



2025

**ANNUAL HEALTH
CARE COST TRENDS
REPORT**

TECHNICAL APPENDICES

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TECHNICAL APPENDIX 1

ACUTE CARE HOSPITALS IN MASSACHUSETTS BY TYPE OF HOSPITAL

ADDENDUM TO THE 2025 COST TRENDS REPORT

Technical Appendix 1: Acute Care Hospitals in Massachusetts by Type of Hospital

(Adapted from CHIA's Hospital Profiles Databook FY2019 through FY2023; for hospitals that switched cohort, please see detail in the cohort column)

Hospital	Cohort	Region (HPC)
Beth Israel Deaconess Medical Center	AMC	Metro Boston
Boston Medical Center	AMC	Metro Boston
Brigham and Women's Hospital	AMC	Metro Boston
Massachusetts General Hospital	AMC	Metro Boston
Tufts Medical Center	AMC	Metro Boston
UMass Memorial Medical Center	AMC	Central Massachusetts
Baystate Medical Center	Teaching	Western Massachusetts
Cambridge Health Alliance	Teaching	Metro Boston
Lahey Hospital & Medical Center	Teaching	Northeastern Massachusetts
Mount Auburn Hospital	Teaching	Metro Boston
Saint Vincent Hospital	Teaching	Central Massachusetts
Steward Carney Hospital	Teaching	Metro Boston
Steward St. Elizabeth's Medical Center	Teaching	Metro Boston
Beth Israel Deaconess Hospital - Milton	Community	Metro Boston
Beth Israel Deaconess Hospital - Needham	Community	Metro Boston
Emerson Hospital	Community	Northeastern Massachusetts
Milford Regional Medical Center	Community	Metro West
Nantucket Cottage Hospital	Community	Cape and Islands
Newton-Wellesley Hospital	Community	Metro Boston
Winchester Hospital	Community	Northeastern Massachusetts
Anna Jaques Hospital	Community (FY2019-FY2022), Community HPP (FY2023)	Northeastern Massachusetts
Athol Memorial Hospital	Community - High Public Payer	Central Massachusetts
Baystate Franklin Medical Center	Community - High Public Payer	Western Massachusetts
Baystate Noble Hospital	Community - High Public Payer	Western Massachusetts
Baystate Wing Hospital	Community - High Public Payer	Western Massachusetts
Berkshire Medical Center	Community - High Public Payer	Western Massachusetts
Beth Israel Deaconess Hospital - Plymouth	Community - High Public Payer	Metro South
Brigham and Women's Faulkner Hospital	Community (FY2019-FY2022), Community HPP (FY2023)	Metro Boston
Cape Cod Hospital	Community - High Public Payer	Cape and Islands
Cooley Dickinson Hospital	Community (FY2019, FY2020)/ Community HPP (FY2021-FY2023)	Western Massachusetts
Fairview Hospital	Community - High Public Payer	Western Massachusetts
Falmouth Hospital	Community - High Public Payer	Cape and Islands
Harrington Memorial Hospital	Community - High Public Payer	Central Massachusetts
HealthAlliance-Clinton Hospital	Community - High Public Payer	Central Massachusetts
Heywood Hospital	Community - High Public Payer	Central Massachusetts
Holyoke Medical Center	Community - High Public Payer	Western Massachusetts
Lawrence General Hospital	Community - High Public Payer	Northeastern Massachusetts
Lowell General Hospital	Community - High Public Payer	Northeastern Massachusetts
Martha's Vineyard Hospital	Community (FY2019-FY2022), Community HPP (FY2023)	Cape and Islands
Marlborough Hospital	Community - High Public Payer	Metro West
MelroseWakefield Hospital	Community - High Public Payer	Metro Boston
Mercy Medical Center	Community - High Public Payer	Western Massachusetts
MetroWest Medical Center	Community - High Public Payer	Metro West
Morton Hospital, A Steward Family Hospital	Community - High Public Payer	Metro South
Nashoba Valley Medical Center, A Steward Family Hospital	Community - High Public Payer	Northeastern Massachusetts
North Shore Medical Center	Community - High Public Payer	Northeastern Massachusetts
Northeast Hospital	Community - High Public Payer	Northeastern Massachusetts
Signature Healthcare Brockton Hospital	Community - High Public Payer	Metro South
South Shore Hospital	Community (FY2019-FY2022), Community HPP (FY2023)	Metro South
Southcoast Hospitals Group	Community - High Public Payer	Southcoast
Steward Good Samaritan Medical Center	Community - High Public Payer	Metro South
Steward Holy Family Hospital	Community - High Public Payer	Northeastern Massachusetts
Steward Norwood Hospital (temporarily closed Spring 2020)	Community - High Public Payer	Metro West
Steward Saint Anne's Hospital	Community - High Public Payer	Southcoast
Sturdy Memorial Hospital	Community - High Public Payer	Metro West

