COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION

TECHNICAL APPENDIX CX
PROVIDER ORGANIZATION PERFORMANCE VARIATION: A FOCUS ON UTILIZATION

ADDENDUM TO 2019 COST TRENDS REPORT

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1 Summary

This appendix describes the Health Policy Commission's (HPC) approach to examining provider organization performance variation of the 2019 Cost Trends Report.

2 Patient Attribution Methodology

2.1 Data

The HPC used the 2017 Registration of Provider Organizations (RPO) and the SK&A Information Services by IQVIA (SK&A) Office Based and Hospital Based Providers dataset to identify providers and create a "Provider File." The HPC then used the Center for Health Information and Analysis All-Payer Claims Database v7.0 (APCD) to attribute patients observed in the APCD to provider organizations in Massachusetts. The HPC's APCD has data from five commercial payers in the state: Blue Cross Blue Shield, Tufts Health Plan, Harvard Pilgrim Health Care, Neighborhood Health Plan[1], and Anthem (Unicare).

2.2 Provider File

These steps describe the creation of the provider file used in the provider attribution methodology. As described below, the member attribution process requires a file of all providers and their National Provider Identifiers (NPIs), as well as a list of only the primary care providers (PCPs) and their NPIs.

Overall provider file:

To create the overall provider file, the HPC combined 2017 RPO data with December 2017 SK&A data. After excluding any providers missing NPIs and removing duplicate entries of providers who may appear in both files, the final provider file includes 32,176 providers, 26,714 from RPO and 5,462 from SK&A.

Primary care provider file:

The HPC defined primary care providers from this list as follows. For the providers in RPO, the HPC included all providers who self-report that they practice as a primary care provider, a pediatrician, or both. The HPC identified PCPs from the SK&A file by using these self-reported specialties: Family practitioner, General practitioner, Internal medicine, Pediatrician, IMP. The PCP file also includes Nurse Practitioners from SK&A (NPs are not included in the RPO data) who self-reported a primary care specialty.

The final PCP file includes 12,049 PCPs, 10,278 from RPO and 1,771 from SK&A.

[1] On January 1, 2019 Neighborhood Health Plan officially became AllWays Health Partners. This transition reflects a redirected business strategy following the 2012 acquisition of Neighborhood Health Plan by Partners HealthCare.

2.3 Attribution Methodology

These steps describe the attribution methodology that relies on the primary care provider file created in 2.2 above.

Individuals with a payer-reported PCP in the member eligibility file:
There are 1,883,279 unique members in the HPC's 2017 commercial analytic file of the APCD. The member eligibility file enables assignment of 62% (1,172,867) of members who have an identifiable PCP in their record.

Step-wise PCP assignment using the medical claim file and pharmacy claim file:
The remaining unassigned members were then linked to their medical claims to identify primary providers of well visits, sick visits, and most frequent prescriber in the pharmacy claim file. Well visits are defined as any claims with the following procedure codes: G0438, G0439, V2020, V2030, V7000, V7030, V7050, V7060, V7080, V7090, 99381-99387, 99391-99397, 99401-99404, 99411-99412, 99420, 99429, 99432, 99461. Sick visits are defined as any claims with the following procedure codes: 99201-99205, 99211-99215. Claims that were identified as either well or sick visits were limited to sites of service where patients would be expected to see a PCP [excluding 01 (pharmacy), 17 (retail clinic), 20 (urgent care), 21 (inpatient hospital), 23 (emergency department), 41 (ambulance), 42 (air ambulance), 51 (inpatient psychiatric facility), 52 (psychiatric facility, partial hospitalization), 53 (community mental health), 55 (residential SUD treatment), 56 (psychiatric residential treatment), 57 (non-residential SUD facility), 62 (outpatient rehab facility), 65 (end stage renal disease facility), 81 (independent lab)]. If a member was not linked to a PCP through a well visit, or sick visit, we then reviewed their pharmacy claims to determine if there was a primary prescriber.

In total, there are 1,485,652 individuals attributed to a provider organization in 2017. Of these members, 1,319,696 members are attributed to 13 of the largest (non-specialty) provider organizations with at least 15,000 attributed commercial members.

3 Study population

For the subsequent analyses, the study population is broadly defined as commercial members who were attributed to a provider organization with at least 15,000 attributed members. We therefore report on the 13 largest provider organizations as they exist in the most current data year available, 2017. The study population is further limited to commercially-insured adults who are at least 18 years old with continuous enrollment (12 months of insurance coverage). Additional study population inclusion and exclusion criteria apply for analyses on medication adherence (4.3) and low value care (4.4) and are detailed below.

