Understanding Emergency Department Utilization Patterns in Illinois

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Objective

To analyze differences in utilization of Emergency Departments for primary care sensitive conditions by facility and by patient ZIP code.

Introduction

Syndromic surveillance has been widely implemented for the collection of Emergency Department (ED) data. EDs may be the only option for seeking care in underserved areas, but they do not represent population-based measures. This analysis provides insight on health-seeking behaviors within the context of the type of care sought.

Methods

The NSSP BioSense database in Adminer was queried for Illinois ED visits that occurred in August 2016, November 2016, February 2017, or May 2017. These months were chosen to account for seasonality and holidays. For each visit, as defined by the BioSense ID, the first listed diagnosis code, defined to be the primary diagnosis, and the latest valid patient ZIP code were determined.

Next, an algorithm[1] developed by New York University (NYU) which uses diagnosis codes to classify ED visits was applied to each visit's primary diagnosis. With this algorithm, a percentage (possibly zero) of each visit was classified as primary care sensitive (PCS), where the percentage is based on the diagnosis code.

The visits were tabulated to find the percentage of visits to each facility or from each ZIP code which were classified as PCS. (Visits whose diagnosis was not matched by the algorithm were excluded.) The relationships between the percentages of PCS visits in each facility or ZIP code and characteristics of the facilities or ZIP codes were then analyzed.

Facilities were grouped by Critical Access Hospital (CAH) status[2] and by location (within, or not within, a primary care Health Professional Shortage Area (HPSA), as determined using a tool from the U.S. Department of Health and Human Services[3]). Percentages of PCS visits at different types of facilities were compared using *t*-tests.

Variables reported in the Social Vulnerability Index (SVI)[4] at the census tract level were converted to ZIP code-level data using a crosswalk from the U.S. Department of Housing and Urban Development[5]. An ordinary least squares regression model in which these variables were used to predict the percentage of PCS visits in each ZIP code was fitted. The R package geoR[6] was used to fit an additional model which accounted for spatial correlation across ZIP codes. In this model, ZCTA latitude and longitude coordinates from the U.S. Census[7] were used as the ZIP codes' locations. Only ZIP codes for which the NYU algorithm matched diagnoses from at least 70% of visits were included in these models.

Results

The overall proportion of PCS visits across all CAHs is significantly greater than the proportion at other facilities ($p < 0.0001$). Likewise, the proportion of PCS visits at facilities in primary care HPSAs is significantly greater than the proportion at other facilities ($p < 0.0001$). Among facilities for which the NYU algorithm matched diagnoses from at least 70% of visits, the mean percentage of PCS visits at facilities in primary care HPSAs is significantly higher than the mean at other facilities ($p = 0.0009$).

The regression model for ZIP code-level data with spatial correlation was found to be better than the regression without spatial weighting. The spatial model found 3 of 16 SVI variables to be significant predictors of the percentage of ED visits which are PCS: after adjusting for all other variables, a one percentage point increase in minority makeup is associated with a 0.09 percentage point increase in PCS visits ($p < 0.0001$), a one percentage point increase in persons in group quarters is associated with a 0.13 percentage point decrease in PCS visits ($p = 0.0009$), and a $1000 increase in per capita income is associated with a 0.12 percentage point decrease in PCS visits ($p = 0.0011$).

Conclusions

ED-based syndromic surveillance can only provide part of the picture for monitoring health conditions across Illinois. Understanding rates of PCS ED visits can enhance the interpretation of health trends. Lower rates can inform recruiting plans for capturing data from additional sources, such as urgent or immediate care facilities, while higher rates of PCS visits at EDs may indicate areas in need of more healthcare resources.

Keywords

Emergency Department; primary care; healthcare resources; socioeconomic

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