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Using electronic health record data to evaluate preventive service utilization among uninsured safety net patients

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ABSTRACT

Objective. This study compared the preventive service utilization of uninsured patients receiving care at Oregon community health centers (CHCs) in 2008 through 2011 with that of continuously insured patients at the same CHCs in the same period, using electronic health record (EHR) data.

Methods. We performed a retrospective cohort analysis, using logistic mixed effects regression modeling to calculate odds ratios and rates of preventive service utilization for patients without insurance, or with continuous insurance.

Results. CHCs provided many preventive services to uninsured patients. Uninsured patients were less likely than continuously insured patients to receive 5 of 11 preventive services, ranging from OR 0.52 (95% CI: 0.35–0.77) for mammogram orders to 0.75 (95% CI: 0.66–0.86) for lipid panels. This disparity persisted even in patients who visited the clinic regularly.

Conclusion. Lack of insurance is a barrier to preventive service utilization, even in patients who can access care at a CHC. Policymakers in the United States should continue to address this significant prevention disparity.

Introduction

In the United States, people without continuous health insurance coverage have worse access to important health care services, report lower satisfaction with their health care, and are less likely to be up-to-date on recommended preventive health services, compared to those with continuous coverage (Ayanian et al., 2001; Bandi et al., 2012; Bednarek & Schone, 2003; Berenson et al., 2012; Casillas et al., 2011; DeVoe et al., 2003; Fretts et al., 2000; Halterman et al., 2008; Mainous et al., 1999; McWilliams et al., 2003; Nelson et al., 2005; Nickel et al., 1998; Powell-Griner et al., 1999; Sudano & Baker, 2003; Walker et al., 2012). The association between continuous insurance coverage and the increased likelihood of preventive care receipt has been demonstrated across genders, age, race/ethnicity, and socioeconomic strata (Ayanian et al., 2001; Bandi et al., 2012; Bednarek & Schone, 2003; Berenson et al., 2012; Casillas et al., 2011; DeVoe et al., 2003; Fretts et al., 2000; Halterman et al., 2008; Mainous et al., 1999; McWilliams et al., 2003; Nelson et al., 2005; Nickel et al., 1998; Powell-Griner et al., 1999; Sudano & Baker, 2003; Walker et al., 2012).

Even in populations with a usual source of primary care, prevention disparities persist between uninsured and insured patients. For example, patients with insurance and a usual source of care have a greater likelihood of receiving lipid screenings, blood pressure checks, breast cancer screenings, and pap smears than those with a usual source of care but no insurance (DeVoe et al., 2003; Mainous et al., 1999). However, little is known about *which* specific preventive services uninsured patients are more or less likely to receive when they access primary care at community health centers (CHCs), where care is delivered regardless of insurance status (National Association of Community Health Centers, 2011; Shi et al., 2012). In part, this uncertainty is due to limitations in data typically used in these types of analyses. For example, claim datasets do not capture uninsured patients, and surveys are vulnerable to recall bias and health literacy limitations. To address these past limitations, and simultaneously address the paucity of data regarding preventive care received by uninsured patients compared to insured patients in the same clinics, this retrospective cohort study used electronic health record (EHR) data to compare preventive service utilization of uninsured CHC patients with that of continuously insured CHC patients.

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Methods

Data sources

We utilized two data sources for this analysis. First, we used EHR data from OCHIN (originally the Oregon Community Health Information Network but shortened to OCHIN as other states joined). OCHIN's centrally hosted and linked Epic© EHR contains data on >1 million patients served at >300 CHCs in several states (OCHIN, 2014). An estimated 80–90% of CHC patients in Oregon seek care at an OCHIN clinic and have relevant ambulatory care data in OCHIN's EHR; from 4/1/2013 through 3/31/2014, approximately 333,000 patients had a visit in an OCHIN clinic (S. Cowburn, personal communication July 7, 2014).

Second, we linked Oregon Medicaid enrollment data to EHR insurance records to obtain longitudinal health insurance coverage information for the study population (Medicaid is the most common insurer in this population). Information on non-Medicaid insurance coverage (e.g., commercial coverage) was obtained from the EHR.

Study population

The primary population of interest was all uninsured, non-pregnant adults (aged 19–64) who were alive throughout the study period, and had ≥1 visit during 2008 through 2011 at one of the 10 Oregon OCHIN CHCs with a fully-implemented EHR for ≥6 months prior to the study start ($n = 9938$ patients). A visit was defined as any face to face encounter in a primary care clinic, including lab and immunization encounters. We used one visit as inclusion criteria to be consistent with recent discussions in the primary care literature Calman et al., 2012. We included only those patients with no documented insurance coverage based on EHR and Medicaid enrollment data. We chose a comparison group of all adults with continuous insurance during the study period, and the same age and visit characteristics ($n = 8106$). We included only those patients with documentation of continuous coverage. All CHCs in our study offered these preventive services.