For all analyses reported as a rate of an event per 1,000 attributed commercial members (ED utilization and inpatient utilization), the underlying data on the commercial member population reflection by provider organization is below.

Provider organization	Attributed commercial adults
Atrius	124,173
Baystate	28,591
BIDCO	94,672
BMC	34,574
Lahey	52,968
MACIPA	25,873
Partners	186,916
Reliant	26,483
South Shore	16,038
Southcoast	13,706
Steward	112,354
UMass	58,659
Wellforce	90,333
Total	865,340

4 Analyses

4.1 Emergency Department Utilization

Emergency department (ED) visits were identified in the 2017 commercial medical claims using procedure codes (CPT) that indicate a professional service was delivered in the emergency department (99281-99285), and any claim lines with HCCI_OTP_CODE equal to 1, indicating that a claim line is from a facility claim originating from an emergency department.

An ED encounter was established as an ED visit for the same member on the same date of service. Claims with a populated admitting diagnosis, indicating that an ED visit turned into a hospital admission, were excluded from subsequent analyses.

A predominant diagnosis across all relevant claim lines for each ED encounter was established by using the diagnosis code that was most commonly populated for each ED encounter. If there was a tie, a diagnosis that matched the patched billings algorithm to identify potentially avoidable emergency department visits was prioritized to ensure classification of the visit. If all or no diagnosis codes had a match with this algorithm, then a random selection was done to identify a single diagnosis code to represent all claim lines of the encounter.

<u>Overall Emergency Department Utilization</u>

Overall ED utilization is defined as the sum of all ED visits for all attributed members of a particular provider organization that are included in the study population defined in Section 3. The rate of overall ED utilization is reported as an adjusted rate of ED visits per 1,000 attributed patients for comparability across different provider organizations that vary in the size of their attributed patient populations and to control for patient characteristics that may vary across provider organizations. The adjusted rate is established through a multivariable regression analysis controlling for patient-level and community-level variables (see more below).

Potentially Avoidable Emergency Department Utilization

Potential avoidable emergency department utilization reporting relies on the Billings algorithm based on landmark work by the NYU Center for Health and Public Service Research. In Billings et al. (1993),[i] 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.).

The Billing algorithm was updated in 2017 (Johnston 2017) to reflect coding changes and the introduction of ICD-10. More information on the "patched" Billings algorithm which was used in this analysis can be found: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5517669/.

For the purposes of reporting, the rate of potentially avoidable emergency department utilization is a weighted sum of the non-emergent and emergent/primary care treatable category values reported as a rate per 1,000 attributed patients adjusted for patient-level and community-level variables.

Mental Health-Related Emergency Department Utilization

Mental health-related ED utilization is defined as the sum of all mental health-related ED visits for all attributed members of a particular provider organization that are included in the study population defined in Section 3. Mental health-related ED utilization is reported as an adjusted rate of ED visits per 1,000 attributed patients for comparability across different provider organizations that vary in the size of their attributed patient populations and to control for patient characteristics that may vary across provider organizations. The adjusted rate is established through a multivariable regression analysis controlling for patient-level and community-level variables (see more below).

Mental health-related ED visits are identified using Clinical Classifications Software (CCS) diagnostic classifications for mental health based on the most frequently used primary diagnosis for an ED encounter.

4.2 Hospital Utilization

Overall Inpatient Stays

Inpatient stays are reported as an adjusted rate per 1,000 attributed patients for comparability across different provider organizations that vary in the size of their attributed patient populations and to control for patient characteristics that may vary across provider organizations. The adjusted rate is established through a multivariable regression analysis controlling for patient-level and community-level variables (see more below).

Ambulatory-Sensitive Inpatient Stays

To report on the adjusted rate of ambulatory-sensitive inpatient stays, the HPC adapts the Agency for Healthcare Research and Quality's (AHRQ) Prevention Quality Indicators (PQIs), a set of measures that can be used to identify the quality of care for "ambulatory care sensitive conditions". This analysis uses version 7.0 of the PQIs, released in June 2018. HPC used the Prevention Quality Overall Composite (PQI 90) for this analysis which included the following conditions: PQI 1—Diabetes Short-term Complications Admission Rate; PQI 3—Diabetes Long-term Complications Admission Rate; PQI 5—Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate; PQI 7—Hypertension Admission Rate; PQI 8—Heart Failure Admission Rate; PQI 10 – Dehydration Admission Rate; PQI 11 – Bacterial Pneumonia Admission Rate; PQI 12 – Urinary Tract Infection Admission Rate; PQI 14—Uncontrolled Diabetes Admission Rate; PQI 15—Asthma in Younger Adults Admission Rate; and PQI 16—Lower-Extremity Amputation among Patients with Diabetes Rate.

