uncomplicated gonorrhea and primary and secondary syphilis include two injectable medications, Ceftriaxone 250 mg IM, and Penicillin G benzathine (Bicillin L-A<sup>®</sup>) 2.4 million units IM, respectively which should be readily accessible for point of care treatment.

**Methods:** The 2016 National Ambulatory Medical Care Survey (NAMCS) was used to identify physicians who regularly evaluate and treat patients for sexually transmitted infections (STI) in their practice, and the on-site availability of Ceftriaxone and “bicillin” in their offices. Percentage estimates of drug availability were reported and multiple logistic regression models were used to determine office characteristics that were predictive of no availability of these medications.

**Results:** An estimated 45.2% (149,483; 95% CI 138,850 – 160,116) of the weighted office-based physicians indicated that they evaluate patients for STIs in their office. Of those, 77.9%, (116,479; 95% CI 105,360–127,598), and 56.1% (83,827; 95% CI 73,709 – 93,945) indicated that they do not have bicillin and Ceftriaxone on site, respectively. Physicians were more likely to report lacking on-site access to both Ceftriaxone (2.03 OR; 95% CI 1.15 – 3.57) and bicillin (3.20 OR; 95% CI 1.63–6.29) if the office was not designated as a Patient Centered Medical Home (PCMH) compared to physicians in offices that were designated as a PCMH.

**Conclusion:** These nationally-representative analyses demonstrate that the majority of physicians who provide STI services do not have on-site access to medications recommended for the treatment of gonorrhea and syphilis.

### Injury and Substance Use

#### Rheumatoid arthritis, osteoporosis screening, and fracture



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**Purpose:** Rheumatoid arthritis (RA) is a systemic autoimmune disease affecting the joints. RA and its treatment with steroids can induce bone loss, making screening for osteoporosis important. Within a cohort of patients with RA, we evaluated predictors associated with osteoporosis screening by dual-energy x-ray absorptiometry, described the distribution of osteopenia/osteoporosis in the screened population, and assessed predictors of fracture.

**Methods:** This retrospective cohort study conducted within Kaiser Permanente Southern California included enrollees aged  $\geq 50$  years with  $\geq 1$  RA diagnosis code during 2008–2017. Predictors obtained from the electronic health record included age at cohort entry, sex, race/ethnicity, body mass index (BMI), height, weight, screening results, fracture outcomes, and use of RA medications and steroids. Cox proportional hazards models were used to estimate the associations between predictors and screening, osteopenia/osteoporosis diagnoses, and fracture.

**Results:** Of 26,921 patients identified with RA, 16,209 patients (60.2%) had their first DXA scan after cohort entry. Asians were more likely to have been screened (HR 1.2; CI: 1.1–1.3) and diagnosed with osteoporosis (HR 1.6; 95%



CI: 1.3–1.9), but less likely to have a fracture (HR 0.5; CI: 0.4–0.7). Increased age was associated with increased screening, risk of osteoporosis, and risk of fracture. Higher BMI was associated with decreased likelihood of screening, osteoporosis diagnosis, and fracture.

**Conclusions:** Characteristics of RA patients screened for osteoporosis reflected those of the general population. Given the increased risk of bone loss in RA, this represents a missed opportunity for early detection of osteoporotic changes and the initiation of preventative treatment.

### Occurrence of fall injury in relation to degenerative spinal conditions: a case-control study of adults from Southern California



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**Purpose:** Back pain is a risk factor for accidental falls among older adults. Degenerative spinal conditions can cause back pain. We hypothesized that diagnosed degenerative spinal conditions and occurrence of injurious falls would be positively associated.

**Methods:** We conducted a case-control study among 46,666 pairs of Kaiser Permanente Southern California (KPSC) members ages 50–85 years who were continuously enrolled at least one year in the period 1/1/2009 – 9/30/2015. Cases were members who received a first diagnosis of a fall-related injury within the study period. One control was selected at random from members who matched the case on age, gender, and KPSC medical center on the fall injury (index) date. A validated coding algorithm was used to classify the presence or absence of a spinal diagnosis among cases and controls in the year prior to index date. Multiple conditional logistic regression was used to estimate adjusted odds ratios (aOR) and 95% confidence intervals (CI) controlling for race/ethnicity, depression, psychotropic medication use, and other factors. Stratified analyses were used to estimate gender-specific aOR.