Note: Specialty hospitals are not included in these cohorts.



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TECHNICAL APPENDIX 2

TRENDS IN SPENDING AND CARE DELIVERY

ADDENDUM TO THE 2025 COST TRENDS REPORT

2.1 Summary

This appendix describes the Health Policy Commission's (HPC) approach to examining broad trends in health care spending, value, and performance in Massachusetts.

2.2 Data sources

The HPC used a variety of sources to produce this section of the Cost Trends Report. Namely, the HPC used the Center for Health Information and Analysis (CHIA) Annual Report from 2013 through 2025 and CHIA's All-Payer Claims Database v2023 from 2019 through 2023. Sources for national data to compare trends between the U.S. and Massachusetts are from the Centers for Medicare and Medicaid Services (CMS) National Health Expenditure Accounts from 2019 to 2023 and other non-public CMS data books. See details in the notes and sources under each exhibit for data sources used to create each figure.

Analyses using the APCD's medical claims include data from seven commercial payers in the state: Blue Cross Blue Shield of Massachusetts, Tufts Health Plan, Harvard Pilgrim Health Care, Mass General Brigham Health Plan (MGBHP), Health New England, Elevance (formerly known as Anthem and includes Wellpoint, a GIC offering), and UnitedHealthcare. Due to a lack of pharmacy claims, Elevance data are excluded in prescription drug claim analyses (noted in notes and sources where applicable).

For percentage growth from 2022 to 2023 and 2019-2023 (average annual) for various quantities in Massachusetts, HPC used CHIA Annual Report, 2019 to 2023, BLS Consumer Price Index and Employment Cost Index, 2019 to 2023, AHRQ Medical Expenditure Panel Survey, 2019 to 2023 Bureau of Economic Analysis (BEA), 2019 to 2023, and American community survey, 2019 to 2023.

For percentage of surveyed respondents indicating each health care affordability issue, HPC used CHIA's Massachusetts Health Insurance Survey, 2023.

For projected monthly after-tax, after health care take home pay for an average Massachusetts household with employer-based coverage under two scenarios of premium growth, the HPC used data from CHIA Annual report, 2022 to 2025, and Massachusetts Employer Survey, 2021, as well as data from AHRQ Medical Expenditure Panel Survey, 2022 to 2025.

2.3 Commercial spending analyses

The following analyses used CHIA's All-Payer Claims Database for the years stated.

2.3.1 Annual change (2022-2023) and average annual change (2019-2023) in prices and per-member utilization of key service categories for the Massachusetts commercial population

For Exhibit 2.5, price and utilization change for selected categories of care were calculated from the Massachusetts APCD V2023 for the years 2019 through 2023.

E&M visits reflect professional spending at physician offices (place of service code 11) and are procedure-code encounters (same person, same procedure code, same date of service). E&M services retained include CPT 99201-99215. Price growth reflects the annual and average annual change in average price for the CPT codes examined from 2019 to 2023. Utilization change reflects the annual and average annual change in utilization per member per year from 2019 to 2023. Utilization per member per year reflects the number of E&M visit encounters divided by member years in the APCD for each year examined.

