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Original Research

Exploring the variation in state-level prescription utilization using a triangulation of analytic methods

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Abstract

Background: Retail prescription fill data have consistently shown wide variation in prescription drug utilization across states, with state-level rates ranging from 8.5 to 19.3 filled prescriptions per capita per year. Empirical explanations for this wide variation have not yet been sought.
Objectives: To examine which factors potentially explain the wide variation in prescription drug utilization across US states.
Methods: Summary data (proportions, counts, rates, etc) on sociodemographics, health, insurance, provider density, health service use, and retail prescription drug fills for each of the 50 states and the District of Columbia, from 2008 to 2010, were retrieved from multiple national data sources, such as the Kaiser Family Foundation's "State Health Facts" Web Portal. Pooled cross-sectional linear, negative binomial, and ordered logit multivariable regressions were used to model states' prescription utilization as a function of the aforementioned possible explanatory variables. Principal components analysis also was employed so as to overcome high correlations among some of the covariates.
Results: Among US states, higher levels of employer-sponsored insurance or Medicaid coverage were associated with both higher levels of prescription utilization and a higher likelihood of being in upper utilization quartiles. A higher density of nurse practitioners was also positively associated with both the level of utilization and the likelihood of higher utilization, whereas a higher density of active physicians was associated with opposite effects. Higher prevalence of physical activity was associated with lower utilization levels as well as a lower likelihood of high utilization. State-level prevalence of chronic conditions and poor health mattered only for the level of prescription utilization. States' sociodemographics were not significantly associated with prescription utilization.
Conclusions: This study suggests that higher prescription utilization across states was associated with the variations in provider types, Medicaid and private insurance coverage, as well as the prevalence of chronic diseases. Further investigation of how each of these factors may contribute to a particular state's prescription drug utilization level is needed.

Keywords: Prescription drugs; States; Per-capita rates; Ecologic data

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Background

Prescription drugs are an essential tool in the management of chronic diseases. Appropriate use of medications that are clinically indicated, safe, and effective enables patients to realize therapeutic goals and achieve positive health outcomes. Underuse of medications often predisposes patients to adverse health outcomes. Polypharmacy, defined as the use of multiple medications beyond clinical need,[1] can also be quite detrimental, potentially leading to poor medication adherence, adverse drug events, and increased medication-related morbidity and mortality, especially among the elderly.[1,2]

Longitudinal data have shown consistently wide variation in U.S. state-level, per-capita prescription drug use. In 2011, residents in West Virginia and Kentucky filled an annual average of 19.3 prescriptions (including refills) at retail pharmacies. Similarly, in Tennessee and Vermont, residents filled an average of 17.5 prescriptions. On the other hand, Alaska, the District of Columbia, Texas, and Colorado had annual prescription use rates that were only half as high: about 8.5 prescriptions per capita.[3]

This across-states pattern of use is consistent across all age groups. Children (<18 years old) in states in the lowest quartile of the prescription use distribution (e.g. Alaska and Colorado) used about one-third of the number of prescriptions their counterparts used in states in the highest quartile (e.g. West Virginia and Kentucky).[4] The elderly (≥ 65 years old), on the other hand, used approximately 39 prescriptions annually in high-utilizing states, compared with about 20.5 in low-utilizing states.[4] West Virginia has remained the top medicated state since 2006, with annual use levels ranging from 17.2 to 19.3 retail prescriptions per capita.[5]

Whether this large gap in prescription utilization is explained by the variation in the demographics, health status, and chronic disease burden across states, or by provider types, prescribing behavior, or pharmaceutical utilization policies is not known. Seeking to parse out the role of each of these factors at the state level can inform state-specific agendas for future research and design of appropriate policy interventions to ensure clinically appropriate levels of utilization.

A major difficulty with seeking to explore the variation in prescription utilization across states is the dispersion of state-level data on the predictors of prescription drugs/health services utilization across a large number of data sources with varying methodologies and degrees of data availability. Further, producing state-level estimates of prescription utilization as well as other state characteristics directly from one national survey is primarily complicated by design-related issues. Nationally representative health surveys that collect utilization data, such as the Medical Expenditure Panel Survey (MEPS) do not permit, by design, the calculation of reliable state-level estimates for all of the relevant variables (only for variables with a large enough sample size). Demographic surveys, such as the Current Population Survey, can provide reliable state estimates of sociodemographics using small area estimation techniques, but offer no data on prescriptions or health services utilization.[6]

Previous literature

In reviewing the literature on the determinants of prescription drug utilization, Andersen's behavioral model of health services utilization provides a useful theoretical framework to conceptualize these determinants.[7–9] In its latest, most comprehensive form,[8,9] Andersen's model posits that health service use is determined by contextual as well as individual factors. Contextual factors characterize the environment of health care access and include community characteristics, as well as health care organization, delivery, and relevant health policy, all measured at the aggregate level under consideration (e.g. neighborhood, city, county, or state-level).[8] In epidemiologic terms, these aggregate-level measures are also known as ecologic summaries, as they summarize the area-wide distributions of these characteristics.[10] Both individual and contextual determinants can be categorized into predisposing, enabling, and need factors (see Fig. 1).[8] At the state level, predisposing characteristics would include summary measures of the distributions of sociodemographics, such as age structure, gender and racial composition, and population proportions at different levels of educational attainment; enabling resources include state characteristics such as proportions living at different levels of income/poverty, rates of insurance coverage, and provider density; need factors are captured by the rates of prevalence of poor self-rated health and chronic physical and mental illnesses, as well as utilization of other health services. Behavioral factors include the prevalence of certain health behaviors, such as physical activity, smoking, and drug abuse.