**Results:** In the year before index date, 29% of cases and 21% of controls had a diagnosed spinal condition. Axial back pain, disc herniation, and spinal stenosis were the most common diagnoses. There was a weak, positive association of spinal diagnosis and fall injury among women (aOR = 1.14, 95% CI: 1.09, 1.18), among men (aOR = 1.13, 95% CI: 1.06, 1.20), and overall (aOR = 1.13, 95% CI: 1.10, 1.17).

**Conclusions:** Injurious fall occurrence is not strongly associated with degenerative spinal conditions.

### The impact of opioid treatment on co-occurring substance use: a systematic review



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**Background:** The number of opioid-related deaths involving combined substance use is on the rise, yet few researchers report how opioid-treatment is related to co-occurring substance use. This review aims to synthesize studies reporting changes in co-occurring substance use following opioid-treatment in the United States.

**Methods:** We searched MEDLINE/PubMed, EMBASE, PsychINFO, and Cumulative Index to Nursing and Allied Health Literature to identify eligible publications through November 2018. A standardized protocol was used to extract data on the study design, treatment, and co-occurring substance use. Article quality was assessed using the Quality in Prognosis Studies tool.

**Results:** Of the 3,219 titles screened, 614 abstracts and 231 full-text original publications were assessed, resulting in 24 eligible articles. Changes in co-occurring substance use post-treatment were most often reported for cocaine, alcohol, cannabis, and sedatives. Nearly half reported changes in “polydrug” or “polysubstance” use, yet inconsistent definitions and metrics used to measure poly-use made these results difficult to compare. Of nine opioid-treatments reporting a statistically significant decrease in co-occurring substance use, eight and three

reported decreased cocaine and alcohol use, respectively. Studies reporting these decreases in co-occurring substance use most often described treatment using methadone or Levacetylmethadol, although one reported decreased co-occurring use of cocaine following buprenorphine treatment.

**Conclusion:** Understanding the relationship between opioid-treatment and co-occurring substance use is crucial for developing opioid-interventions that can be tailored to individuals who misuse multiple substances. Future researchers should develop a standardized definition for poly-use and consensus around measurement metrics for assessing co-occurring substance use.

### Mental Health

#### Allostatic load, unhealthy behaviors, and depressive symptoms in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)



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**Purpose:** The study purpose was to determine whether unhealthy behaviors moderated the relationship between allostatic load (AL) and future significant depressive symptoms (SDS) among Hispanic Community Health Study/Study of Latinos participants. We hypothesized that Hispanics/Latinos who engage in more unhealthy behaviors will exhibit a weaker relationship between AL and SDS.

**Methods:** Longitudinal data (2008–2011 and 2013–2018) from 11,187 participants were analyzed. The exposure of interest was an index of twelve established biomarkers (categorized using clinically-relevant cut points) of AL at Visit 1. The main outcome was significant ( $\geq 10$  out of 30) depressive symptoms at Visit 2. An index of cigarette smoking, excessive/binge drinking, sedentary behavior, and poor diet quality at Visit 1 was an effect modifier. Multivariable logistic regression; adjusted for age, gender, education, birthplace, and Visit 1 SDS; was used to model AL, the unhealthy behavior index (UBI, range: 0–4), and their interaction on Visit 2 SDS, stratified by national background.

**Results:** Puerto Ricans engaged in more unhealthy behaviors and had higher Visit 1 SDS while Mexicans engaged in fewer unhealthy behaviors (11.1% and 1.7%  $\geq 3$  behaviors) and had lower Visit 1 SDS (38.2% and 22.7%). Puerto Rican participants who had greater AL and UBI had significantly lower odds of future SDS (AL and UBI=1: OR=0.90, 95% CI=0.80, 0.99).

**Conclusions:** By linking the cumulative physiologic sequelae of stress and behavior to SDS, our findings do not support previous research among Latinos overall or Mexicans specifically using self-reported chronic stress. Instead, our findings show that these relationships differ by national background.

#### Sex disparities in adverse childhood experiences and cognition among young adults: results from a nationally representative sample



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**Purpose:** One in seven children has experienced abuse and/or neglect in the US. These adverse childhood experiences (ACEs) reportedly increase cancer, HIV/AIDS, and depression risk. Sex differences exist in ACEs and cognitive function. However, research examining the association between ACEs and cognition is limited. This study examined the association between ACEs and cognition; and assessed sex differences.