Outpatient surgeries

HPC identified surgical encounters as all surgical, anesthesia and other services on the day of major surgical procedure conducted in outpatient setting adding all costs of the day of surgery to calculate surgery price. Major surgical procedure is defined as surgery flag=2 in [HCUP surgery flag software](#).

Whenever an encounter had multiple surgical procedures performed on the same day, the procedure with the highest work RVU value and the highest payment was designated to be the main surgical procedure on the encounter. Surgical encounters that coincided with ED visits or inpatient stays were excluded. HPC calculates change in utilization as change in number of outpatient surgical encounters per member per month.

Price change is estimate as growth in spending due to price changes, where the distribution of surgeries across CPT codes stays fixed at 2023 level. For example, for the 2019-2023 time period, the formula is as follows:

$$Price\ change\ 2019\ to\ 2023 = \frac{\sum Pi2023 * Ni2023}{\sum Pi2019 * Ni2023}$$

where *i* is each CPT code for which sample has 20 or more observation in both years for each hospital. This resulting price change from 2019 to 2023 is then annualized to represent average annual price growth over the period.

2.3.2 Annual growth (2022-2023) and average annual growth (2019-2023) in spending per enrollee by site of care

For exhibit 2.6, commercial spending represents full-claims only and does not include the net cost of private health insurance. Spending amounts in all hospital categories include both professional and facility spending. Total spending for categories of care calculated using the APCD and were divided by member years in the APCD to create per member per year amounts. These amounts were used to calculate average annual change. Please see the table below for data sources for each category.

Data sources for each site of care in Exhibit 2.6

Categories of care	Data
Hospital inpatient	APCD facility (inpatient facility claims) and professional claims (place of service code 21 - inpatient)
Pharmacy	CHIA Total Medical Expenditures, 2019-2023; Spending is net of rebates
Office, urgent care and retail clinic	APCD professional claims (place of service codes 11, 20 and 17)
HOPD, ED, and ASC	The sum of the following categories using APCD facility and professional claims: HOPD (place of service codes 19 and 22), ambulatory surgical centers (place of service code 24), and ED (place of service code 23)

2.3.3 Commercial spending per member per year for major categories of hospital outpatient department care, 2019-2023

For Exhibit 2.7, the HPC focused on Massachusetts acute care hospitals only (e.g., excluding freestanding psychiatric hospitals and spending that occurred in out of state hospitals). HOPD spending by type of service was primarily categorized using the Restructured Berenson-Eggers Type of Service (BETOS) Classification System (RBCS) and Agency for Health Care Research and Quality (AHRQ) Surgery Flags Software. RBCS is a taxonomy that groups CPT codes into clinically meaningful categories and subcategories. RBCS is updated annually by a technical expert panel, and this analysis is based on the 2023 version of RBCS.

The RBCS contains the following categories: Anesthesia, Evaluation and Management (E&M), Imaging, Procedures, Tests, Treatments, DME and Other. The HPC largely followed this categorization, though some category names were changed for clarity (e.g., “Tests” to “Diagnostic tests and labs”). The treatments category was divided into three buckets of spending using the RBCS subcategories: chemotherapy and radiation oncology, injections and infusions (nononcologic), and other medical treatments. Spending on DME and Other (including other medical treatments) were not shown in the exhibit as they were smaller categories of spending. Given that Procedures was a particularly large category, the HPC identified major surgeries using the AHRQ Surgery Flags Software and created a separate category for those procedures. The rest of the procedures category was named “Colonoscopies, endoscopies, minor surgeries and other procedures.”

As RBCS is created using Medicare data, the taxonomy may miss some large volume or large spending CPT codes that are more relevant for the commercial population (e.g., invitro fertilization). The HPC worked with a clinical expert and manually categorized the following CPT codes. Other unclassified CPT codes were excluded from the analysis.

