COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION

TECHNICAL APPENDIX B4
AVOIDABLE HOSPITAL USE

ADDENDUM TO 2015 COST TRENDS REPORT

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1 Summary

This technical appendix describes the Health Policy Commission's (HPC) approach to examining avoidable hospital use.

2 Analysis of Preventable Hospitalizations in Low-Income Communities

This section describes the Commission's approach to measuring the rates of preventable hospitalizations in Massachusetts by quartile of community income.

We conducted this analysis by applying measures of preventable hospitalization developed by the Agency for Healthcare Research and Quality (AHRQ) to data from the Hospital Inpatient Discharge Database from the Massachusetts Healthcare Data Consortium (MHDC) and the American Community Survey (ACS) from the US Census Bureau.

2.1 Data and Sample

We used the MHDC's inpatient discharge database for the calendar year 2012-2014 and the ACS for the calendar years 2008-2013 for our analysis. The sample included patients that met AHRQ's measure definition and resided in Massachusetts.

2.2 Measures of Preventable Hospitalizations

To calculate rates of preventable hospitalization, the HPC used AHRQ's Prevention Quality Indicators (PQIs), a set of measures that can be used with inpatient discharge data to identify the quality of ambulatory care. This analysis used version 4.5 of the PQIs, released in May 2013. [i] We used the Chronic PQI composite for this analysis which included the following conditions:

Chronic conditions:

1. PQI 1—Diabetes Short-term Complications Admission Rate
2. PQI 3—Diabetes Long-term Complications Admission Rate
3. PQI 5—Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate
4. PQI 7—Hypertension Admission Rate
5. PQI 8—Heart Failure Admission Rate
6. PQI 13—Angina Without Procedure Admission Rate
7. PQI 14—Uncontrolled Diabetes Admission Rate
8. PQI 15—Asthma in Younger Adults Admission Rate
9. PQI 16—Lower-Extremity Amputation among Patients with Diabetes Rate

Each measure consists of a numerator (the number of hospitalizations) and a denominator (the size of the relevant population). The denominators for all PQIs, except for PQI 5—COPD or

[i] The CDC's analysis does an adjustment by age and gender on the basis of the 2000 standard population.

Asthma in Older Adult and PQI 15—Asthma in Younger Adults, are individuals age 18 or older. We created a composite for all individuals with either COPD or Asthma by adding the numerators for PQI 5 and PQI 15 together and using a denominator consisting of all individuals age 18 or older. In addition, we created a composite of preventable hospitalizations from diabetes by summing the rates across PQIs 1, 3, 14, and 16. Following specifications from AHRQ, the HPC also constructed a composite of preventable hospitalizations for all conditions.

2.3 Analytic approach

Because patient income was not available in the discharge database, the HPC's analyzed differences in preventable hospitalizations by community income (zip-code level) rather than by patient income.

In order to construct community -level measures that were adjusted by age and sex, the HPC calculated rates for each PQI within cells defined by zip code, gender, and age group (18-19, 20-24, 25-29, …, 80-84, 85+) and then produced the adjusted rate by weighting the rate for each demographic group within zip code with a standard set of weights based on the demographic profile of the state as a whole.

Numerators (the number of preventable hospitalizations by PQI, zip code, gender, and age group) were derived from MHDC's discharge database. Denominators (the size of the population by zip code, gender, and age group) came from the ACS' 2008-2012 Massachusetts estimates.

Community income was defined as the median income for the patient's zip code tabulated area (ZCTA). Zip codes were ordered according to their median income, and quartiles were defined so that each quartile contained one-fourth of the population, based on five year estimates from the American Community Survey.

The following numerators and denominators were used for the following years.

For 2012 discharges we used the ACS' 2008-2012 Massachusetts estimates.
For 2013 discharges we used the ACS' 2009-2013 Massachusetts estimates.
For 2014 discharges we used the ACS' 2009-2013 Massachusetts estimates, because 2010-2014 estimates were not available during the analysis.

3 Emergency department utilization

For our ED analysis, we used the Outpatient Emergency Department (ED) Database from the Center of Information and Analysis (CHIA). This dataset is part of CHIA's Acute Hospital Case Mix data. This dataset includes all outpatient emergency department visits, including Satellite Emergency Facility visits, by patients whose visits result in neither an outpatient observation stay nor an inpatient admission at the reporting facility from FY 2010 to FY 2014. The ED database contains patient demographics, clinical characteristics, services provided, charges, and hospitals

and practitioner information, as well as mode of transport. Our study population included patients who were Massachusetts residents with non-missing age and sex attributes. When examining regional ED rates, we adjusted for age and sex.

Our ED utilization analyses use the Emergency Department Algorithm developed by John Billings and colleagues at New York University. NYU has developed software for applying the algorithm using three different applications: SAS, SPSS, and ACCESS – the HPC was able to transfer the algorithm data into STATA coding. The main purpose of the NYU ED Algorithm is to identify emergency department visits for primary care treatable conditions - i.e., visits that could have been provided in primary care setting or emergencies that could have been avoided if primary care had been delivered at earlier stage of illness. The NYU algorithm assigns the probability that each ICD-9 diagnosis code associated with an ED visit falls into one of the four categories: (1) non-emergent; (2) an emergency for a problem requiring contact with the medical system within 12 hours but treatable in an office visit (primary care treatable); (3) an emergency not treatable in an office visit but preventable or avoidable; and (4) an emergency that is not preventable or avoidable. More information on algorithm can be found at http://wagner.nyu.edu/faculty/billings/nyued-background

The ED algorithm provides an estimate of the number of avoidable ED visits within a dataset of ED visits. Following the NYU's ED algorithm, avoidable ED utilization in this report is defined as ED visits that are preventable or avoidable with timely and effective primary care, including three categories: (1) non-emergent; (2) emergency but primary care treatable. We applied the algorithm to ED visits from FY2010-2014.

Additionally, the algorithm also classifies injury, mental health problems, alcohol, or substance abuse separately. Accordingly, these conditions are pulled out of the emergent/non-emergent standard classification. Behavioral health related ED visits are calculated from Billing's classification of mental health, alcohol and substance abuse diagnoses, which are based on primary diagnosis.

4 Individuals with very high ED use

To attribute multiple visits to the same individual, we matched records and defined unique patients using social security number, birthdate, and sex in the ED dataset.

5 Distance to urgent care center or retail clinic

Using National Bureau of Economic Research's ZIP Code Distance Database, we matched zip codes with urgent care centers or retail clinics to every other zip code in Massachusetts to find the minimum distance of residents to an urgent care center or retail clinic. Zip codes with an urgent care center or retail clinic had a distance of 0 miles. We defined the distance by PCSA as

the minimum distance of any zip code in the PCSA to a zip code with an urgent care center or retail clinic.