**Methods:** Data were obtained from Waves III (18–28) and IV (24–34) of the National Longitudinal Study of Adolescent to Adult Health from 2,511 men and 3,144 women. Type and number of ACEs were based on reports at Wave III of sexual, physical abuse or neglect before 6<sup>th</sup> Grade. Cognition was operationalized by summing verbal and numerical recall scores (Wave IV), which measure memory – a key cognition process. Multiple

linear regression, adjusting for age and race/ethnicity and accounting for multistage sampling, was used to determine the association between ACEs and cognition. The minimally important differences (MIDs) were calculated.

**Results:** Compared to respondents who reported no ACEs, respondents who reported neglect and three ACEs scored two points lower ( $\beta$ : -1.96; 95% CI: -3.87, -0.04) and three points lower ( $\beta$ : -3.32; 95% CI: -6.55, -0.08) in cognition, respectively. This pattern was seen among men who reported neglect ( $\beta$ : -2.60; 95% CI: -5.18, -0.02). MIDs were 1.75 overall and 1.68 for men.

**Conclusion:** The MIDs suggested clinical significance for the relationship between neglect, its syndemic effect with abuse, and cognition. Future research should assess how sex vulnerabilities may arise to develop gender- and ACE-specific programs for families.

### Relationship between substance use disorders with encounters and the criminal justice system among persons diagnosed with schizophrenia or schizoaffective disorders



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**Purpose:** To examine the relationship between substance use disorder (SUD) and criminal justice system (CJS) encounters among individuals receiving care for schizophrenia or schizoaffective disorders at a community care facility.

**Methods:** A retrospective cohort study was conducted using clinical data from a community-based mental health service provider and CJS encounter data from a county jail in Ohio from January 31, 2011 to July 18, 2018. Time-to-event analyses were performed to compare the incidence of CJS encounters between individuals with and without SUD.

**Results:** Of the 972 individuals with a mean (standard deviation) age of 42.1 (13.4) years, 596 (61.5%) were male, 520 (53.5 %) were white, and 376 (38.7%) had a SUD diagnosis. Individuals with a SUD diagnosis were 2.64 times as likely (Hazard Ratio (HR): 2.64; 95% Confidence Interval (95% CI): 1.58 - 4.40) to have an encounter with the CJS than individuals without SUD after adjusting for gender, race, age, other comorbidities, and a history of prior arrest. Individuals who had alcohol dependency alone were 2.47 times (HR: 2.47; 95% CI: 1.69 - 3.60) and individuals with multiple substance use disorder diagnosis were 2.16 times (HR: 2.16; 95% CI: 1.57 - 2.98) as likely to have a CJS encounter than those without any SUD diagnosis.

**Conclusions:** The findings of SUD elevating the risk of CJS encounters among individuals with schizophrenia or schizoaffective spectrum disorders points to the need for treatment of substance use disorder among these individuals to decrease the individual and societal cost of a CJS encounter.

### Examining the effects of Hurricane Sandy among World Trade Center Health Registry (WTCRH) enrollees using a mixed methods approach



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**Purpose:** Hurricane Sandy (Sandy) struck the east coast of the United States on October 29, 2012. Previous studies have shown an elevated risk of Sandy-related post-traumatic stress disorder (PTSD) among those with high levels of Sandy exposures and a prior history of 9/11-related PTSD. The purpose of this study is to further explore the psychological sequelae of persons who were exposed to both Sandy and the 9/11 terrorist attacks.

**Methods:** In 2013, WTCRH enrollees completed a survey about their experiences during and after Sandy. Sandy-specific PTSD was measured using an event-specific PTSD checklist. The free-response section of the survey was analyzed qualitatively using a thematic analysis. Multivariable logistic regression was used to examine the association between Sandy-related PTSD and feelings of optimism about the future.

**Results:** Among the 4,558 participants (51.4%) who completed the Sandy survey, 8.1% (n=335) had Sandy-related PTSD and 15.9% (n=690) felt 'not very/not at all optimistic' about their future. Those who reported feeling 'not very/not at all optimistic' were 6.6 times more likely to have Sandy-related PTSD compared to those who felt very/somewhat optimistic (95% CI: 5.2-8.3). Seven themes were identified in the qualitative analysis: patriotism/gratitude, helping others/self, disruption of household function, financial stress, negative emotional response, lack of information, and being unaffected. **Conclusion:** The findings from this mixed method analysis indicate a need to combine financial and mental health services and to better understand factors influencing positive outcomes post-disaster.

