

Characterizing Oregon's Medicaid Super-Utilizers: Regression Analyses

OHSU CENTER FOR HEALTH SYSTEMS EFFECTIVENESS

FINAL REPORT

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PREPARED FOR:

Oregon Health Authority

PREPARED BY:

Center for Health Systems Effectiveness
Oregon Health & Science University

AUTHORS:

Christina Charlesworth, MPH
Hyunjee Kim, PhD

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Characteristics associated with overall ED super-utilization and avoidable ED super-utilization align with those reported for other states and national studies.

Executive Summary

BACKGROUND AND STUDY GOAL

“Super-utilizers” are patients who use exceptionally high amounts of health care services. The goal of these analyses is to explore which characteristics of Oregon Medicaid members are associated with emergency department (ED) super-utilization.

APPROACH

Using administrative claims data, we identify three groups of persistent ED super-utilizers among the adult Medicaid population:

- **Group A:** Members with 4 or more ED visits of **any** kind in 2013 and 2014
- **Group B:** Members with 4 or more **avoidable** ED visits in 2013 and 2014 (a subset of Group A)
- **Group C:** Members with 4 or more ED visits for **mental health** conditions in 2013 and 2014 (a subset of Group A)

We use regression models to examine which member characteristics in 2012 are associated with ED super-utilization in 2013 and 2014.

MAJOR FINDINGS

- The factor that was most strongly associated with all three types of ED super-utilization was prior ED visit history.
- Mental health conditions were associated with all three types of ED super-utilization.
- Characteristics associated with overall ED super-utilization and avoidable ED super-utilization align with those reported for other states and national studies – for example, younger age, female sex, poor physical health, and a history of primary care use.
- Super-utilizers of mental health ED visits are a distinct and relatively small population. Unlike the other two super-utilizer groups, their physical health status was not associated with ED super-utilization. However, history of schizophrenia, and prior use of behavioral health services were strongly associated with membership in this group.
- Dual-eligibility for Medicaid and Medicare was associated with overall ED super-utilization and mental health ED super-utilization.

CONCLUSIONS

Different member characteristics were associated with different types of ED super-utilization. In particular, mental health ED super-utilizers are a distinct population. Tailored interventions may be required to impact ED use for specific super-utilizer subgroups.

Targeting members with sustained high needs offers the greatest opportunity to improve care and conserve resources.

Study Goal

The goal of these analyses is to explore which characteristics of Oregon Medicaid members are associated with emergency department (ED) super-utilization.

Background

“Super-utilizers” are patients who use exceptional amounts of health care services.¹ This high utilization contributes to a disproportionate amount of health care spending being concentrated among small groups of patients.^{2,3} For example, in Oregon Medicaid in 2002, approximately 50% of ED spending supported care for just 3% of patients.³ Due to the high needs and high costs of super-utilizers, policy-makers may be interested in better understanding these patients, particularly those in the Medicaid program. Patients with public insurance such as Medicaid are more likely to be super-utilizers⁴ and also more likely to have persistently high spending,⁵ compared with patients with other payers. As a first step towards the goal of understanding ED super-utilization in Oregon Medicaid, this report explores factors that are associated with three different types of ED super-utilization.

Approach

Our analyses consist of two steps. First, we assess whether each Medicaid member is an ED super-utilizer or not in 2013 and 2014 (the outcome of interest). Second, we use statistical models to examine the association between Medicaid member characteristics in 2012 and ED super-utilization.

1. IDENTIFYING ED SUPER-UTILIZERS AMONG MEDICAID MEMBERS

We focus on *persistent* super-utilizers who had high ED use rates in both 2013 and 2014. Targeting members with sustained high needs offers the greatest opportunity to improve care and conserve resources. Specifically, we identify the following three (not mutually exclusive) groups:

- **Group A:** Members with 4 or more ED visits of **any** kind in 2013 and 2014.
- **Group B:** Members with 4 or more **avoidable** ED visits in 2013 and 2014 (a subset of Group A).
- **Group C:** Members with 4 or more ED visits for **mental health** conditions in 2013 and 2014 (a subset of Group A).

