COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION

TECHNICAL APPENDIX C1
HOSPITAL UTILIZATION

ADDENDUM TO 2019 COST TRENDS REPORT

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1 Summary

This technical appendix describes the Health Policy Commission's (HPC) approach to examining hospital utilization in the 2019 Cost Trends Report.

2 Emergency department (ED) utilization

2.1 Data

For **Exhibit III: All ED visits, avoidable ED visits, and behavioral health ED visits per 1,000 residents, 2013-2018**, HPC used the Emergency Department (ED) Database from the Center of Information and Analysis (CHIA) for 2013-2018. This dataset is part of CHIA's Massachusetts Acute Hospital Case Mix Database and includes all outpatient emergency department visits, including Satellite Emergency Facility visits, by patients whose visits resulted in neither an outpatient observation stay nor an inpatient admission at the reporting facility. The ED database contains patient demographics, clinical characteristics, services provided, charges, and hospitals and practitioner information, as well as mode of transport. The HPC also used the 2013-2018 American Community Survey (ACS) from the U.S. Census Bureau to calculate population rates. For more on this dataset see section Technical Appendix D: Data Sources.

2.2 Analysis

Avoidable Emergency Department Visits

The Billings algorithm is based on work by the NYU Center for Health and Public Service Research. In Billings et al. (1993),[1] the researchers, along with a panel of ED and primary care physicians, develop the following classification for ED visits:

- Non-emergent—The patient's initial complaint, presenting symptoms, vital signs, medical history, and age indicated that immediate medical care was not required within 12 hours;
- Emergent/Primary Care Treatable—Based on information in the record, treatment was required within 12 hours, but care could have been provided effectively and safely in a primary care setting. The complaint did not require continuous observation, and no procedures were performed or resources used that are not available in a primary care setting (e.g., CAT scan or certain lab tests);
- Emergent - ED Care Needed - Preventable/Avoidable—Emergency department care was required based on the complaint or procedures performed/resources used, but the emergent nature of the condition was potentially preventable/avoidable if timely and effective ambulatory care had been received during the episode of illness (e.g., the flare-ups of asthma, diabetes, congestive heart failure, etc.); and
- Emergent - ED Care Needed - Not Preventable/Avoidable—Emergency department care was required and ambulatory care treatment could not have prevented the condition (e.g., trauma, appendicitis, myocardial infarction, etc.).

Avoidable ED visits for **Exhibit III** and **Exhibit IV** are based on the "patched" Billings algorithm, which updates the original crosswalk (ICD-9) to ICD-10 and accounts for any periodic coding changes. See Johnston et al. (2017) for more information.[2]

All map visualizations were done with ESRI's ArcMap 10.4.

Behavioral Health Emergency Department Utilization

HPC's analysis of behavioral health related ED visits was calculated using the Clinical Classifications Software (CCS) diagnostic classifications of mental health, alcohol and substance abuse diagnoses, based on primary diagnosis, for federal fiscal years 2013 to 2018. Some discontinuity in trends by diagnosis between 2015 and 2016 may be attributed to the change in diagnostic coding from ICD-9 to ICD-10 in October 2016.

3 Inpatient admissions

3.1 Data

For **Exhibit V: Total inpatient hospital discharges by payer, 2014-2018** HPC used the Hospital Inpatient Discharge Database (HIDD) from the Center of Information and Analysis (CHIA). This dataset is part of CHIA's Massachusetts Acute Hospital Case Mix Database. The HIDD database contains all discharges from Massachusetts acute hospitals from FY 2014 to FY 2018 and contains comprehensive patient-level information including socio-demographics, clinical data, and charge data. The sample included patients that resided in Massachusetts. HPC obtained the number of enrollees by payer from the 2018 CHIA Enrollment Databook. For more on the CHIA Case Mix Database, see Technical Appendix D: Data Sources.

4 Inpatient discharges in community hospitals

4.1 Data

For **Exhibit VI: Inpatient discharges in community hospitals, 2010-2018**, HPC used the Hospital Inpatient Discharge Database (HIDD) from the Center of Information and Analysis (CHIA). This dataset is part of CHIA's Massachusetts Acute Hospital Case Mix Database. The HIDD database contains all discharges from Massachusetts acute hospitals from FY 2010 to FY 2018 and contains comprehensive patient-level information including socio-demographics, clinical data, and charge data. The sample included patients that resided in Massachusetts. For more on the CHIA Case Mix Database, see Technical Appendix D: Data Sources.

4.2 Definitions

"Community hospitals" are general acute care hospitals that do not support large teaching and research programs. "Teaching hospitals" are defined as hospitals that report at least 25 full-time equivalent medical school residents per one hundred inpatient beds in accordance with Medicare Payment Advisory Commission (MedPAC) guidelines. "Academic medical centers" are a subset of teaching hospitals characterized by (1) extensive research and teaching programs, (2) extensive resources for tertiary and quaternary care, (3) principal teaching hospitals for their respective medical schools, and (4) full service hospitals with case mix intensity greater than 5 percent above the statewide average. These definitions are consistent with CHIA's designations

in the Massachusetts Hospital Profiles, but HPC combines CHIA's community hospitals and community-high public payer hospitals into one community hospital category. Discharges for newborns were identified by using MDC 15.

5 Share of hospital-based care by hospital systems

5.1 Data

For **Exhibit VII: Share of inpatient and outpatient care in the five largest hospital systems and independent hospitals, 2010-2018**, HPC used CHIA's Hospital Cost Reports for 2012-2018.

5.2 Analysis

The HPC estimated combined inpatient and outpatient hospital volume by system. Inpatient discharge volume is reported in the Hospital Cost Reports. Outpatient hospital volume was estimated by dividing outpatient gross patient service revenue (GPSR) by inpatient GPSR per discharge. For example, if inpatient GPSR divided by discharges was $10,000, then every $10,000 of outpatient GPSR would equal one adjusted outpatient discharge. See, e.g., American Hospital Association, Trendwatch Chartbook 2019: Glossary 1 (Nov. 14, 2019), available at aha.org/guidesreports/2019-10-25-trendwatch-chartbook-2019 (describing this metric using the term "adjusted admissions").

For more on the CHIA Hospital Cost Reports, see Technical Appendix D: Data Sources.

[1] Billings et al (1993)."Impact of Socioeconomic Status on Hospital Use in New York City, Health Affairs (Spring 1993).
[2] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5517669/