## Nutrition

### Exploring multidimensional attributes of high-quality dietary patterns and their association with mortality to inform the Dietary Guidelines for Americans



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**Purpose:** The Dietary Guidelines for Americans (DGAs) outline different ways to consume a healthy diet. While high-quality diet characterized by the Healthy Eating Index (HEI) is associated with lower mortality, what is not known are specific characteristics of high-quality dietary patterns and whether these vary among those with a high HEI-2015.

**Methods:** Diet data from the 1995-1996 NIH-AARP Diet and Health Study men were categorized into HEI-2015 quintiles (q) and a random sample drawn from q1 and q5. A cluster analysis was conducted in HEI-2015-q1 (n=48,243), solutions from 3 to 12 considered, and the 4-cluster solution selected. Mortality was ascertained through 2011 and multivariate-adjusted hazard ratios (HR) from Cox proportional hazards models estimated for clusters relative to HEI-2015-q1 (n=48,242).

**Results:** Clusters varied by degree of alignment with guidelines. Clusters 1, 2 and 4 exceeded fruit and vegetables recommendations and exhibited lower than recommended intake of added sugars and saturated fats but Cluster 2 only exceeded total and whole fruits. Additional cluster characteristics included: Cluster 1 - higher whole grains; Cluster 2 higher dairy; Cluster 3 exceeded all protein goals; Cluster 4 exceeded fruit and vegetable goals. Significant associations were observed for clusters 1-4 with all-cause mortality (HR ranges 0.77-0.84, all p-values <0.05), cancer mortality (HR 0.74-0.82, p-values < 0.05) and clusters 1-3 with CVD mortality (HR ranges 0.74-0.90, p-values <0.05).

**Conclusions:** These findings highlight qualitative and quantitative differences in high-quality diet and associations with decreased mortality. Replication in other populations will be most informative for the development of future DGAs.

### Evaluation of total fat and fatty acids intakes in the Korean population: using data from the 2016–2017 Korea National Health and Nutrition Examination Surveys



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**Purpose:** This study evaluated dietary intakes of total fat and fatty acids among the Korean population.

**Methods:** This cross-sectional study used the 2016–2017 Korea National Health and Nutrition Examination Survey data. A total of 13,803 subjects who were aged  $\geq 1$ y and had dietary data were selected. Data on energy and nutrient intakes were obtained by a 24-h recall method. Total fat and fatty acids intakes were evaluated based on the Acceptable Macronutrient Distribution Ranges (AMDR) of 2015 Dietary Reference Intakes for Koreans by sex and age groups. All statistical analyses accounted for the complex sampling design effect and appropriate sampling weights.

**Results:** Mean intakes of energy and total fat were  $1921 \pm 11.4$  kcal and  $46.8 \pm 0.4$  g, respectively, and about 22% of energy was obtained from fat

in this study population (22.2% in male and 20.9% in female). Mean percentages of energy from saturated, monounsaturated, and polyunsaturated fatty acids were 6.8%, 6.9%, and 5.1%, respectively. About 27% of adolescents exceeded the AMDR for fat (30% of energy) whereas 4.7% exceeded among older adults. In children and adolescents, about half of the subjects obtained  $\geq 8\%$  of energy from saturated fatty acids. Among adults, proportion of subjects who consumed  $\geq 7\%$  of energy from saturated fatty acids decreased across age groups (50.5% in 19–49y, 25.8% in 50–64y, and 14.8% in  $\geq 65$ y).

**Conclusions:** Our findings suggest current information on total fat and fatty acids intakes in Koreans and can be used to provide dietary guidelines for the improvement of public health.

## Occupational Health

### Objective measures of sleep duration and quality with ankle brachial index in police officers



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**Purpose:** Poor sleep quality and sleep duration have been shown to be associated with subclinical cardiovascular disease (CVD). Ankle brachial index (ABI), a common measure of peripheral artery disease (ABI  $< 1.0$ ), is a strong risk factor for CVD. Our aim was to investigate whether sleep duration and quality are associated with ABI among police officers.