Each super-utilizer therefore has 8 or more visits over a period of two years. We use four ED visits per year as the cutoff for defining super-utilization because it was the most commonly used threshold to define frequent ED use in the literature.⁴ An avoidable ED visit is defined as a visit that could have been prevented if appropriate care had been provided in primary care settings. To identify avoidable ED visits and ED visits for mental health conditions we use a pre-existing algorithm that was developed in consultation with a panel of ED physicians.⁶ More details are provided in the Appendix.

2. ASSESSING THE RELATIONSHIP BETWEEN MEMBER CHARACTERISTICS AND SUPER-UTILIZER STATUS

After identifying Medicaid members in Groups A, B, and C, we assessed the relationship between characteristics of all Medicaid members in 2012 and belonging to one of the three super-utilizer groups in 2013 and 2014.

Study Population and Data

We include all members enrolled in Oregon Medicaid, including dual-eligibles (members enrolled in Medicaid and Medicare). We exclude:

- Members younger than 18 years because pediatric ED utilization is likely to be highly correlated with parent ED visit behaviors.⁸
- Members who were enrolled for less than nine out of 12 months in each calendar year between 2012 to 2014 to ensure that adequate information is available for assessing ED super-utilization and baseline patient characteristics for each person in the study. Note that this criteria excludes the 2014 Medicaid expansion population.

We use 2012-2014 health care enrollment and claims from the Oregon All Payers All Claims database (APAC) and the Oregon Health Authority's Medicaid database. Data include Medicaid claims for Medicaid-only enrollees, and Medicaid and Medicare claims for dual-eligibles.

Member Characteristics

We assess the relationship between super-utilizer status in 2013 and 2014, and the following member characteristics during 2012:

- **Demographics** including age, gender, and race
- **Eligibility for Medicare** (i.e., being a dual-eligible member)
- **Neighborhood characteristics**, including the percentage of residents in the member's neighborhood living in poverty, and the percentage of residents in the member's neighborhood with a college degree
- **How far the member lives** from the closest ED
- Presence of sixteen categories of **physical health conditions**
- Presence of five categories of **mental health conditions**
- Use of five types of **health care services**

Additional details about member characteristics are provided in the Appendix. Because APAC excludes claims related to substance abuse, our results underestimate the prevalence of mental health conditions related to substance abuse.³

Statistical Analysis

We use multivariate logistic regression models to estimate the association between the member characteristics described above and being an ED super-utilizer. Separate models are used for Groups A, B, and C. The outcome of interest is whether each member was a persistent super-utilizer based on ED visits in 2013 and 2014. The independent variables are member characteristics in the baseline year (2012).

Results are presented as odds ratios. An odds ratio describes the odds that an outcome (ED super-utilization) will occur given the presence of a particular characteristic (e.g., dual-eligibility), compared to the odds that the outcome will occur in the absence of the characteristic. This measure allows us to assess whether each baseline member characteristic is associated with future ED super-utilization. An odds ratio of 1 indicates no association between the characteristic of interest and the outcome, an odds ratio greater than 1 indicates a positive association, and an odds ratio between 0 and 1 indicates a negative association.

Results

NUMBER OF SUPER-UTILIZERS

Table 1 describes the number of ED super-utilizers in each group. Of the 178,739 total Medicaid beneficiaries that met the study inclusion criteria, the proportion that belonged to super-utilizer Group A was relatively small (approximately 3%, N=5,909). Super-utilizers identified on the basis of avoidable ED visits (Group B) and mental health ED visits (Group C) are subsets of Group A, and represent only 0.5% and 0.1% of total Medicaid members in the study, respectively. Group B and Group C represent approximately 15% and 2% of super-utilizer Group A members, respectively. Table 1 also shows the number of super-utilizers in each group that are dual-eligible. Dual-eligibles represent 27.4%, 20.3%, and 40.2% of super-utilizers in Groups A, B, and C, respectively, compared to 24.3% of all members included in the study. The median number of visits for each super-utilizer group is also displayed in Table 1. For super-utilizers in Group A, the median number of ED visits of any kind during 2013/2014 was 14. For super-utilizers in Group B, the median number of avoidable ED visits in 2013/2014 was 12. For super-utilizers in Group C, the median number of mental health ED visits during 2013/2014 was 13.

