COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION

TECHNICAL APPENDIX B2
CHANGES IN INPATIENT SEVERITY OF ILLNESS

ADDENDUM TO 2019 COST TRENDS REPORT

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1 Summary

This section describes the Health Policy Commission's (HPC) approach to the analyses contained in **Chapter 3.1: "Changes in inpatient severity of illness"** of the 2019 Cost Trends Report.

2 Data

2.1 Data sources

The HPC used the Center for Health Information and Analysis' Hospital Inpatient Discharge Database (HIDD) FY2010 through FY2018. This dataset contains discharge level data covering socio-demographic characteristics of the patient and other details of their admission, including reason for, duration of, and services and procedures provided during the admission. Each inpatient discharge was assigned one or more versions of the 3M APR™DRG (v26, v30, v34, v36) and one version of the MS-DRG that corresponded to the year.

The Center for Health Information and Analysis' All-Payer Claims Database (APCD) was used for payment estimates. The Center for Health Information and Analysis' Annual Report on the Performance of the Massachusetts Health System TME databooks were used in cost estimates.

Other data sources included 3M APR™DRG classification system v30.0, v34.0, MassHealth publically available weights (2015-2018), and Medicare MS-DRG weights and LOS for 2013-2018.

For more information on these sources, see **Technical Appendix D: "Data Sources."**

2.2 Exclusions

For the purposes of this analysis, HPC excluded all discharges with a primary diagnosis of mental health and substance abuse disorders, transfers out of the hospital, patients who died during their stay, and length of stay (LOS) outliers.

Inpatient stays in major diagnostic category MDC 19 and MDC 20 were excluded because the acute-hospital discharge data base does not have all inpatient stays related to these conditions as some occur in behavioral health (non-acute care) hospitals.

Transfers to another hospital were also excluded to avoid double-counting an admission. Transfers also do not represent a complete treatment course for the patient and so may not have an accurate DRG. Likewise, patients who died are also excluded because they do not represent a full course of treatment.

Length of stay outliers were excluded because many payers pay for such cases on a per-diem or estimated cost basis. Each payer may have different methodologies for determining such outliers.

For purposes of this study, HPC excluded any discharges with LOS longer than 5 times the median LOS for that MS-DRG. Nationwide median LOS estimates for each MS-DRG originated from the dataset with Medicare MS-DRG weights produced by CMS.

After exclusions, 87.8 percent of discharges (4,221,738) remained in the analysis.

3 Analysis

3.1 Change in risk scores over time

The risk score series is created by first deriving each payer's aggregate risk score in a given year across all provider groups from CHIA's reported full-claims commercial TME by payer (available in databooks associated with the Annual Reports). The risk score is calculated as the weighted average unadjusted TME divided by the weighted average adjusted TME. Payer risk score methodology is usually constant within a three-year data series as reported by CHIA. Thus, CHIA's 2019 annual report, which reports on data years 2016-2018, is used to compute risk score growth for each payer from 2016 to 2017. The 2018 annual report is used to calculate risk score growth for each payer from 2015 to 2016. The year-to-year risk score growth percentages are accumulated in the exhibit shown, with 2013 defined as zero. As noted, several payers were dropped from the analysis due to anomalous jumps in risk scores from one year to another within a databook (suggesting a change in methodology), or due to large swings due to small, or greatly fluctuating, membership from year to year.

3.2 Measuring acuity trends

Acuity changes were measured using two alternative DRG systems: MS-DRG and 3M APR™DRG. To estimate acuity changes according to MS-DRG system, HPC used the current MS-DRG version assigned to discharges in every year along with corresponding MS-DRG weight for the same version. Medicare updates the MS-DRG version on an annual basis.

To estimate acuity trends according to the 3M APR™DRG system, HPC used version 30.0 of an APR-DRG system assigned to discharges throughout 2013-2018 period (as recommended by CHIA). Many commercial payers reported using this version for several or all of the years during this study period. Both 3M APR™DRG weights for v30.0 well as MassHealth APR-DRG v30.0 were applied to all discharges in analysis dataset, yielding similar acuity trends.

To estimate by-payer acuity changes between 2013 and 2018, the HPC separated discharges by payer (Medicare, MassHealth, commercial) and applied the weights for that respective payer according to the payment system they use (MS-DRG with Medicare discharges, MassHealth weights for MassHealth, both MS-DRG and 3M APR™DRG weights for commercial discharges).

3.3 Calculating intensive care utilization (ICU) and length of stay (LOS)

Units of intensive care used for every admission were summarized by adding together units used for ICU, cardiac care unit (CCU), and neonatal ICU (NICU) based on revenue codes corresponding to that inpatient discharge.

As a sensitivity measure, we also included intermediate ICU use along with the other intensive care measures. Even when including intermediate ICU usage, the HPC found that all ICU use still decreased from 2013 to 2018.

3.4 MassHealth COPD payments

MassHealth COPD payments were calculated using the MassHealth weights for 3M APR™DRG v34.0. These went into effect in March of 2018. MassHealth payment was calculated using the payment formula: MassHealth APR-DRG weight*adjudicated payment amount per discharge (APAD).

3.5 Septicemia and related conditions

To identify conditions related to APR-DRG 720 (septicemia) v26.0, HPC:

- examined the most frequent secondary diagnoses for the stays with this septicemia DRG,
- examined volume change in DRGs with related diagnoses identified in previous step (e.g. pneumonia)
- confirmed the selected secondary diagnosis and their related DRGs with literature review and expert clinical input

Average commercial payment for inpatient stay with septicemia was estimated using allowed amounts from 2016 in the APCD v.6.0. These claims were identified using the MS-DRG for septicemia instead of the APR-DRG because it was more completely populated in the data. MS-DRG and APR-DRG systems have a high concordance for their septicemia DRG (99% of septicemia cases in APR-DRG system are also coded as septicemia in MS-DRG system). The payment for pneumonia, UTI and other related conditions were calculated in the same fashion.

3.6 Cost estimates

Cost estimates were calculated for Medicare by estimating the increase in acuity (average weight) using the MS-DRG system from 2013 to 2018 and applying this percentage increase to inpatient spending for Massachusetts Medicare beneficiaries according to CHIA's annual report.

Cost estimates were calculated for commercial spending by applying the ratio of average acuity in 2013 to average acuity in 2018 according to either the MS-DRG system or the 3M APR™DRG v30.0 system (depending on which DRG version each commercial insurer used) to commercial spending in 2018, but with the following caveats: we assumed that 60 percent of commercial inpatient stays were covered by payers that used the same APR-DRG weights in

2013 and 2018 and paid hospitals proportionally according to those updates; 15 percent of stays were covered by payers using the MS-DRG system which is automatically updated annually; 25 percent of stays had no financial impact of acuity increases – either because they were paid per-diem, because APR-DRG version updates offset acuity increases, or there were some additional contract-based spending offsets to acuity increases.

Estimated behavioral health payments were subtracted from the total spending prior to applying the acuity factor for both Medicare and commercial payer cost estimates.