**Methods:** Participants were officers who enrolled in the Buffalo Cardio-Metabolic Occupational Police Stress study (2010–2015). Objective sleep measures were obtained from actigraphy. ABI was calculated as highest systolic blood pressure (SBP) of right ankle divided by highest SBP of right arm. Mean values of ABI were compared across categories of the sleep measures using ANOVA/ANCOVA.

**Results:** Officers ( $n=210$ ; 70% men) ranged in age from 28 to 65 years (mean $\pm$ SD=46.3 $\pm$ 6.7 years). Thirty (14.3%) officers had low ABI ( $< 1.0$ ). Sleep duration was significantly associated with ABI after adjustment for age, sex, physical activity, metabolic syndrome, high sensitivity C-reactive protein, and smoking status:  $< 7$  hours (mean ABI=1.062 $\pm$ 0.010) vs.  $\geq 7$  hours (1.090 $\pm$ 0.010);  $p=0.009$ . Race/ethnicity significantly modified this association (interaction  $p=0.012$ ). Race-stratified analyses showed that the association between sleep duration and ABI was only significant among White/Hispanic officers;  $< 7$  hours (ABI=1.052 $\pm$ 0.012) vs.  $\geq 7$  hours (1.093 $\pm$ 0.011);  $p=0.002$ . Two measures of sleep quality (sleep efficiency and latency to persistent sleep) were not significantly associated with ABI.

**Discussion:** Longer sleep duration (i.e.,  $\geq 7$  hours) was significantly associated with higher (i.e., better) mean ABI among White/Hispanic but not among African American officers. Reasons for the racial differences are unclear.

### Shiftwork and symptoms of anxiety and depression in police officers



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**Purpose:** Shiftwork is a necessity in the police occupation. Shiftwork may be accompanied by circadian rhythm disruption and changes in body functions, including those that influence mental health. This study evaluated the association between shiftwork and symptoms of anxiety and depression in urban police officers.

**Methods:** Cross-sectional data were from the Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) study, 2004–09. Electronic work history records were used to identify the dominant work shift [day (D), afternoon (A), or night (N)]. Symptoms of anxiety and depression were assessed with the Beck Anxiety Inventory (BAI) and the Beck Depression

Inventory (BDI-II). Analysis of covariance was used to examine trends in mean symptom scores across shift. Models were adjusted for age, gender, race/ethnicity, smoking status, alcohol intake, sleep quality, and overtime hours.

**Results:** Among 361 officers (73.1% men), day shift officers had the highest adjusted mean anxiety symptom score (D:7.54 $\pm$ 0.57, A:6.38 $\pm$ 0.72, N:4.84 $\pm$ 0.74;  $p=0.023$ ). Differences in adjusted mean depressive symptom scores across shift were not significant (D:6.99 $\pm$ 0.48, A:5.39 $\pm$ 0.61, N:5.27 $\pm$ 0.64;  $p=0.067$ ). Similar to anxiety symptoms, day shift officers had the highest adjusted mean depressive symptom score.

**Conclusion:** Although higher police-specific work stress has been associated with the afternoon and night shifts in this group of officers, day shift officers had the highest anxiety and depressive symptoms in the current study. Our results may indicate a tendency for officers with anxiety and depressive symptoms to self-select to day shift or departmental assignment to day shift as a more tolerable shift for officers prone to or exhibiting symptoms.

## Pediatrics

### The impact of parental job loss during the great recession on biomarkers in children



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**Purpose:** Evidence is limited on the biological pathways between socio-economic shocks and child health. This study examines associations between parental job loss during a recession and children's biomarkers.

**Methods:** The sample includes 5482 children enrolled in the Generation XXI cohort study, based in Porto, Portugal, with data collected at birth (2005–2006), 4 years (2009–2011), and 7 years (2012–2014). The outcomes were inflammatory, metabolic, cardiovascular, and anthropometric biomarkers measured at 7 years. The exposure variable indicated whether the child was exposed to any parental job loss between birth and 7 years. We analyzed each biomarker outcome individually using ordinary least squares regression, controlling for a range of covariates and stratified by child gender.

