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Insurance Generosity and Inflammatory Bowel Disease: Does Higher Patient Cost-Sharing Result in Suboptimal Medication Habits and Inferior Clinical Outcomes?

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OBJECTIVES/SPECIFIC AIMS: Our primary objectives were to examine the impact of biologic cost sharing on 1) adherence to biologics and 2) persistence on biologics in inflammatory bowel disease (IBD) patients. Our secondary objective was to assess the effect of biologic cost sharing on clinical IBD outcomes, including rates of hospitalization, abdominal surgery, and corticosteroid treatment. **METHODS/STUDY POPULATION:** This retrospective cohort analysis used a national insurance claims database (Optum Clinformatics DataMart) to assess adult IBD patients enrolled in medium or large private insurance plans from 2007-2016. Patients were followed for one year of continuous enrollment after their index biologic claim. We assessed adherence to biologic medications (medication possession ratio >0.8) dependent on patient cost sharing, as measured by an employer-plan's average out-of-pocket biologic medication cost. We also examined the effects of patient cost sharing for biologics on need for hospitalization, abdominal surgery, or corticosteroid treatment. We used multivariate logistic regression models adjusting for clinical and demographic characteristics. We estimated the effect of cost sharing on biologic therapy persistence using repeated measures proportional hazard survival models. **RESULTS/ANTICIPATED RESULTS:** We identified 2,193 adult IBD patients who initiated biologic therapy and met study criteria (Crohn's disease 66.1% vs. ulcerative colitis 24.9%, mean age 40.8 years, mean Charlson index 0.50). Median [IQR] out-of-pocket cost per 30-day biologic prescription was \$62 [\$34 - \$157]. 66.9% of patients were adherent to biologic therapy. Higher out-of-pocket costs for biologics were associated with increased odds of nonadherence; patients with ulcerative colitis were more price-responsive than patients with Crohn's disease or indeterminate colitis (Figure 1). However, higher out-of-pocket biologic costs were not associated with increased odds of all-cause or IBD-related hospitalization, IBD-related surgery, or corticosteroid prescriptions for IBD flares. Patients whose out-of-pocket costs were less than \$10 per 30-day biologic prescription persisted on biologic therapy for significantly longer than patients who paid >\$10 (Figure 2). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Nonadherence to biologics increases when IBD patients face higher out-of-pocket costs, particularly for ulcerative colitis patients. However, this is not associated with worse clinical outcomes. Patients with cost-sharing <\$10 persisted on biologics longer than patients whose cost sharing exceeded \$10.

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Intrahepatic Cholestasis of Pregnancy (ICP) is associated with higher prevalence of NAFLD: a case-control study.

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OBJECTIVES/SPECIFIC AIMS: Intrahepatic Cholestasis of Pregnancy (ICP) is the most common liver disease unique to pregnancy. Progression of non-alcoholic fatty liver disease (NAFLD) has been linked to the dysregulation of bile acid homeostasis. However,