HPC categorization of CPT codes not covered under RBCS

CPT code	Adapted RBCS category
Any unclassified codes between J8501-J8999	Chemotherapy and radiation oncology
Any unclassified codes between J9000-J9999	Chemotherapy and radiation oncology
U0005	Diagnostic tests and labs
S0201	E & M
S9480	E & M
S9485	E & M
77061	Imaging
77062	Imaging
S8037	Imaging
S4015	Colonoscopies, endoscopies, minor surgeries and other procedures
90738	Injections and infusions (nononcologic)
S0020	Injections and infusions (nononcologic)
S0028	Injections and infusions (nononcologic)

S0030	Injections and infusions (nononcologic)
S0077	Injections and infusions (nononcologic)
Any unclassified codes between J0120-J8499	Injections and infusions (nononcologic)
All T codes	Other
V5261	Other

2.3.4 Number of elective hip and knee replacements by setting of care per 100,000 commercial members, 2019-2023

This exhibit is based on outpatient surgery encounter data constructed from commercial APCD v2023. HPC identified surgical encounters as noted in 2.3.1 above. The outpatient sample for this exhibit included surgeries within hip replacement and knee replacement CCS categories. The inpatient sample included “Elective hip replacement” APR-DRG and “Elective knee replacement” APR-DRG. Outpatient sites of care included ASCs and HOPDs. ASC site of care was defined using a [list of the licensed ASC providers from DPH](#) for the Massachusetts providers matched with their corresponding NPIs. Non-state ASCs were defined using provider state information along with the ASCs-specific modifiers and site-of-service variables on the surgery claims.

2.3.5 Average commercial price of cancer immunotherapy drug Keytruda by hospital, 2019 and 2023

For Exhibit 2.9, data are for Keytruda (CPT J9271, ‘Injection, pembrolizumab, 1 mg’) and reflect the price for a 200-milligram dose. To calculate the total cost of a 200-milligram dose, the HPC calculated encounter level unit prices by dividing the total dollar amount billed (spending) by the total number of units billed (quantity). The average commercial price of a standard dose represents the average unit price (for hospitals with sufficient volume) multiplied by 200 units, which was the median units billed for Keytruda in 2023.¹ To eliminate data errors or unusual billing practices, the HPC excluded encounters where the units billed were more than the 95th percentile or less than the 5th percentiles of units billed for Keytruda. Facilities listed are limited to those with at least 20 commercial encounters delivered in 2023 after exclusions. APR-DRGs

The Medicare price was calculated using the Medicare payment limit for Keytruda (CPT J9271) as reported by CMS in the Average Sales Price (ASP) Drug Pricing files. Payment limits are unit prices for administrated drugs and reflect ASP plus 6%. The 2019 Medicare price reflects the October 2019 payment limit multiplied by 200, and the 2023 Medicare price reflects the October 2023 payment limit multiplied by 200 to reflect the total cost for 200 units.

2.3.6 Estimated per member per year net spending by therapeutic classes with the highest total spending, 2022-2023

For exhibit 2.10, the HPC first calculated gross prescription drug spending by therapeutic class per member per year using the APCD. Therapeutic class is based on Red Book, a product of Micromedex. The

¹ A dose of Keytruda varies between 200 or 400 milligrams billed by the milligram i.e., if 200 milligrams are administered to a patient then 200 units of the drug are billed. For more information on dosing regimens for Keytruda see relevant [prescribing information](#).

following rebate estimates were then applied to each of the top spending therapeutic class based on publicly available rebate estimates from [MedPac](#) (see Chart 10-24).

Rebate percentage by therapeutic class

Therapeutic class	Rebate percentage
Anti-infective agents	10%
Chemotherapy (i.e., antineoplastic agents)	10%
Central nervous system agents	10%
Hormones & synthetic substances (e.g., insulin)	50%
Immunosuppressants	29%

2.3.7 Percent of commercially-insured adults who had at least one GLP-1 prescription that year, January 2020 to Jun 2024

For exhibit 2.11, the HPC used the Massachusetts Enhanced All-Payer Claims Database (E-APCD) from 2020 to 2024. The following medications were included: Victoza, Saxenda, Trulicity, Ozempic, Rybelsus, Wegovy, and Mounjaro. Exhibit includes prescriptions among commercially-insured members between 18 and 64 years of age and with 12 months of medical and pharmacy coverage that year (6 months in 2024).

