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# An Automated Model Using Electronic Health Record Data to Identify Delirium Among Hospitalized Older Adults: A Pilot Project

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**Purpose:** To explore the geographic distribution and associated risk factors for maternal GBS colonization and infant death prior to discharge in eastern Wisconsin births.

**Methods:** Retrospective study of institutional data from PeriData.net, a comprehensive birth registry, utilizing data from 2007 through 2013 at all Aurora medical centers. Categorical variables were analyzed with chi-square tests, and ordinal or continuous variables by Mann-Whitney or two-sample t-tests. Binary regression was used for multivariate modeling.

**Results:** Population demographics (N=99,305) were mean age 28 years, 59% married, 64% white, 42% government-insured, 39% nulliparous, mean prepregnancy body mass index (BMI) of 27, gestational age of 39 weeks, birth weight of 3,296 g and 26% C-section rate. The GBS colonization rate was 22.3%. Among ZIP codes with > 100 subjects, 8 ZIP codes had a GBS-positive rate > 30% (7 in Milwaukee, 1 in Kohler). GBS colonization was higher in blacks (34%) than whites (20%; P<0.0001), in unmarried women (26% vs. 20%; P<0.0001), with increasing BMI (mean BMI 27.3 if GBS-positive vs. 26.6; P<0.0001) and based on ZIP code group (P<0.0001); and was predictive of neonatal antibiotics for sepsis (26% if GBS-positive vs. 22%; P<0.0001). In multivariate analysis, unmarried status, higher BMI, race and ZIP code were predictive of GBS colonization. Rate of infant death during birth hospitalization was 0.57% (n=558) and varied by ZIP code group. GBS colonization was negatively associated with infant death (0.25% in GBS-positive vs. 0.66%; P<0.0001; N=98,065 with lethal anomalies and stillbirths excluded). This association remained when controlling for gestational age. In multivariate analysis, death rate was associated with one ZIP code group, no prenatal care, preterm labor, vaginal bleeding, hydramnios, oligohydramnios, lower gestational age and maternal GBS (negative predictor).

**Conclusion:** Geographic characteristics are associated with infant death during birth hospitalization and maternal GBS colonization. Demographic characteristics are only associated with maternal GBS colonization. It is unclear if maternal GBS colonization is “protective” against infant demise due to increased surveillance.

### **An Automated Model Using Electronic Health Record Data to Identify Delirium Among Hospitalized Older Adults: A Pilot Project**

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**Background:** Delirium is a serious change in mental status with adverse outcomes, but remains underrecognized. The electronic health record (EHR) may assist in the identification of delirium.

**Purpose:** This study was performed to generate an

automated delirium identification model using data from the EHR among hospitalized older adults.

**Methods:** Inpatients 65 years and older were included in this cross-sectional study. The researchers used “confusion assessment method” as the gold standard to identify delirium. Four categories of variables were obtained from the EHR on the day of and the day prior to researcher assessment: 1) hypoactive delirium (any one of the following: nurse’s assessment of motor retardation or reduced level of consciousness or decline in activities of daily living [ADL] score); 2) hyperactive delirium (any one of the following: use of restraints or antipsychotic medications or nurse’s assessment noting a change in mental status or poor attention or motor agitation or poor thought process or anxiety); 3) patient factors (any one of the following: dementia, age, mean blood urea nitrogen and serum creatinine); and 4) health care-associated factors (any one of the following: urinary catheter, surgical procedure, brain imaging). Relationships were analyzed using chi-square or Fisher’s test as appropriate. Statistical significance was set at P<0.05.

**Results:** Ninety-two participants in three hospitals were included in the analysis. Of these, mean age was 77 ± 8.8 years and 54% were female, 70% had a Morse fall score > 45, and mean ADL score was 10 of 12. The prevalence of delirium was 17%. In the univariate analysis, variables associated with delirium included abnormal mental status (94% vs. 41%; P<0.0001); reduced level of consciousness (69% vs. 9%; P<0.0001), motor retardation (50% vs. 13%; P<0.0007), motor agitation (38% vs. 7%; P=0.004) abnormal attention (81% vs. 12%; P<0.0001), abnormal thought process (56% vs. 11%; P<0.001), dementia (31% vs. 11%; P=0.03), age (82 vs. 72 years; P=0.02), number of medications (10 vs. 12; P=0.0313), use of antipsychotic medication (31% vs. 7%; P=0.004), mean Braden score (15 vs. 18; P=0.0038) and Morse fall score > 45 (94% vs. 59%; P=0.02). In the multivariate analysis, factors associated with delirium included reduced level of consciousness and abnormal attention (area under curve 0.920).

**Conclusion:** This pilot study demonstrates that variables present in the EHR may be used to develop an automated model to identify delirium in hospitalized older adults. These findings need to be validated in a larger study and define if the model performs well in predicting clinical outcomes.

### **Prognostic Indices for Hospitalized Older Adults: A Meta-Analysis and Systematic Review**

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**Background:** A prognostication predictive model incorporated into the electronic health record (EHR) may be useful in assisting the health care team in accurately predicting mortality and may be used in appropriately