TABLE 1: NUMBER OF SUPER-UTILIZERS (OUT OF 178,739 MEDICAID MEMBERS)

GROUP	Total super-utilizers	Dual-eligible super-utilizers	Median Number of Visits
A: 4 or more ED visits of any kind	5,909	1,619	14
B: 4 or more avoidable ED visits	934	190	12
C: 4 or more mental health ED visits	137	55	13

RELATIONSHIP BETWEEN MEMBER CHARACTERISTICS AND BEING AN ED SUPER-UTILIZER

Table 2 summarizes results for the three different super-utilizer groups. Key findings include:

- **The factor that was most strongly associated with ED super-utilization was prior ED visit history.** A prior history of ED visits in 2012 resulted in substantially greater odds of belonging to Group A, B, or C. The effect of having four or more ED visits was especially large for Groups A and B.
- **Many of the factors associated with super-utilization in Group A were similar to factors associated with super-utilization in Group B.** For example, age, gender, presence of physical health conditions and prior use of primary care were all associated with being in Group A and B. In contrast, these factors were not associated with being in Group C.
- **Mental health conditions were associated with being in all three groups; however, mental health conditions were particularly important for Group C.** For example, the odds of being in Group C were approximately six times greater for members with schizophrenia or other non-mood disorders, compared to members without these conditions.
- **Dual-eligible status** was associated with being in Group A or C, but not Group B.
- **Hospitalizations and use of long-term services and supports** were associated with being in Group A, but not with being in Group B or C.

Discussion

In regression models for all three groups of super-utilizers, the factor that was most strongly associated with ED super-utilization was prior ED visit history. There were many similarities in results for super-utilizers based on four or more ED visits of any type (Group A) and super-utilizers based on four or more avoidable ED visits (Group B). For example, younger age, female gender, and poorer health status were all positively associated with super-utilization in these groups, and these findings align with those of other studies.⁴ Prior use of primary care was also positively associated with Group A and B super-utilization, which is similar to the findings of other studies. This may be because ED super-utilizers tend to be higher users of healthcare services in general. It may also suggest that access to any primary care does not fully capture all important aspects of primary care. For example, the timeliness, quality and consistency of primary care could also be important factors related to ED super-utilization,^{4,7} but were not available in the data for this report.

Some factors were associated only with overall ED super-utilization, but not with avoidable ED super-utilization. For example, prior inpatient hospitalizations and use of long-term services and supports were associated with super-utilization based on any type of ED visit, but not with avoidable ED visits. This may be because acute hospitalizations and use of long-term services and supports indicate a higher severity of illness that causes unavoidable ED visits. Dual-eligible status was associated with super-utilization based on ED visits of any kind, but not with super-utilization based on avoidable ED visits.

Similar to findings in our previous descriptive report, the mental health super-utilizer group (Group C) was distinct. The size of this group was less than 140 patients, which was smaller than the other two groups. In contrast to the other two groups, age, gender, physical health status, and prior use of primary care was not significantly associated with mental health ED super-utilization in statistical models. However, prior use of inpatient or outpatient behavioral health services and history of anxiety and schizophrenia were associated with being a member of this group.