an association of NAFLD with ICP has not been previously evaluated. We evaluated the association between ICP and NAFLD and associated metabolic risk factors, including obesity, dyslipidemia, hypertension, and diabetes. **METHODS/STUDY POPULATION:** A single-center, retrospective case-control study was conducted between January and December 2017 in a primarily Latina population in a New York City health system with a high prevalence of ICP, 2.53% of all pregnancies (compared to 0.32% nationally). Pearson's chi-square or Fisher's exact test and Wilcoxon rank-sum tests were performed to evaluate association of ICP with categorical variables and continuous variables, respectively. Unadjusted odds ratios (OR) with 95% confidence intervals (95% CI) were calculated in comparison with the control group for clinically significant outcomes. **RESULTS/ANTICIPATED RESULTS:** 149 pregnancies complicated by ICP were identified from electronic medical records; 200 controls were matched by delivery year. Hispanic women were more likely to be diagnosed with ICP than non-Hispanic women (OR 1.90, 95% CI 1.87-3.03). ICP and control patients were similar for: median age (OR 1.02, 95% CI 0.99-1.06), nulliparity (OR 0.79, 95% CI 0.48-1.30) and prevalence of hepatitis C (OR 1.35, 95% CI 0.08-21.67). In regards to metabolic risk factors, ICP patients and control patients were similar in prevalence of obesity (body mass index >30kg/m²; OR 1.01, 95% CI 0.62-1.61), hemoglobin A1c >5.5% (OR 0.80, 95% CI 0.34-1.9), total cholesterol >200 mg/dL (OR 4.15, 95% CI 0.83-20.84), and prevalence of hypertension (OR 0.69, 95% CI 0.31-1.52). Median bile acid levels were 30.6 μmol/L (IQR 11.6, 32.7) in the ICP group. ICP patients had higher median alanine aminotransferase (ALT) (32 vs. 16 U/L, p<.0001), alkaline phosphatase (181 vs 128 U/L, p<.0001) and total bilirubin levels (0.5 vs 0.35, p<.0001) compared to controls. ICP patients were more likely to have ALT levels > 50 U/L (2 times the upper limit of normal; OR 3.22, 95% CI 1.48-7.03). ICP patients were significantly more likely to have a history of biliary disease (OR 3.29, 95% CI 1.39-7.80). ICP patients were more likely to have evidence of steatosis on liver imaging (OR 4.69, 95% CI 1.68-13.12) than non-ICP patients. When evaluating a diagnosis of NAFLD based on ICD-10 code or evidence of steatosis on liver imaging, ICP patients were significantly more likely to have a diagnosis of NAFLD than controls (OR 5.7, 95% CI 2.08-15.65). **DISCUSSION/SIGNIFICANCE OF IMPACT:** ICP appears to be associated with NAFLD independently of metabolic risk factors such as obesity, dyslipidemia, hypertension, and diabetes, suggesting a direct link between NAFLD and ICP. If findings are confirmed, ICP patients, especially those with elevated ALT, would benefit from screening for NAFLD and linkage to liver specialty care postpartum.

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Knowledge, Attitudes and Practices on End-of-Life Care among Healthcare Professionals in a Community Hospital in Puerto Rico

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OBJECTIVES/SPECIFIC AIMS: The study aims to determine the baseline knowledge, attitudes and practices of the professionals (i.e., doctors and nurses) that provide the end-of-life care at an acute community hospital. By obtaining information on what is known, what is believed and what is done by doctors and nurses in end-of-life care, we can identify needs, problems, barriers and possible solutions. **METHODS/STUDY POPULATION:** Develop a questionnaire in Spanish addressing knowledge, attitudes and practices about end-of-life care in an acute hospital, define the survey objectives, and develop the survey protocol. To validate the pertinence

and usefulness of each questionnaire item, a panel of experts in palliative and end-of-life care will be consulted. o To finalize the questionnaire, it will be pre-tested with a small number of healthcare providers randomly selected from the survey's intended population. Implement the questionnaire to doctors/nurses providing direct end-of-life care by purposeful sampling at an acute community hospital. o Beforehand, survey interviewers will be recruited and trained. Perform quantitative and qualitative analyses o Answers to closed-end questions and quantitative data will be tallied using Microsoft Excel and analyzed using STATA statistical software. o Relationship between the participant's characteristics and their knowledge, attitudes and practices will be assessed using chi-square test. o Answers to open-ended questions in the questionnaire will be collected, analyzed based on their content, and placed in more comprehensive categories by NVivo software. RESULTS/ANTICIPATED RESULTS: It is expected to capture variations and/or consistencies in the amount of knowledge, the type of attitudes and the actual practices among and within physicians and nurses on end-of-life care in a community acute hospital. DISCUSSION/SIGNIFICANCE OF IMPACT: The proposed research is expected to contribute key information from the perspectives of physicians and nurses who deliver end-of-life care in an acute community hospital in Puerto Rico. This contribution is significant because it will serve as the platform to develop culturally-appropriate educational/training materials and, subsequently, implement culturally-responsive guidelines for the care of seriously ill Hispanics, with the expectation of improving their quality of life, and perhaps reducing their medical care costs.

