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## Characteristics and spending patterns of high cost, non-elderly adults in Massachusetts

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### ABSTRACT

**Background:** Given that health care costs in Massachusetts continue to grow despite great efforts to contain them, we seek to understand characteristics and spending patterns of the costliest non-elderly adults in Massachusetts based on type of insurance.

**Methods:** We used the Massachusetts All-Payer Claims Database (APCD) from 2012 and analyzed demographics, utilization patterns and spending patterns across payers (Medicaid, Medicaid managed care, and private insurers) for high cost patients (those in the top 10% of spending) and non-high cost patients (the remaining 90%).

**Results:** We identified 3,712,045 patients between the ages of 18–64 years in Massachusetts in 2012 who met our inclusion criteria. Of this group, 8.5% had Medicaid fee-for-service, 11.1% had Medicaid managed care, and 80.3% had private insurance. High cost patients accounted for 65% of total spending in our sample. We found that high cost patients were more likely to be older (median age 48 vs 40,  $p < 0.001$ ), female (60.2% vs. 51.2%,  $p < 0.001$ ), and have multiple chronic conditions (4.4 vs. 1.3,  $p < 0.001$ ) compared to non-high cost patient patients. Medicaid patients were the most likely to be designated high cost (18.1%) followed by Medicaid managed care (MCO) (13.9%) and private insurance (8.6%). High cost Medicaid patients also had the highest mean annual spending and incurred the most preventable spending compared to high cost MCO and high cost private insurance patients.

**Conclusions & implications:** We used 2012 claims data from Massachusetts to examine characteristics and spending patterns of the state's costliest patients based on type of insurance. Providers and policymakers seeking to reduce costs and increase value under delivery system reform may wish to target the Medicaid population.

### 1. Introduction

In Massachusetts, despite great efforts to control high costs,<sup>1</sup> state health care spending continues to grow. Massachusetts has historically had the highest state per capita spending in the nation<sup>2</sup>, with health care expenditures totaling over \$54 billion in 2014, nearly a 5% increase from the year before.<sup>3</sup> The state's commercial market and Medicare total spending increased by nearly 3% each while spending for Medicaid in the state grew by 19%, partly due to rising enrollment.<sup>3</sup> Further, growing health care spending extracts ever larger opportunity costs; as health care spending continues to increase, available funds for other government agencies and services decreases. In every year since 2001, health care has constituted the largest proportion of the Massachusetts state budget, and has made up over 50% of the state's budget since fiscal year 2012.<sup>4,5</sup> From 2001–2010, Massachusetts state health care spending increased by 59%, while spending on education,

infrastructure, and housing decreased by 15%.<sup>6</sup>

High health care spending is no longer an issue just for the government, taxpayers, and health insurers—patients' health care costs are increasingly starting to fall to health systems and individual providers through alternative payment models such as Accountable Care Organizations (ACOs), bundled payment initiatives, and federal pay-for-performance programs.<sup>7</sup> In Massachusetts, commercial payers are also expanding their use of alternative payment models with health care providers in the state.<sup>3,8,9</sup> Total health spending in Massachusetts is expected to continue to increase, with projections of up to \$123 billion spent on health care by 2020 if policy interventions fail to take hold and bend the cost curve.<sup>10</sup> As such, both policymakers and clinical leaders have incentives to control spending and increase value for the patients they serve.<sup>11</sup>

One potentially promising strategy for controlling costs is to target the small proportion of individuals that account for the majority of

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health care spending.<sup>12</sup> Prior research has shown that 5% of the U.S. population accounts for nearly 50% of health care spending in any given year.<sup>13</sup> Much of this previous work has focused on understanding high and variable spending in the Medicare population<sup>14,15</sup>; these high cost patients often have high health care needs due to advanced age and multiple chronic conditions.<sup>16</sup> However, we know far less about high cost patients in the non-elderly, non-Medicare population. In the state of Massachusetts, this is particularly important given that the vast majority of the 6 million residents are covered through either Medicaid (24%) or commercial insurance (53%) while only 13% are covered by Medicare.<sup>17</sup> Further, given the priority the state has made to control costs – and given that Massachusetts has previously served as a model for the broader nation on health care reform, understanding the major drivers of spending for high cost and high need patients in the non-Medicare population is critically important. Yet, we have very little recent empirical data on this population.

Given the importance of better understanding the characteristics of expensive non-Medicare patients and their drivers of spending, we sought to answer three questions. First, who are the costliest non-elderly patients in Massachusetts and how do their characteristics vary by major type of insurance (Medicaid, Medicaid managed care, and commercial market plans)? Second, what are the differences in health care spending by service between high cost patients and non-high cost patients across these payer groups? And finally, what proportion of spending in high cost and non-high cost patients is potentially preventable and how does this vary by insurance type?

