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Patterns of Emergency Care Utilization by Chronically Ill

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Objective

To study patterns of utilization of emergency care resources by chronically ill in order to identify efficiency and quality of care improvement opportunities.

Introduction

The nature of Emergency Room services makes the patients' visits hard to predict and control and the services incur high costs. Chronic patients should not require urgent care to treat their chronic illness, if they were properly managed in primary care. We track frequency of emergency room visits by chronically ill when the primary complaint of record is their chronic condition. We use a record of institutional insurance claims collected in over 400 hospitals in California between 2006 and 2010. We identify dimensions of data that provide statistically significant differences of utilization between strata. We found particularly significant differences in resource utilization subject to type of insurance coverage carried by the patient, and subject to patient's age. We studied Diabetes, Asthma, and Arthritis patients from 8 age groups spanning ages 5 to 85, and 13 insurance payer types.

Methods

The utilization of ER of patients covered by different insurers can be quantified using the Relative Utilization Ratio (RUR), defined as following using Diabetes as an example:

p1i= (PTi among all the Diabetic patients in ER)/ N1 ;
p0i= (PTi among all the other patients in ER)/ N0 ;
RUR = p1i / p0i

N1 is the total number of records of Diabetic patients seen at the ER, and N0 is the total number of ER visits of all patients except diabetics. PTi reflects the number of visits by patients covered by insurance type i (i ranges from 1 to 13 in our study). We report RUR scores aggregated over all hospitals.

Confidence intervals were computed for each RUR using parametric method under the following assumptions:

1. PTi ~ Binomial (N1, p1i) for the Diabetic patients;
2. PTi ~ Binomial (N0, p0i) for the for the patients presenting with other primary complaints;
3. p1i ⊥ p0i

Results

We computed RURs and confidence intervals for the chronically ill patients covered by each insurance type and for each age group. Figure below summarizes results obtained for diabetic patients. RUR of 1 corresponds to age group and insurance type for which ER utilization by diabetic patients does not differ from the usage by other patients. RUR significantly greater or lower than that suggests over- or under-utilization, respectively. The results shown are grouped by insurance type and private coverage results are plotted in red while public ones are shown in blue, spanning multiple age groups along the horizontal axis. We observe a striking and significant difference in RUR distribution between public and private payers, especially among medium-aged patients. It indicates a substantially better effectiveness in primary care management of diabetic patients under private plans. It also suggests a present and current opportunity for public insurance plans to follow the protocols of primary management of chronic illness successfully implemented by private insurers. We found analogical patterns for Asthma and Arthritis.

Conclusions

Our analysis of ER resource utilization uncovered opportunities for improvements in efficiency of care, and consequently in patient outcomes, that can be attained by publicly funded plans if they follow the comparatively successful practice of private providers more closely. We believe that similar analyses can be conducted for any condition, not just chronic illness, and not just in the context of ER resource utilization, including peer-to-peer comparison of relative efficiency and effectiveness of individual health care providers.

Methods:

The utilization of ER of patients covered by different insurers can be quantified using the Relative Utilization Ratio (RUR), defined as following using Diabetes as an example:

$$p_{1i} = \frac{PT_i \text{ among all the Diabetes patients in ER}}{N_1}$$

$$p_{0i} = \frac{PT_i \text{ among all the other patients in ER}}{N_0}$$

$$RUR = p_{1i}/p_{0i}$$

N_1 is the total number of records of diabetes patients seen at the ER, and N_0 is the total number of ER visits of all patients except diabetics. PT_i reflects the number of visits by patients covered by insurance type i (i ranges from 1 to 13 in our study). We report RUR scores aggregated over all hospitals.

Confidence intervals were computed for each RUR using parametric method under the following assumptions:

1. $PT_i \sim Binomial(N_1, p_{1i})$ for the diabetic patients;
2. $PT_i \sim Binomial(N_0, p_{0i})$ for the patients presenting with other primary complaints;
3. $p_{1i} \perp p_{0i}$

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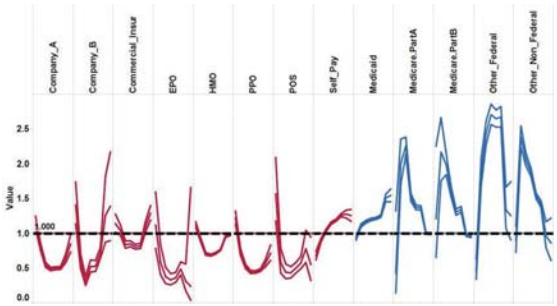
Method-Equation



Result-RUR Chart

Keywords

resource utilization; chronic disease; data analytics

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