4.3 Medication Adherence

Statins for CVD

For this analysis, a cohort of patients with a recorded diagnosis of CVD diagnosed with CVD on the basis of their medical claims was identified using the first seven populated diagnoses. The earliest claim with a populated CVD diagnosis was retained as an index diagnosis date.

Based on clinical practice guidelines, patients were included in this measure if they were between the ages of 21 and 75 years old for men and between the ages of 40 and 75 for women. Claims with missing age and sex information were excluded from analysis. This member roster was saved.

Separately, a subset of pharmacy claims that matched a statin prescription on the basis of a drug's NDC code was created. The earliest prescription date filled was identified, and a sum of the reported supply of a prescription was calculated by patient for the 2017 data year.

Pharmacy records of members with a previously identified CVD diagnosis were retained. A time period variable was generated to calculate the maximum amount of days (out of one year) that a member could possibly have observed statin coverage. The proportion of days covered (PDC) was calculated by member as the sum of the total days' supply over the year divided by the number of days from the first fill to the end of the year.

Based on existing medication adherence guidelines for statins, a threshold of 80% for PDC was used to establish a definition for adherence. Commercial members with insurance from Anthem were excluded from this analysis due to data quality issues with the pharmacy claims data.

4.4 Low Value Care

Identifying a Low Value Service

The measures generally adhere to the following logic:

- Measure exclusions: Remove all claims for patients that have at the time of the procedure, or in their claims history, have had any diagnosis code for which the procedure in question may be indicated.

- Identify the eligible population (denominator): Use ICD-10 codes and/or CPT codes to capture all encounters. Encounters were defined as unique patient on a unique date.

- Identify LVC service (numerator): Identify all encounters that include a claim for the procedure code that is of low value for the eligible population.

The HPC took a conservative approach in implementing the existing measures. For example, only the first screening identified in a patient's claim history was labeled as being low value. If that patient received more than one non-indicated screening test, all subsequent tests were considered monitoring, not screening, based on clinical opinion.

Analysis Timeframe

We measured low value services that occurred in 2017 claims data. Claims from 2016 were included as a "look-back period" to determine whether members should be included in the eligible population. For example, if a patient received a hypothyroidism diagnosis in July 2016 and subsequently received a T3 test in August 2016 and March 2017, only the March 2017 T3 test was included in the calculation of low value use and spending for the purpose of reporting on low value care in 2017.

Low Value Care Spending

After identifying the low value encounters, the HPC calculated spending by only including spending on the specific claim line attached to the LVC service. Some claim amounts (e.g., $0) were determined to be not representative of the actual cost because these services were likely paid under a global payment, capitated encounter records, or secondary payments where another carrier covers a portion of the reimbursement. Claims with these amounts were counted in total spending by imputing the median spending for the particular procedure code in the eligible population.

As previously mentioned, these low value care spending estimates only include the 7 services that were used in the study and do not represent all low value services. Spending includes insurer and enrollee payments for covered medical services.

Measure Source and Specification

Screening		
T3 screening for patients with hypothyroidism	Schwartz AL, Jena AB, Zaslavsky AM, McWilliams JM. Analysis of Physician Variation in Provision of Low-Value Services. JAMA Intern Med. 2019 Jan 1;179(1):16-25.	**Eligible population:** CCW codes (ICD-10) for acquired hypothyroidism **Exclusions:** None **Numerator:** Total or free T3 test. CPT: 84480 84481
Stress testing for patients with an established diagnosis of ischemic heart disease or angina	Schwartz AL, Landon BE, Elshaug AG, Chernew ME, McWilliams JM. Measuring low-value care in Medicare. JAMA Intern Med. 2014 Jul;174(7):1067-76.	**Eligible population:** CCW codes (ICD-10) for ischemic heart disease **Exclusions:** None **Numerator:** Cardiac stress testing. CPT: 93015 93016 93017 93018 93350 93351 78451 78452 78453 78454 78460 78461 78464 78465 78472 78473 78481 78483 78491 78492