## 2. Methods

### 2.1. Data

We obtained claims data from the Massachusetts All-Payer Claims Database (APCD) for the year 2012. The APCD contains all public and private insurance claims from all non-federal Massachusetts providers for inpatient, outpatient, post-acute care, physician services, tests, imaging, and drugs. Due to the state's successful implementation of health reform, nearly the entire population has some form of coverage, so the APCD is nearly a universal account of all health care delivered in the state with the exception of Medicare-fee-for-service (FFS). We therefore restricted our analyses to adults between the ages of 18 and 64 and without FFS Medicare coverage or Medicare Advantage.

We calculated annual costs for each patient in 2012 using the standardized cost methodology as described by the Centers for Medicare and Medicaid Services.<sup>18</sup> This approach assigns each provided service with a Medicare-based cost, allowing us to examine patterns of utilization across geographies, providers, and payers independent of variation in price that may be driven by market power or wage rates. We classified the patients in the highest 10% of standardized spending for the year 2012 as “high cost” patients. We considered the remaining 90% of patients as “non-high cost”. We further subdivided this population into the three major types of insurance in Massachusetts: Medicaid, Medicaid managed care organization (MCO) plans, and private commercial market insurance (the aggregation of plans from group and individual markets). There were some patients who switched insurance in 2012. We assigned each patient to only one insurance provider that incurred the highest costs in a given year. As a sensitivity analysis, we replicated our study using patients who did not switch insurance during the year, and the results (not shown) were similar.

We also identified the demographics and chronic conditions of each patient. To identify chronic conditions, we used the ICD-9 definitions used by the HCC classification system and the CMS Chronic Conditions Data Warehouse (CCW) classification categories.<sup>16</sup> Through consultation with a group of physicians, economists, and health services researchers, we finalized a list of 29 chronic conditions. We also identified substance abuse claims for alcohol and drugs using a list of ICD-9 codes as done in prior work.<sup>16</sup>

We calculated preventable spending using methods described in a previous study.<sup>14</sup> We examined preventable hospitalizations, ED visits, and associated costs. To identify preventable hospitalizations, we used the Agency for Health Care Research and Quality Prevention Quality Indicators software.<sup>19</sup> This algorithm, which has been validated in prior work, defines potentially preventable hospitalizations related to specific conditions, such as heart failure, diabetes, hypertension, and asthma. These are conditions for which good outpatient care can likely prevent the need for hospitalization. A full list of the preventable hospitalization diagnoses and their associated ICD-9 codes is available in the appendix.

To identify preventable emergency department visits, we used an algorithm created by Billings et al.<sup>20,21</sup> It uses diagnosis codes to separate ED visits into 4 categories: 1) non-emergent, 2) emergent but primary care treatable, 3) emergent, ED care needed, but preventable, and 4) emergent, ED care needed, and not preventable. Similar to prior work,<sup>14</sup> we consider the first three of these categories as encompassing preventable ED visits.

### 2.2. Analysis

After calculating standardized payments, we sorted them into major categories: inpatient care, ambulatory care, durable medical equipment, post-acute/rehabilitative/long-term/hospice care, and pharmaceutical spending. All paid claims were assigned to one of these categories. We further grouped claims into subsets within each category, such as physician costs and procedure costs in the inpatient setting, or radiographic studies and laboratory testing in the ambulatory setting.

We compared demographics, comorbidities, and patterns of spending across high-cost patients and non-high cost patients. We then compared the high cost patients stratified by major insurance payer, and examined the likelihood of being designated high cost within payer. We also evaluated patterns of utilization, including number of hospitalizations and average number of days spent in different care settings and number of different services, including tests and procedures, of patients by insurance type. We also identified and compared the top most expensive admissions by diagnoses-related groups (DRGs) and also the top most expensive drug categories using national drug codes (NDCs) by payer to further understand drivers of inpatient and drug spending. We used chi-square and *t*-tests to assess differences among the groups.

All analyses were performed using SAS software version 9.1. The study was approved by the Harvard T.H. Chan School of Public Health Office of Human Research Administration.

## 3. Results

### 3.1. Patient characteristics

We identified 3,712,045 patients between the ages of 18–64 years in Massachusetts in 2012 who met our inclusion criteria, of which 8.5% had Medicaid fee-for-service, an additional 11.1% had Medicaid managed care, and 80.3% had private insurance (Table 1). High cost patients accounted for 65% of total spending in our sample. They were more likely to be older (median age 48 vs 40,  $p < 0.001$ ), female (60.2% vs. 51.2%,  $p < 0.001$ ), and had multiple chronic conditions (4.4 vs. 1.3,  $p < 0.001$ ) compared to non-high cost patient patients (Table 1). Both high cost Medicaid and MCO patients were more likely to live in the poorest counties while high cost privately-insured patients were more evenly spread across the state. Similar patterns existed for non-HC patients by payer (see Appendix Table 1).

Of the high cost patients, 15.4% had Medicaid insurance, 15.5% had Medicaid managed care, and 69.1% had private insurance. Thus, the likelihood of being designated a high cost patient in 2012 was 18.1% for patients with Medicaid insurance, 13.9% for patients with MCO plans, and only 8.6% for patients with private insurance (Fig. 1). High

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