TABLE 2: ASSOCIATION BETWEEN MEMBER CHARACTERISTICS IN 2012 AND THREE TYPES OF ED SUPER-UTILIZATION IN 2013 AND 2014

CHARACTERISTIC	ODDS RATIO*		
	GROUP A	GROUP B	GROUP C
Age (years)†			
50-64	0.68	0.48	0.68
65-74	0.54	0.29	0.48
75+	0.41	0.27	0.21
Female	1.14	1.63	0.78
Race‡			
Black	1.12	1.39	1.40
Other	0.92	1.05	1.01
Unknown	0.83	1.02	0.75
Dual eligible	1.16	1.11	1.63
Neighborhood characteristics			
Poverty level	1.01	0.99	1.02
Education level	1.01	1.01	1.03
Distance to nearest ED	1.00	1.00	0.98
Physical health conditions			
Myocardial infarction	1.18	1.68	1.02
Congestive heart failure	1.19	0.57	0.81
Peripheral vascular disease	1.00	1.03	0.25
Cerebrovascular disease	0.98	0.96	1.00
Dementia	0.52	0.17	NA
Rheumatic disease	1.10	1.05	0.31
Peptic ulcer disease	1.34	1.54	2.02
Mild liver disease	1.25	1.32	1.04
Diabetes mellitus without chronic complications	1.33	1.36	1.06
Chronic pulmonary disease	1.51	1.67	0.81
Diabetes mellitus with chronic complications	1.17	0.90	0.34
Hemiplegia or paraplegia	1.00	0.87	0.20
Renal disease	1.19	1.15	1.03
Any malignant tumor	1.09	1.10	0.66
Moderate or severe liver disease	1.22	1.09	1.36
Metastatic solid tumor	0.79	0.98	1.72
Behavioral health conditions			
Bipolar or depression disorders	1.19	1.39	1.34
Adjustment disorder	1.16	1.29	1.32
Anxiety disorder	1.34	1.31	2.09
Schizophrenia & other non-mood disorders	1.25	1.32	6.30
Other	1.14	1.07	1.62
History of ED use§			
1-3 visits	6.23	6.34	2.26
4+ visits	46.11	103.66	10.11
History of other healthcare use			
Any acute inpatient admission	1.18	1.03	0.72
Any primary care visit	1.14	1.33	1.33
Any outpatient behavioral health visit	1.01	0.88	2.22
Any inpatient behavioral health admission	0.91	0.78	3.38
Any use of long-term services & supports	1.13	0.84	1.01

* Highlighted cells indicate a significant Odds Ratio based on the threshold $P < 0.05$.

† Reference group is 18-49 years.

‡ Reference group is white race.

§ Reference group is 0 prior ED visits.

Implications

These findings provide preliminary insight about population-level factors that may be related to ED super-utilization. There are several important results that may be of interest to policymakers.

- 1** In general, ED super-utilizers in Oregon are similar to those described in other states. Findings in this report are consistent with other state and national studies describing characteristics associated with overall ED super-utilization. For example, other studies have also found that younger age, female sex, poor health, and a history of primary care use are positively associated with ED super-utilization. This suggests that interventions which have been successful in other states may also be successful in Oregon.
- 2** Super-utilizers of mental health ED visits are a distinct population. History of schizophrenia and other non-mood disorders and prior use of behavioral health services were strongly associated with membership in this group. This finding may help identify target populations for whom mental health services could be improved in order to avoid mental health related ED use. The size of the mental health ED super-utilizer group was also relatively small, which may make intensive interventions for this group more feasible.
- 3** Dual-eligibility was associated with being in Group A and Group C after adjustment for all other characteristics. This suggests that fragmented coverage or disability status among dual-eligibles may lead to unmet needs that result in ED visits.

Future Work

The current study provides exploratory models that examine population-level factors associated with ED super-utilization. These types of models are not intended for prediction or classifying individuals as likely future super-utilizers. However, future work could test the ability of statistical models to predict the probability of individual members becoming super-utilizers. This tool could then be used to identify and target individuals for interventions. This report uses enrollment criteria that excludes members who became newly eligible for Medicaid during coverage expansion under the Affordable Care Act. Future work could therefore repeat the analyses in this report for the expansion population, after adequate years of data become available. Future work could also use interviews, focus groups, or surveys to investigate unmet needs and reasons for persistently high ED use among super-utilizer populations in Oregon.