**Results:** Among girls, parental job loss was associated with higher LDL cholesterol ( $\beta$ : 0.038mg/dL, 95% CI: 0.00,0.07), insulin resistance index ( $\beta$ : 0.122, 95% CI: 0.02,0.23), systolic blood pressure ( $\beta$ : 0.022mmHg, 95% CI: 0.01,0.03), diastolic blood pressure ( $\beta$ : 0.018mmHg, 95% CI: 0.00,0.03), heart rate ( $\beta$ : 0.018bpm, 95% CI:0.00,0.04), weight ( $\beta$ : 0.028kg, 95% CI: 0.01,0.05), body mass index ( $\beta$ : 0.028kg/m<sup>2</sup>, 95% CI: 0.01,0.05), waist circumference ( $\beta$ : 0.019cm, 95% CI: 0.01,0.03), hip circumference ( $\beta$ : 0.013cm, 95% CI: 0.00,0.02), and waist to height ratio ( $\beta$ : 0.018, 95% CI: 0.01,0.03). Among boys, parental job loss was associated with lower leukocytes ( $\beta$ : -0.054  $10^9$ cells/L, 95% CI: -0.09,-0.01) and glucose ( $\beta$ : -0.014mg/dL, 95% CI: -0.03,-0.00).

**Conclusions:** Findings suggest that exposure to parental job loss during the Great Recession in Portugal was associated with negative impacts on sub-clinical disease processes among girls, but not boys.

### Conjoint effect of social determinants of health and injury severity score predicts survival disadvantage of black children with trauma



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**Purpose:** Pediatric Trauma remains one of the leading causes of morbidity and mortality among children in the United States, accounting for an estimated 12,175 deaths annually, and is related to social determinants of health (SDH). We aimed to examine racial variability in pediatric trauma and to determine the conjoint effect of SDH and Injury Severity Score (ISS).

**Methods:** A retrospective cohort design was used to assess the SDH associated with pediatric trauma mortality (PTM) among children 0–18 years of age using the Delaware Trauma Registry (DTR), 2000–2016. The



Chi square, Binomial, Poisson and Cox proportional Hazard regression models were used to examine mortality risk and survival respectively.

**Results:** Of the 13,577 children with trauma, mortality prevalence was 1.73%, 95% CI, 1.36–2.14. Relative to commercial insurance, uninsured children were 77% more likely to die, RR =1.77, 95% CI (1.31–2.40). Compared to Whites, Blacks were 42.4% more likely to die as a result of the time from injury to arrival at ED, Hazard Ratio (HR) =1.42, 95% CI (0.94–2.15). The ISS 25–75 was highest among Blacks (29.8%) compared to Whites (21.9%). Relative to Whites, blacks were 70% more likely to die following trauma, RR=1.70, 95% CI (1.27–2.28). After adjustment for potential confounding, the excess mortality between Black and White decreased by 37% but clinically persisted although imprecise, adjusted risk ratio (aRR) =1.33 (0.83–2.15).

**Conclusion:** The PTM prevalence is marginal in Delaware relative to the Mid-Atlantic region albeit racial disparities, with survival disadvantage observed in Blacks, public insurance, and ISS.

## Social Determinants of Health

### The social and structural determinants of non-adherence to antihypertensive medication treatment



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**Abstract:** There is paucity in data on the social and structural determinants of non-adherence. Therefore, we aimed to identify the social and structural determinants of non-adherence to antihypertensive medications (AHM).

**Methods:** We linked the Centers of Disease Control and Prevention (CDC) Atlas of Heart Disease and Stroke (2014–2016 cycle) and the 2016 County Health Rankings (CHR) datasets for this analysis. County-level non-adherence to AHM is captured in the CDC Atlas dataset as the proportion of days covered (PDC) with AHM during a 365-day period using Medicare Part D claims data. PDC <80%, was considered as non-adherence to AHM. Both datasets contain >100 individual county-level variables classified into four domains of health factors by CHR: health behaviors, clinical care, social and economic factors and physical environment. To define SDH constructs from this large variable set, we applied principal component analysis (PCA). Hierarchical linear models (HLM) were used to quantify the variation in county-level non-adherence and to identify the social structural determinants of non-adherence.

**Results:** County-level non-adherence varied significantly between states (intraclass correlation coefficient=78%) and between 2,067 (out of 3,141) counties with data on AHM non-adherence and variables. Five constructs of social and structural health determinants accounted for more than half (53%) of the variation in AHM non-adherence between counties within states: stress (20%), socioeconomic disadvantage (18%), healthcare access (6%), housing and transit (5%) and safety (4%). All five constructs were independently correlated with AHM non-adherence after adjusting for each other and demographic factors ( $\geq 65$  yrs, race, sex and rural/urban).

