Multi- and Single-Year High-Utilizers of Inpatient Services Share Many Clinical and Behavioral Characteristics

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INTRODUCTION

Interventions designed to target high-utilizer patients rarely include control groups and cannot account for "regression to the mean," the observation that many high-utilizers will return to an average amount of healthcare use without any intervention.[1,2] Because of the impact that regression to the mean could have on the efficacy of an intervention, we sought to identify differences in medical and social characteristics between high-utilizers whose increased use is limited to 1 year versus those who remain high-utilizers over multiple years.

METHODS

Data for this study were collected from the electronic medical record (Epic Systems, Verona, WI) of Grady Health System (GHS) in Atlanta, GA. IRB approval was obtained from Emory University and the GHS Research Oversight Committee. A random sample of patients admitted three or more times to the hospital in 2012 was identified for the study.

Each patient's medical record was reviewed for demographic, medical, social, and hospital use data.[3] Demographic data included age, sex, race, deceased status, and date of death. Race was collapsed into a dichotomous variable, black and non-black. Medical data included ten medical and four psychiatric diagnoses. Behavioral data included whether or not the patient had any active or historical alcohol, tobacco, or drug use.

Records were then analyzed for hospital use for the year prior (2011) and two following years (2013–2014) compared to the index year. Patients were classified as a high-utilizer if they had three or more admissions in a year, a "non-high-utilizer" if they had labs, imaging, a clinic, or ED visit, or had 1–2 admissions, or "no contact" if they had no contact with GHS. If patients were deceased, their hospital use for the year of their death was recorded, and they were categorized as deceased for the following year. Patients who died in 2012 or 2013 were removed from the analysis.

Statistical analyses were performed in SAS Studio. Chi-squared tests were performed on categorical variables and independent t tests were performed on continuous variables ($p < 0.05$).

RESULTS

Of the 490 patients in the sample, 91 died during the follow-up period. Of the remaining 399 patients, 60.9% ($n = 243$) were multi-year high-utilizers. There were no statistically significant differences between single- and multi-year high-utilizers in sex or race distribution. Single-year high-utilizers were slightly older than multi-year high-utilizers (Table 1).

The only diagnosis more common among multi-year high-utilizers was COPD/asthma. Multi-year high-utilizers were more likely to have a documented history of tobacco use and substance abuse. All mental health diagnoses had a similar prevalence in both groups (Table 2).

DISCUSSION

In this study, we investigated whether common medical and behavioral characteristics could distinguish high-utilizers who regress to the mean after a single year from those who do not. This is important because in order to accurately assess interventions that lack control groups, we must be able to account for the high-utilizers who would have returned to an average level of use without being enrolled in an intervention.

We found that multi- and single-year high-utilizer's medical histories and substance use patterns were not as different as expected. Multi-year high-utilizers were more likely to have COPD/asthma—a chronic disease with acute exacerbations that can result in a lot of hospital admissions over many years. Although both groups had a significant burden of chronic disease, the patients who are multi-year high-utilizers have evidence of additional complicating factors, such as substance and tobacco use.[4]

The major limitations of this study are that it is based on a single hospital system and that the data were obtained from

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Table 1 Demographic Data for Multi-Year High-Utilizers Versus Single-Year High-Utilizers

	Multi-year HUPs $N = 243$ (60.9%)	Single-year HUPs $N = 156$ (39.1%)	
Sex			0.383
Male	56.2%	51.9%	
Female	43.6%	48.1%	
Age (years)	55.7 ±14.6	59.8 ±14.3	0.008*
Race			
Black	92.7%	91.0%	0.562
Non-Black	7.3%	9.0%	

*Significant at $p < 0.05$

Table 2 Medical and Social Characteristics of Multi-Year High-Utilizers Versus Single-Year High-Utilizers

	Multi-year HUPs ($n = 243$) (%)	Single-year HUPs ($n = 156$) (%)	p value
HTN	82.7	80.1	0.514
DM	50.2	44.2	0.244
CHF	47.3	44.2	0.545
COPD/asthma	46.1	33.8	0.012*
CKD	35.4	32.7	0.579
Cancer	9.1	10.9	0.545
Liver disease	15.2	16.7	0.700
Pancreatitis	5.4	6.4	0.657
HIV/AIDS	13.6	10.9	0.429
CVA	17.3	16.7	0.873
Alcohol	52.3	47.5	0.132
Tobacco	73.2	63.4	0.049*
Other substances	45.9	28.2	0.005*
Mental health diagnoses			
Depression	24.3	21.2	0.469
Anxiety	6.6	5.8	0.743
Bipolar	9.1	7.1	0.479
Schizophrenia	8.6	7.7	0.737
Others	7.4	6.4	0.704

*Significant at $p < 0.05$

chart review, so we are therefore limited by the quality of data in the chart.

While the patient factors included in this analysis did not reveal major differences between the two groups, we hope that this highlights the need to better predict the impact that regression to the mean has on interventions in this population, and provides initial data to further the discussion.

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Compliance with Ethical Standards:

Conflict of Interest: *The authors declare that they do not have a conflict of interest.*

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