Variables/analysis

Independent variables

Our primary independent variable was insurance status. We categorized patients as having either no insurance or continuous insurance throughout the study period. Continuously covered patients include those with private insurance, public insurance, or a combination of the two. *Dependent Variables:* Our outcomes of interest were receipt of select preventive services at least once in the study period across all OCHIN CHCs during the study period of 2008–2011. We chose eleven services recommended by the United States Preventive Services Task Force, the Advisory Committee on Immunization Practices Centers for Disease Control et al., 2010, 2013, or the American Diabetes Association Anon., 2014: blood pressure screening, tobacco use assessment, measurement of body mass index, lipid screening, glucose screening, mammography, cervical cancer screening with Papanicolaou (Pap) testing, influenza (flu) vaccination, pneumococcal vaccination, fecal occult blood testing (FOBT) for colorectal cancer screening, and chlamydia screening. Each preventive outcome was assessed in the subpopulation for which it is recommended in national guidelines (Relevant age/sex criteria are in Table 2 footnotes). To obtain guideline-appropriate denominators for some preventive services, we identified diagnosis codes for diabetes, cardiovascular disease, and pulmonary disease.

Covariates

We included gender, age, race/ethnicity, primary language, household income as average percent of Federal Poverty Level (FPL) and number of visits in the study period as independent variables. Race/ethnicity categories other than Hispanic and non-Hispanic white were collapsed because of low overall numbers.

Analysis

We calculated descriptive statistics for the overall study population, and by insurance category. We then performed logistic mixed effects regression modeling, yielding odds ratios for receipt of each preventive service in the study period comparing insurance categories adjusted for covariates. We also conducted logistic mixed effects regression stratified by primary care office visit count (≤4, >4) and report unadjusted percentages of receipt of each preventive service and adjusted odds ratios by strata. We chose a cutoff of four visits because this stratified our cohort into those seeking care on average yearly or less and those seeking care more than an average of once per year. Finally, we performed a stratified multivariable Poisson mixed effects regression model to estimate adjusted rates of services per person in the study period for each insurance group. For all regression models, we accounted for clustering of subjects within CHC by including a random intercept for clinic; patients were assigned to the clinic they frequented most often during the study period. We also performed a post-hoc sensitivity analysis, using a matched propensity score analysis in lieu of regression covariate adjustment. Analyses were performed using SAS version 9.3 and statistical significance was set at a type I error of 5%. The IRB of Oregon Health and Science University approved the study.

Results

Population characteristics

The total study population was 18,044 patients (Table 1). Uninsured CHC patients were less likely than the continuously insured to be female, non-white Hispanic, English-speaking, from households earning ≤100% of the federal poverty level (FPL), and to have 4 visits in the 4 year study period. Uninsured patients were more likely to be Hispanic, Spanish-speaking, and have household earnings >100% FPL.

Multivariable regression

After adjustment for covariates, there were no significant differences between the insured and uninsured groups in odds of receipt of services in six of the eleven services of interest: blood pressure screening, body mass index assessment, smoking assessment, chlamydia screening, FOBT testing, and pneumococcal vaccination. Compared to continuously insured patients, the uninsured had significantly lower odds of receiving five of the eleven services: lipid screening, glucose screening, pap smears, flu vaccine, and mammography orders. Odds ratios ranged

Table 1
Characteristics of study population: total and by insurance category.

Characteristics	Total	Continuously uninsured	Continuously insured	*p*-value
N	18,044	9938	8106	
# w/ some private coverage	1314	NA	1314	
Gender (%)				<0.001
Female	57.5	54.5	61.2	
Male	42.5	45.5	38.8	
Age at start of study				
Mean (SD)	40.6 (11.3)	39.1 (11.1)	42.4 (11.3)	<0.001
19–29 (%)	20.5	23.4	17.0	
30–39 (%)	26.2	29.8	21.8	
40–49 (%)	27.0	25.6	28.7	
50–64 (%)	26.2	19.4	29.9	
Race/ethnicity				<0.001
Hispanic	23.1	37.8	5.0	
Non-Hispanic, White	55.7	43.1	71.2	
Non-Hispanic, other	14.6	11.3	18.8	
Missing/unknown	6.6	7.8	5.1	
Primary language				<0.001
English	65.4	48.7	86.0	
Spanish	20.0	34.3	2.4	
All others	8.0	7.3	8.7	
Unknown	6.6	9.7	2.9	
Average household income				<0.001
≤100% of FPL	61.4	53.0	71.8	
>100% of FPL	33.4	41.7	23.3	
Unknown	5.1	5.3	4.9	
Total visits				
Mean	15.0	8.6	22.8	<0.001
Median	8.0	5.0	16.0	
IQR	3.0–19.0	2.0–11.0	7.0–30.0	
% ≤4 visits	32.6	46.8	15.2	
% >4 visits	67.4	53.2	84.8	

Patients receiving care in 2008–2011 at Oregon community health centers using the OCHIN EHR.
P-values comparing demographic characteristics between insurance categories for age and visit numbers are computed from two-sample *t*-tests; all others from chi-square tests.