**Conclusion:** Social and structural factors are strong determinants of AHM non-adherence. Future research will interrogate how these contextual factors interact with patient and provider-level factors to influence non-adherence.

### Impact of poverty status on prevalence of metabolic syndrome based on sex among African Americans in the United States: National Health and Nutrition Examination Survey 2001–2006



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**Purpose:** Metabolic syndrome (MetS) is an important risk factor for cardiovascular disease. Little evidence exists on the possible role of poverty on MetS among African Americans.

**Methods:** We used data from the National Health and Nutrition Examination Survey (NHANES) 2001–2006. MetS was defined as having any 3 of the following: elevated blood pressure, elevated triglycerides, lower high-density lipoprotein cholesterol, elevated fasting glucose, and elevated central obesity. Poverty was based on poverty income ratio (PIR): substantially above poverty (PIR >3–5) (referent group), above poverty (PIR 1–3), and below poverty (PIR  $\leq 1$ ). Odds ratios (OR) and 95% confidence intervals (CI) were estimated using step wise survey-weighted multivariate logistic regression adjusting for demographic and lifestyle factors.

**Results:** There were 3455 African American participants,  $\geq 18$  years. Prevalence of MetS was 18% and 25% among men and women respectively ( $P < 0.001$ ). Overall, there was no association between poverty and MetS in the aggregate population. In fully adjusted models, as compared to men substantially above poverty (PIR >3), men both in above poverty group (PIR 1–3) (OR=1.56, 95% CI=0.98–2.49) and in lowest income group (PIR <1) (OR=1.65, 95% CI=1.03–2.63) were more likely to have MetS. No association of PIR and MetS was observed among women. Further we observed a positive trend between PIR and MetS among men and not women ( $p=0.05$  for men, 0.08 for women).

**Conclusions:** We found an association between poverty status and MetS among African American men but not women. Further studies are needed to identify factors that impact high prevalence of MetS among AA women.

## Women's Health

### Association between sex hormones and cardiovascular health metrics in women



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**Purpose:** The American Heart Association (AHA) created a composite of modifiable metrics to define cardiovascular health (CVH) in an effort to promote prevention. The aims were to determine whether CVH metrics are associated with sex hormone in women, and if this association was stronger among post-menopausal women.

**Methods:** Data was obtained from the NHANES data, 2015–2016. AHA quantified CVH by seven metrics (diet, physical activity, smoking, BMI, glucose, cholesterol, and blood pressure) that are categorized as ideal, intermediate and poor. Outcome is the total number of metrics within the ideal range is and exposure is hormone levels (log<sub>10</sub> transformed). The associations were evaluated using multinomial regression, and potential confounders were adjusted. Effect modifications were assessed.

**Results:** 1231 women were included, with average age 50 years, and 52% ( $n=641$ ) of the women were post-menopausal. The average total ideal CVH metric score was 3. Higher levels of log<sub>10</sub> transformed SHBG were positively associated with high vs. low ideal metric score in overall women (OR=31.44, 95%CI: 9.82, 100.63). The association became stronger among postmenopausal (OR=511.15, 95% CI: 46.44, 999.99) vs. premenopausal women (OR= 6.00, 95% CI: 1.26, 28.50). There was no association between ideal CVH metrics score and estradiol or testosterone.

**Conclusion:** Higher level of SHBG was associated with higher ideal CVH metrics score in adult women in NHANES 2015–2016, especially among postmenopausal versus premenopausal women. This could provide insight into the pathway between hormone levels and CVH, and provide opportunities to design interventions targeting high risk groups to improve CVH.

### A multiple-group confirmatory factor analysis of psychosocial stressors among Medicaid-covered pregnant women



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**Purpose:** Differential experiences of psychosocial stress during pregnancy may contribute to racial disparities in adverse outcomes such as preterm birth. It is important that measurement scales are valid and unbiased across comparison groups to assess the effect of psychosocial stress on pregnancy outcomes. This analysis examined the construct validity and measurement invariance of maternal stress, measured by self-reported factors such as depression, social support, and stressful life events, among Medicaid-covered pregnant women.