Vitamin D screening for patient without chronic conditions	Mafi JN, Russell K, Bortz BA, Dachary M, Hazel WA Jr, Fendrick AM. Low-Cost, High-Volume Health Services Contribute The Most To Unnecessary Health Spending. Health Aff (Millwood). 2017 Oct 1;36(10):1701-1704. Colla CH, Morden NE, Sequist TD, Schpero WL, Rosenthal MB. Choosing wisely: prevalence and correlates of low-value health care services in the United States. J Gen Intern Med. 2015 Feb;30(2):221-8.	**Eligible population:** All patients **Exclusions:** Members who had 25-Ohvitamin D screening and diagnosis of chronic conditions within 1 year on or prior to the testing. ICD-10: E550 E559 E643 M83 N18 K7200 E8411 E8419 E848 E849 K50 K51 K520 Z9884 K7030 K740 K7460 K7469 K743 K744 K745 E8351 E8352 E673 E678 Q780 Q782 M3210 M3390 M889 Z79891 Z79899 G737 L400 L401 L402 L403 L404 L4050 L4051 L4052 L4053 L4054 L4055 L4056 L4057 L4058 L4059 L408 L409 E210 E211 E212 E213 E214 E215 Z7951 Z7952 K900 K901 K902 K903 K904 K9089 K909 K7201 K762 K7031 K702 K741 K742 K7689 K760 K7581 K7291 K7211 K7041 K7111 K7290 K912 N251 E209 E200 E208 E892 M833 E840 E662 E672 E68 L419 L410 L411 L418 L413 L414 L415 L945 M899 M949 M859 M32 M33 M360 M88 M81 M80 Members who had 25-Ohvitamin D screening and diagnosis of risk factors within 90 days on or prior to the testing. ICD-10: D86 A15 A17 A18 A19 B39 B38 J63 C81 C82 C83 E440 E83 G40 C84 C85 C86 C96 C88 C91 Members who had 25-Ohvitamin D screening and diagnosis of pregnancy and obesity on the day of the testing. ICD-10: O02 O03 O69 O04 O07 Z33 O08 A34 O20 O44

		O45 O46 O67 O10 O11 O13 O16 O14 O15 O21 O90 O33 O30 O36 O09 O71 Z32 O68 O60 O23 O9A O31 O35 O76 O72 Z36 O77 O47 O99 O25 O32 O40 O62 O73 E66 O00 O48 O29 O34 O64 O41 O63 O74 Z68 O12 O98 O75 O66 O42 O43 O82 O01 O26 O24 O80 O65 O61 O70 Z34 P50 Members who had 25-Ohvitamin D screening and diagnosis of falls and non-traumatic fracture within 1 year on or prior to the testing. ICD-10: Z9181 Z87311 Z87310 Members who had 1, 25-(OH)2-vitamin D screening and diagnosis of inherited or acquired disorders of vitamin D and phosphate metabolism within 90 days on or prior to the testing. ICD-10: D86 A15 A17 A18 A19 B39 B38 J63 C81 C82 C83 E44 E83 C84 C85 C86 C96 C88 C91 M83 N18 **Numerator:** Vitamin D test. CPT: 82306 82652
Preoperative Testing		
Chest radiographs occurring ≤30d before a low- or intermediate-risk non-cardiothoracic surgical procedure (not associated with inpatient or emergency care)	Schwartz AL, Landon BE, Elshaug AG, Chernew ME, McWilliams JM. Measuring low-value care in Medicare. JAMA Intern Med. 2014 Jul;174(7):1067-76.	**Eligible population:** Patients undergoing a low- or intermediate-risk non-cardiothoracic surgical procedure. BETOS: P1x P3D P4A P4B P4C P5C P5D P8A P8G. CPT: 19120 19125 47562 47563 49560 58558 **Exclusions:** None **Numerator:** Chest X-Ray. CPT: 71010 71015 71020-71023 71030 71034 71035
Baseline labs in patients without significant systemic disease undergoing low-risk surgery	Mafi JN, Russell K, Bortz BA, Dachary M, Hazel WA Jr, Fendrick AM. Low-Cost,	**Eligible population:** Patients undergoing a low- or intermediate-risk non-

	High-Volume Health Services Contribute The Most To Unnecessary Health Spending. Health Aff (Millwood). 2017 Oct 1;36(10):1701-1704.	cardiothoracic surgical procedure. BETOS: P1x P3D P4A P4B P4C P5C P5D P8A P8G. CPT: 19120 19125 47562 47563 49560 58558 **Exclusions:** All services where the low risk surgery falls on or 1 day after the E&M visit for emergency care, observation or urgent care visit. CPT: 99217 99219 99226 99284 99218 99220 99281 99285 99224 99282 99225 99283 5160 4590 7620 9810 4500 4520 All electrolyte testing laboratory related services. CPT: 82374 82435 80051 82435 80047 80053 84132 80048 84295 80050 All services with a diagnosis of endocrine, liver or renal disorders. ICD-10: E08 E09 E10 E11 E13 E16 E20 E21 E22 E23 E24 E25 E26 E27 E28 E29 E30 E31 E32 E34 E35 E89 K70 K71 K72 K73 K74 K75 K76 K77 K80 K81 K82 K83 K87 K91 M3214 M3215 M3504 N00 N01 N02 N03 N04 N05 N06 N07 N08 N11 N14 N15 N16 N17 N18 N19 N25 N26 N27 CBC testing related services and a diagnosis of anemia or history suggestive of recent blood loss in the last 6 months prior to the CBC testing. CPT: 85014 85018 G0306 85025 G0307 85027 85032. ICD-10: C966 D5* D6* D71* D72* D73* D74* D75* D761 D762 D763 I8501 I880 I881 I882 I883 I884 I885 I886 I887 I888 I889 K270 K272 K920 K921 K922 R58 Z832 Coagulation testing related