In the text below the exhibit, the HPC estimated the spending impact of GLP-1 prescriptions on the commercial market from 2022 to 2023. For this analysis, the HPC used the APCD to estimate gross GLP-1 spending in 2022 and 2023 and applied rebate estimates sourced from [Hernandez et al.](#) and an [American Enterprise Institute publication](#). Total commercial net pharmacy spending and commercial spending overall were based on CHIA’s Annual Report on the Performance of the Massachusetts Health Care System 2025.

2.4 Affordability of care analyses

2.4.1 Percentage growth from 2022 to 2023 and 2019-2023 (average annual) for various quantities in Massachusetts

For exhibit 2.12, HPC used CHIA Annual Report for commercial health care expenditures (TME, or total medical expenditures). BLS Consumer Price Index (CPI) was used for general inflation growth and Employment Cost Index (ECI) was used to derive medical labor cost. CPI and ECI figures were both based on the Boston area MSA (Metropolitan Statistical Area). AHRQ Medical Expenditure Panel Survey was used to derive family premium growth. Bureau of Economic Analysis (BEA) was used for gross domestic product (GDP) growth. American Community Survey was used for both 40th percentile and median and income.

2.4.2 Percentage of surveyed respondents indicating each health care affordability issue by health care share of compensation, 2023

For exhibit 2.13, HPC used CHIA’s Massachusetts Health Insurance Survey, 2023 and data from AHRQ Medical Expenditure Panel Survey, 2023.

2.4.2.1 Survey Data

The HPC identified all Massachusetts families on employer-sponsored insurance (ESI) with a family plan with 12-months of continuous health insurance coverage at the time of the survey. ESI represents insurance received through work or a union. Insurance status is self-reported in the survey. Missing values

were imputed using hot deck imputation based on values from the “nearest neighbor.” Senior-headed households and those below 139% of the Federal Poverty Level (FPL) were excluded.

Unmet healthcare needs were considered for the respondent and their family. Respondents were asked, “Was there any time in the past 12 months that, due to cost, you did not get needed care of the type indicated?” or “Does your family currently have any medical bills that are being paid over time?” Types of care considered for this analysis included doctor care, specialist care, mental health care or prescription drugs. This included medical bills being paid off with a credit card, personal loan, or through a bill payment arrangement with a hospital or provider (e.g., “payment plan”).

2.4.2.1 Spending data

Total health spending includes both average employee and employer payments toward health insurance premiums, as well as average out-of-pocket (OOP) spending. OOP represents money paid that is not covered by health insurance and does not include premium payments. Total compensation includes total family income and average employer payments toward health insurance premiums. The health share of compensation is defined as total health spending divided by total compensation. Health shares of compensation ranged from 3% to 50% among families on ESI with 12 months continuous coverage.

2.4.3 Projected monthly after-tax, after health care take home pay for an average Massachusetts household with employer-based coverage under two scenarios of premium growth

For exhibit 2.14, the HPC used data from CHIA Annual report and Massachusetts Employer Survey, as well as data from AHRQ Medical Expenditure Panel Survey.

2.4.3.1 Take-home pay model

HPC modeled the impact of premium and cost sharing increases on the take-home pay a typical worker with a median family income. HPC developed two scenarios: one where premiums and out-of-pocket spending grew at the recent trend growth rate of 7% and one where the premiums and out-of-pocket grew at 3.6%, the current rate of the HPC health care cost benchmark. Modeling assumes that 1) 75% of employees in the firm take health care coverage offered by the hypothetical employer, 2) the employee faces a 20% average tax rate on salary and a 30% marginal tax rate on the salary increase, and 3) employer and employee premium contributions are not taxed but out of pocket spending is after-tax, and 4) an employee taking up family coverage from their employer bears the full cost of the employee premium contribution and 75% of the employer contribution to their premium as reduced wages (with the remainder spread across the employer’s workforce in general).