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Macrophages, APOL1 Genotype, & Immunometabolism in CVD (MAGIC)

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OBJECTIVES/SPECIFIC AIMS: This study aims to understand the potential immunomodulatory effect of APOL1 variants in auto-antigen activated myeloid cells by assessing lysosomal integrity in activated cells expressing APOL1. The primary stimuli were: 1. ssRNA hY3 as a proxy for the Ro immune complex; 2. in an bulk RNA seq model, interferon-response gene, Siglec 1, as a read out of interferon activity. The primary outcomes were: 1. Myeloid cell APOL1 expression both in primary macrophage cultures and ex-vivo patient derived macrophages; 2. Lysosome integrity as measured by fluorescence intensity of lysotracker dye on light microscopy. METHODS/STUDY POPULATION: All recruited subjects provided written informed consent as per the NEW YORK UNIVERSITY Division of Rheumatology-wide Specimen and Matched Phenotype Linked Examination (SAMPLE) protocol. Subjects were African American; SLE subjects met 4 American College of Rheumatology criteria for SLE. Healthy donor monocytes representing each genotype in duplicate (reference allele: G0/G0; heterozygote variant: RV/G0; and homozygote variant RV/RV) were cultured with GM-CSF to yield macrophages which were incubated in serum free media or with hY3 ssRNA (TLR 7/8 agonist) to yield inflammatory M1 macrophages. Fold increase of APOL1 in untreated vs hY3 treated macrophages was measured using qPCR. Live cells were then cultured on glass chamber slides with DNA dye, DAPI, and LysoTracker red, a fluorescent dye that stains acidic lysosomes. As a

proof of concept, interferon response gene, Siglec1, and APOL1 transcriptional activity in peripheral blood monocytes (PBMCs) were measured and correlated in 17 SLE patients by RNA seq. RESULTS/ANTICIPATED RESULTS: Regardless of genotype, hY3 increased APOL1 expression by 29 (+/-18.4) fold (P = 0.007 vs no treatment). Genotyping of the qPCR product showed concordance with the chromosomal DNA with the RV heterozygotes expressing both alleles. To examine lysosomal membrane integrity, live hY3-treated macrophages were stained with lysotracker dye and fluorescence intensity was measured. Compared to reference allele carrying macrophages, each additional variant allele corresponded with a lesser degree of lysosome compartment staining. In SLE PBMCs, we found that APOL1 was highly expressed, and significantly correlated with Siglec1 (F=10.5; P = 0.005) supporting an association between circulating interferons and APOL1 accumulation in monocytes. DISCUSSION/SIGNIFICANCE OF IMPACT: Given that the "cytokine milieu" in SLE elicits APOL1 expression, induces inflammatory cell metabolic rewiring, and stimulates autophagy thereby exposing defects in autophagic flux, this gene-environment interaction may underpin the relationship between chronic inflammation and heightened APOL1 polymorphism-attributed cardiovascular risk. These data support further inquiry into the intersection between chronic autoimmunity and APOL1's functional role in the vascular microenvironment. The in vitro studies herein extend our prior work by demonstrating a mechanistic link between SLE-associated inflammation, APOL1 risk variant status and CVD via a lysosomal defect which converges on common autophagic and metabolic pathways in mononuclear cells.

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Maternal Daytime Dysfunction Due to Sleepiness and its Relation to Child Psychopathology

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OBJECTIVES/SPECIFIC AIMS: Anxiety is prevalent in early childhood and, when left untreated, increases children's risk for chronic anxiety and depression later in life. Maternal risk factors (e.g. income and marital status) have also been shown to heighten their children's risk for the development of the aforementioned psychopathology. Sleep plays a critical role in behavior regulation, is affected in depression, and is influenced by a wide range of demographic and psychological variables. The purpose of this study was to examine the relationship between maternal sleep and the presence in their children of reported symptoms relating to anxiety, depression, and behavior regulation. METHODS/STUDY POPULATION: Children (n=59, aged: 4-9 years (M = 6.069, SD = 1.006, 59.3% female) and their mothers were sampled from clinic and community settings and were administered questionnaires. Maternal sleep quality was assessed by the Pittsburgh Sleep Quality Index, which captures both numeric and self-reported categories relating to an individual's perception of their sleep. Child anxiety and depression were assessed via parent-reported Child Behavioral Checklist (CBCL). Maternal depression symptoms were assessed with the Beck Depression Inventory (BDI). Associations between these measures were analyzed by ANOVA with post-hoc analysis and linear regression as appropriate. RESULTS/ANTICIPATED RESULTS: A statistically significant difference was observed in the mean child CBCL scores when children were sub-set into maternal categories of self-reported days of dysfunction due to sleepiness over the past month. Mean child CBCL T-score domains with statistically significant differences