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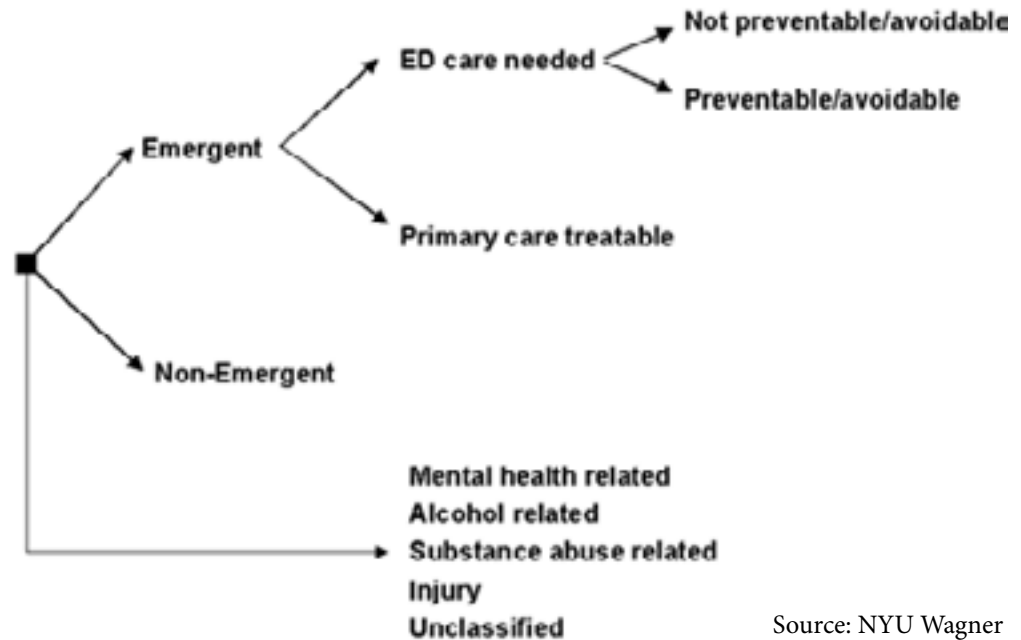
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Appendix

BILLINGS ALGORITHM

As seen in Figure 1, the algorithm calculates probabilities for four types of ED visits based on the documented types of primary diagnosis: non-emergent; emergent yet primary care treatable; emergent and ED care needed yet preventable; and emergent and ED care needed and not preventable. We define a visit as avoidable if the sum of the probabilities of the last two categories (emergent and ED care needed yet preventable; emergent and ED care needed and not preventable) is less than 0.25, which is an approach validated in other studies. In addition to four types of ED visits, the algorithm of Billings et al. also classifies ED visits related to mental health conditions.

FIGURE 1: BILLINGS EMERGENCY DEPARTMENT VISIT CLASSIFICATION



Source: NYU Wagner

MEMBER CHARACTERISTICS

- Patient demographics include age (18-49, 50-64, 65-74, and 75+), sex, and race (White, Black, Other, and Unknown).
- Neighborhood characteristics include the percentage of the population living below the poverty level, and the percentage of the population who are college graduates (extracted from the 2007-2011 American Community Survey), based on ZIP code of residence.
- Health conditions include a modified version of the Charlson comorbidity index. The modified comorbidity index excludes human immunodeficiency virus and AIDS because the APAC database does not include those conditions. We also include each member's mental health conditions, as defined by the Ettner classification system. Mental health condition categories include: bipolar, major depression, or dysthymia or other depression; adjustment disorder; anxiety disorder; schizophrenia or other non-mood disorders; and other (including disorders originating in childhood, personality disorder, and other miscellaneous mental health conditions).
- Insurance coverage status includes each member's eligibility for Medicare (ie dual-eligibility).
- Health service utilization includes frequency of ED visits, primary care visits, inpatient admissions (excluding for mental health, chemical dependency, or pregnancy), inpatient admissions (for mental health conditions), outpatient mental health visits, and any use of long-term services and supports (personal care, group home care, foster care, and nursing home care).
- Distance of the nearest ED is the distance between residence and the nearest ED in miles, based on the member's ZIP code of residence.