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### Assessing the Validity of an ICD-9 and ICD-10 Coding Algorithm for Identifying Cervical Premalignant Lesions Using Administrative Claims Data

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**OBJECTIVES/GOALS:** We compared the validity of an International Classification of Diseases, Clinical Modification (ICD) algorithm for identifying high-grade cervical intraepithelial neoplasia and adenocarcinoma in situ (together referred to as CIN2+) from ICD 9th revision (ICD-9) and 10th revision (ICD-10) codes. **METHODS/STUDY POPULATION:** Using Tennessee Medicaid data, we identified cervical diagnostic procedures in 2008-2017 among females aged 18-39 years in Davidson County, TN. Gold-standard cases were pathology-confirmed CIN2+ diagnoses validated by HPV-IMPACT, a population-based surveillance project in catchment areas of five US states. Procedures in the ICD transition year (2015) were excluded to account for implementation lag. We pre-grouped diagnosis and procedure codes by theme. We performed feature selection using least absolute shrinkage and selection operator (LASSO) logistic regression with 10-fold cross validation and validated models by ICD-9 era (2008-2014, N=6594) and ICD-10 era (2016-2017, N=1270). **RESULTS/ANTICIPATED RESULTS:** Of 7864 cervical diagnostic procedures, 880 (11%) were true CIN2+ cases. LASSO logistic regression selected the strongest features of case status: Having codes for a CIN2+ tissue diagnosis, non-specific CIN tissue diagnosis, high-grade squamous intraepithelial lesion, receiving a cervical treatment procedure, and receiving a cervical/vaginal biopsy. Features of non-case status were codes for a CIN1 tissue diagnosis, Pap test, and HPV DNA test. The ICD-9 vs ICD-10 algorithms predicted case status with 68% vs 63% sensitivity, 95% vs 94% specificity, 63% vs 64% positive predictive value, 96% vs 94% negative predictive value, 92% vs 89% accuracy, and C-indices of 0.95 vs 0.92, respectively. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Overall, the algorithm's validity for identifying CIN2+ case status was similar between coding versions. ICD-9 had slightly better discriminative ability. Results support a prior study concluding that ICD-10 implementation has not substantially improved the quality of administrative data from ICD-9.

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### Association between surgery with general anesthesia and cognitive decline in older adults: analysis using shared parameter models for informative dropout

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**OBJECTIVES/GOALS:** Recent studies have assessed the association between surgery with general anesthesia and cognitive decline in longitudinal cohorts of older adults. Patients diagnosed with dementia more frequently drop out of these longitudinal studies or are unable to complete the test battery. We revisit this aim with focus on methods for informative dropout. **METHODS/STUDY POPULATION:** We use data from the Mayo Clinic Study of Aging (MCSA), a longitudinal epidemiological study of the

prevalence, incidence, and risk factors for mild cognitive impairment (MCI) and dementia. Our primary outcome of interest was global cognitive z-score, assessed at study visits every 15 months. We implement linear mixed effects models to assess the association between post-enrollment exposure to surgery/anesthesia and subsequent cognitive decline trajectories. Demented patients more frequently drop out of MCSA, so, subjects with the worst cognitive outcomes are unobserved and missing data may be informative. Since this missingness may be missing not at random, we use shared parameter models to analyze continuous cognitive outcomes while jointly modeling time to dementia. **RESULTS/ANTICIPATED RESULTS:** A total 1948 subjects, non-demented at baseline, from the MCSA were included. Median age was 79, 51% of subjects were male, and 16% had MCI at enrollment. Among median follow-up of 4 study visits over median 5.4 years, 172 patients developed dementia and dropped out from further assessments of cognitive function. In adjusted linear mixed effects models, our data suggest post-enrollment exposure to surgery/anesthesia is associated with a decline in cognitive function over time (change in slope = -0.07 standard deviations of cognitive z-score per year, 95%CI = -0.08, -0.05, p<.001). After adjusting for informative dropout using shared parameter models, surgery/anesthesia is associated with greater cognitive decline (change in slope = -0.14 per year, 95%CI = -0.16, -0.12, p<.001). **DISCUSSION/SIGNIFICANCE OF IMPACT:** We revisited a prior analysis by our group with consideration of informative dropout. Subjects who dropout due to dementia may have different trajectories of cognitive decline compared to non-demented subjects. Shared parameter models estimate the association between surgery/anesthesia and cognitive decline accounting for informative dropout.

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### Automated Fetal Brain Volumetry on Clinical Fetal MRI Using Convolutional Neural Network

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**OBJECTIVES/GOALS:** We seek to develop an automated deep learning-based method for segmentation and volumetric quantification of the fetal brain on T2-weighted fetal MRIs. We will evaluate the performance of the algorithm by comparing it to gold standard manual segmentations. The method will be used to create a normative sample of brain volumes across gestational ages. **METHODS/STUDY POPULATION:** We will adapt a U-Net convolutional neural network architecture for fetal brain MRIs using 3D volumes. After re-sampling 2D fetal brain acquisitions to 3mm<sup>3</sup> 3D volumes using linear interpolation, the network will be trained to perform automated brain segmentation on 40 randomly-sampled, normal fetal brain MRI scans of singleton pregnancies. Training will be performed in 3 acquisition planes (axial, coronal, sagittal). Performance will be evaluated on 10 test MRIs (in 3 acquisition planes, 30 total test samples) using Dice scores, compared to radiologists' manual segmentations. The algorithm's performance on measuring total brain volume will also be evaluated. **RESULTS/ANTICIPATED RESULTS:** Based on the success of prior U-net architectures for volumetric segmentation tasks in medical imaging (e.g. Duong et al., 2019), we anticipate that the convolutional neural network will accurately provide segmentations and associated volumetry of fetal brains in fractions of a second. We anticipate median Dice scores greater than 0.8 across our test sample. Once validated, the method will retrospectively generate a normative database of over 1500 fetal brain volumes