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TECHNICAL APPENDIX 3

OPPORTUNITIES TO IMPROVE COST SHARING BENEFIT DESIGN

ADDENDUM TO THE 2025 COST TRENDS REPORT

3.1 Summary

This appendix describes the Health Policy Commission's (HPC) approach to examining cost sharing among Massachusetts residents.

3.2 Data Sources

Unless otherwise noted, the analyses included seven commercial payers: Blue Cross Blue Shield of Massachusetts, Tufts Health Plan, Harvard Pilgrim Health Care, Health New England, Mass General Brigham Health Plan (formerly AllWays Health Partners), and United Health. Elevance (formerly Anthem and includes Wellpoint, a GIC offering) was excluded due to lack of pharmacy claims.

3.3 Analytic file creation

To evaluate total cost sharing incurred by members across a range of services, the HPC constructed claim line level files that categorized medical claim lines into broad service categories. Categorizations were primarily based on the Restructured Berenson-Eggers Type of Service (BETOS) Classification System (RBCS), which is a taxonomy that groups CPT codes into clinically meaningful categories and subcategories. This analysis is based on the 2023 version of RBCS.

The RBCS contains the following categories: Anesthesia, Evaluation and Management (E&M), Imaging, Procedures, Tests, Treatments, DME, and Other. The HPC largely followed this categorization, though some category names were changed for clarity. The treatments category was divided into three separate categories: chemotherapy and radiation oncology, injections and infusions (nononcologic), and other medical treatments. The Procedures category was subdivided based on the Agency for Health Care Research and Quality (AHRQ) Clinical Classifications Software (CCS) and Surgery Flags Software to create a Major Surgeries category and a Colonoscopy, Endoscopy, and Minor Procedures category. Because both methods are based on procedure codes, if a claim line was missing a procedure code, then the claim was categorized based on revenue codes.

Claim lines were initially split based on site of care using place of service codes for professional claims and whether the claim was a facility claim (billed by a hospital).

Final categories included inpatient care (including professional and facility claims), out-of-network care, ambulatory care, and all other care (home health, skilled nursing facilities, hospice, durable medical equipment, and all associated professional claim lines). Ambulatory care was further subdivided into subcategories, including major surgery, imaging, chemotherapy/radiation oncology, labs/tests, injections/infusion (non-oncologic), evaluation and management (E&M) (including behavioral health), anesthesia, physical therapy, ED/observation/critical care, colonoscopies/endoscopies and other minor procedures, and all other ambulatory care. Pharmacy claims were not subdivided and were considered their own classification of care. Please see the tables below for inclusion criteria for each category and subcategory of care.

Members included in the analysis were covered under one of the six payers listed above, had 12 months of medical and pharmacy coverage, and were less than 65 years of age. Only claims for these members were retained. Members who met these conditions but did not have health care spending (no utilization) were not included in per-member calculations (excluded from the denominator).

3.3.1 Inclusion criteria for medical and pharmacy claims in service categories

HPC Category	Place of service (professional claims)	Other
INPATIENT	14, 21, 51, 52, 61, 25, 55, 09, 56, 16, 04	Inpatient facility claims
OTHER	42, 41, 31, 32, 33, 34, 12, 13	Facility claims for home health, skilled nursing facilities, and hospice based on bill type RBCS subcategory: "Ambulance" CPT codes: A0426-A0434 DME provided in a home setting (place of service, 12).
OUT-OF-NETWORK		Out-of-network claims based on the in-network indicator field in the MA APCD
AMBULATORY		All remaining claims after the above exclusions
PHARMACY		All pharmacy claims

3.3.2 Inclusion criteria for ambulatory subcategories

HPC Subcategory	RBCS Category	AHRQ CCS	CPT code	Revenue Code	Place of service	Notes
MAJOR SURGERY		Surgery flag=2				
IMAGING	"Imaging"	"CT Scan"		035X 040X 061X 032X 034X		
CHEMOTHERAPY/RADIATION ONCOLOGY	"Chemotherapy" "Radiation"		J8501- J8999 J9000- J9999	033X		
LABS/TESTS	"Test"	"Electrographic cardiac monitoring" "Pathology" "Laboratory"		030X 031X 073X 074X		
INJECTIONS/INFUSIONS (NONONCOLOGIC)	"Injections"	"Vaccinations"	J0120- J8499 S0077 S0030	026X 0258 0636 0771		Includes COVID-19 vaccinations