**Methods:** Baseline data from the Virginia Strong Start for Mothers and Newborns program was analyzed (N=1,632). Model fit estimates of three confirmatory factor analysis (CFA) models were compared to determine the appropriate measurement structure for this data. Multiple-group CFA assessed measurement invariance across African American/Black women (n=894) and women of all other races (n=738).

**Results:** Robust estimates of model fit supported a hierarchical CFA model composed of four latent domains of stress (Tucker-Lewis Index =0.955; Root Mean Square Error of Approximation =0.031; Standardized Root Mean Square Residual =0.060). Standardized factor loadings of three domains - external stress, perceived stress, and enhancers of stress- indicated positive correlations with a second-order latent factor for overall maternal stress (0.96, 0.44, 0.73, respectively), whereas the fourth domain, buffers of stress, had a negative association (-0.46). Multiple-group CFA demonstrated strong measurement invariance.

**Conclusion:** Among Medicaid-covered pregnant women, measures for psychosocial stress were shown to be unbiased across two subgroups of maternal race. Further, these findings support the construct validity of overall maternal stress underlying the common variability among four latent domains of stress.

### Distribution of severe maternal morbidity in Virginia: a population-level study



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**Purpose:** Rates of severe maternal morbidity (SMM) give a more holistic picture of maternal health status than maternal mortality rates do. SMM rates in the United States (U.S.) increased by 75% among delivery hospitalizations recently and SMM affects 50,000 U.S. women/year. This study aimed to estimate the burden of SMM in Virginia by applying evidence-based methods to population health data.

**Methods:** A retrospective cohort study using delivery hospitalization records in Virginia from 2012 through 2016 was performed. ICD-10 codes were applied to an ICD-9-based 25-condition diagnostic algorithm to identify SMM cases statewide. The burden and distribution patterns of SMM across the state were determined. Chi-square tests (at  $\alpha=0.05$ ) were used to assess whether SMM rates varied by age, race/ethnicity, geography, and receipt of blood transfusion.

**Results:** Most delivery hospitalizations occurred among women who were non-Hispanic white (53.82%), aged 30-34 years (30.36%), and from the Northern region (33.18%). SMM incidence (per 10,000 delivery hospitalizations) ranged from 205.7 in 2012 to 189.6 in 2016 compared to previous reports that ranged from 141.1 in 2008 to 155.3 in 2014. Rates of SMM, blood transfusion, and severe hypertension were highest among

non-Hispanic black women and women  $\geq 40$  years old. Variations in SMM rates by age, race/ethnicity, geography, and receipt of blood transfusion were statistically significant ( $p<0.0001$ ).

**Conclusion:** There are disparities in the distribution of Virginia's high SMM burden. Severe hypertension and receipt of blood transfusion are significant indicators. Multifaceted, multidisciplinary, and culturally-acceptable interventions are needed to significantly reduce this burden and improve maternal health.

### Intimate partner violence and postpartum visit attendance among women in the United States



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**Purpose:** Intimate partner violence (IPV) has been identified as a significant predictor of poor maternal and infant outcomes, adverse maternal health behaviors, and the underutilization of prenatal care services. However, the relationship between IPV and postpartum visit attendance is underinvestigated. Guided by Andersen's Behavioral Model of Health Services Use, this study examined the association between having a history of physical IPV before or during pregnancy and postpartum visit attendance among a nationally representative sample of women in the United States.

**Methods:** Data for this cross-sectional study (n=140,438) were derived from Phases 6 (2009-2011) and 7 (2012-2015) of the Pregnancy Risk Assessment Monitoring System (PRAMS). Unweighted frequencies and weighted percentages were obtained to describe the distribution of the study population by IPV history. Multivariable logistic regression analysis was performed, calculating adjusted odds ratios and 95% confidence intervals. All analyses were conducted using SAS 9.4 statistical software and survey procedures to account for the weighting of the PRAMS sample.

**Results:** After controlling for predisposing, enabling, and need for care characteristics, findings revealed a significant association between IPV history and postpartum visit attendance. Women who reported a history of IPV were 25% less likely to attend their postpartum visit (AOR: 0.75, 95% CI: 0.62-0.92) compared to women with no history of IPV.

**Conclusion:** Experiencing physical IPV before or during pregnancy may be an underlying barrier to postpartum health services use. IPV victimization should be addressed in future interventions to maintain an effective continuum of care for at-risk women.

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