Predicting Cervical Neoplasms Among Intrauterine Device Users

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Background

The OHDSI community has presented evidence to suggest that relative risk of cervical neoplasms is less than half for copper intrauterine device (Cu IUD) users compared to levonorgestrel-releasing intrauterine system (LNG-IUS) users [1]. These findings may have implications for the health of approximately 1 million women. The purpose of this study is to predict which IUD users may be at risk for developing a cervical neoplasm. A valid prediction model may lead to protective interventions for IUD users who are at risk for high grade cervical neoplasms.

Methods

We implemented a retrospective, observational, cohort study. Using ATLAS, we made 3 target cohorts for Cu-IUD users, LNG-IUS users, and all IUD users. The first two target cohorts and outcome cohort have been described previously. Additionally, we made a third target cohort that included all IUD users, independent of device type. The time at risk was from 1 year to 10 years after IUD implantation. The prediction was implemented with a Lasso Logistic Regression, among other models at the discretion of the investigators. The study data came from the IBM MarketScan Commercial Claims & Encounters (CCAE) database.

Results

The crude incidences of cervical neoplasms for the Cu-IUD and LNG-IUS are shown (Table 1). The AUC was 0.7 for the Cu-IUD and all IUD users cohorts. For the LNG-IUS cohort, the model did not converge. Prior HPV infection, synthetic hormone exposure, vaginal delivery and smoking history were associated with a cervical neoplasm (Table 2).

Target Cohort Name	Target Count	Outcome Count	%Outcome Incidence	AUC
Cu-IUD	124702	893	0.7	0.68
LNG-IUS	6650	94	1.4	N/A
IUD All	126365	917	0.7	0.67

Table 1: Model performance for the target cohorts. AUC = Area Under the Curve. Cu-IUD = Copper IUD, LNG-IUS = Levonorgestrel Intrauterine System, IUD All = All IUD Users.

Time Window	Variable	Coefficient
365 to 0 days prior	HPV DNA Detection	0.37
Any to 0 days prior	Levonorgestrel Exposure	0.35
Any to 0 days prior	Normal delivery	0.20
365 to 0 days prior	Etonogestrel Exposure	0.12
365 to 0 days prior	Ex-cigarette Smoker	0.11

Table 2: Covariates and coefficients for variables associated with the outcome for the Cu-IUD cohort.

Conclusions

The covariates that were associated with a high grade cervical neoplasm were consistent with known risk factors. This finding supports the validity of using OHDSI data to evaluate novel cervical neoplasia risks, such as IUD type.

Reference:
[1] Spotnitz ME, Natarajan K, Ryan PB, Westhoff CL *Relative Risk of Cervical Neoplasms Among Copper and Levonorgestrel-Releasing Intrauterine Device Users.* Obstet Gynecol 135(2):319-327 (2020).

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