		services in those with a diagnosis of coagulation disorders up to 2 years prior to the coagulation testing event or on anticoagulant medications 3 months prior to the coagulation testing. CPT: 85002 85611 85049 85730 85055 85732 85610. ICD-10: D65-D69.9 **Numerator:** Laboratory tests. CPT: 80047 80048 80050 80051 80053 81000 81001 81002 81003 81005 81007 81020 81050 81099 82040 82247 82310 82330 82374 82435 82565 82947 82948 82950 82953 84075 84132 84155 84295 84450 84460 85002 85014 85018 85025 85027 85032 85049 85055 85610 85611 85730 85732 95250 95251 G0306 G0307
Procedures		
Coronary stent placement or balloon angioplasty for patients with an established (≥6 mo before the procedure) diagnosis of ischemic heart disease or angina (not associated with an ED visit)	Schwartz AL, Landon BE, Elshaug AG, Chernew ME, McWilliams JM. Measuring low-value care in Medicare. JAMA Intern Med. 2014 Jul;174(7):1067-76.	**Eligible population:** CCW codes (ICD-10) for ischemic heart disease **Exclusions:** None **Numerator**: Stenting and balloon angiography. CPT: 92928 92933 92929 92934 92920 92921
Outpatient epidural, facet, or trigger point injections for lower back pain	Schwartz AL, Jena AB, Zaslavsky AM, McWilliams JM. Analysis of Physician Variation in Provision of Low-Value Services. JAMA Intern Med. 2019 Jan 1;179(1):16-25.	**Eligible population:** Patients with low back pain. ICD-10: M47817 M47819 M5126 M519 M5136 M5134 M961 M961 M4647 M4800 M4806 M4806 M545 M5489 M4327 M533 M532X8 M533 M4300 M9983 M9903 M9904 Q762 S338XXA S336XXA S338XXA S338XXA S338XXA S339XXA S335XXA M5127 M5137 M5135 M5186 M549 M4328 M4310 M9984 M5136

		M5187 M532X7 M5137 M533 I256 I25700 I25701 I25708 I25709 I25710 I25711 I25718 I25719 I25720 I25721 I25728 I25729 I25730 I25731 I25738 I25739 I25750 I25751 I25758 I25759 I25760 I25761 I25768 I25769 I25790 I25791 I25798 I25799 I25810 I25811 I25812 I2582 I2583 I2584 I2589 I259 I2101 I2102 I2109 I2111 I2119 I2121 I2129 I213 I214 I219 I21A1 I21A9 I220 I221 I222 I228 I229 **Exclusions:** Patients with radicular back pain. ICD-10: M4716 M4710 M519 M5106 M5430 M5414 M5107 M5415 M5416 M5417 J1438 **Numerator:** Spinal injections. CPT: 62311 64483 20552 20553 64493 64475

5 Control variables

Adjusted rates are the de facto reported figures for all analyses except for those pertaining to low value care (section 4.4). Adjusted rates take into account the potential differences across provider organizations in patient health status [risk scores are assigned to using the Johns Hopkins Adjusted Clinical Groups Case-Mix System (ACG®) software], age, sex, patient insurance type, and insurer type.

In addition to these variables, community-level variables from the 2017 American Community Survey were linked at the member zip code level and include:

- Median family income
- Median home value
- Percent of employed persons ages 16 and over in white collar occupations
- Percent of single parent households with dependents under age 18
- Whether or not the population ages 25 and over with at least a high school education is over 80%
- Percent of population on food stamps/SNAP
- Percent of population who have lived in the same house in the past 12 months
- Percent of population ages 16 and over who are unemployed

A multivariable regression model was used to calculate adjusted rates. For each analysis, all independent variables were means-centered and reported adjusted rates were scaled per 1,000 attributed measures.

[i] Billings et al (1993).“Impact of Socioeconomic Status on Hospital Use in New York City, Health Affairs (Spring 1993).