			M0222 Q0222 Q0221 M0247		
E&M	"E&M"	"Consultation, evaluation, and preventative care"	H-series		ED/Observation/Critical Care that is included in the RBCS "E&M" category was included in its own category
ANESTHESIA	"Anesthesia"	"Anesthesia"		037X	
PHYSICAL THERAPY	"Physical, Occupational, and Speech Therapy" "Spinal Manipulation"		97810- 97814 98940- 98943	042X 043X	Speech therapy was included in the "other" ambulatory subcategory Chiropractor and acupuncture services were included in the physical therapy category
ED/OBSERVATION/CRITICAL CARE	"Emergency Care Services" "Critical Care Services" "Observation Care Services"				
COLONOSCOPIES/ENDOSCOPES AND OTHER MINOR PROCEDURES	"Procedure"				Excluding major surgeries identified by AHRQ Surgery Flags
OTHER	"Dialysis" "DME" "Medical/Surgical Supplies" "Orthotic Devices" "Oxygen and Supplies"	"Hearing devices and audiology supplies"	T-series 92507 92508 92597 96105 92521- 92526		Largely includes all other services that were not categorized above

“Vision, Hearing, and Speech Services”	92605- 92610
“Treatment – Miscellaneous”	
“Other”	

3.4 Analyses

3.4.1 Cost sharing per member per year

The following exhibits were created using similar methodology, varying only in the way cost sharing was ultimately reported in the final exhibit (e.g., percentage versus dollar amount, by service category versus yearly, etc.): “Commercial spending per member per year, 2019-2023”, “Cost sharing per member per year by cost sharing type, 2019-2023”, “Cost sharing per member per year by service category, 2023”, “Distribution of cost sharing by cost sharing type and service category, 2023”, “Distribution of cost sharing by cost sharing type and ambulatory service category, 2023”.

The HPC combined all medical (all categories described above) and pharmacy claims for all members in the sample for each year of data. Cost sharing (including deductible, copay, and coinsurance) and spending was summed by year and category of care. Cost sharing and spending per member per year is equal to total cost sharing or spending in each year divided by total member years for each year in the APCD. Insurer-paid amounts are equal to spending per member per year minus cost sharing per member per year.

The same procedures were followed to calculate cost sharing by type (e.g., copay) and by service category. Distributions of cost sharing reflect cost sharing per member per year.

3.4.2 Distribution of cost sharing per member per year in 2023; percent of members with \$5,000 or more in cost sharing per year, 2019-2023

Similarly to the description above, all medical and pharmacy claims were combined for all members in each year of data. Cost sharing was summed across members (collapsed to the member level) to calculate total cost sharing incurred by individual members within each year. Members were categorized into groups based on the total amount of cost sharing incurred in the year and was reported as a percentage of all members in each year. Members with no health care spending were not included.

3.4.3 Distribution of cost sharing per member by sex and chronic condition status, 2023

Similarly to the description above, all medical and pharmacy claims were combined for all members in the 2023 data year and were collapsed to the member level to sum cost sharing across the year.

Chronic conditions were assigned based the John’s Hopkins Adjusted Clinical Groups (ACG) Software. Chronic conditions analyzed included AIDS/HIV, asthma, arthritis, cancer, cardiovascular conditions, diabetes, epilepsy, hypertension, mood disorders, multiple sclerosis, psychosis, renal disorders, and substance use disorder. A binary variable was created to indicate whether a member had at least one of

these conditions in the year or none of these conditions. The distribution of cost sharing represents the range (including the average) in the total out-of-pocket spending incurred in 2023 by members in either group.

The distribution of cost sharing by sex represents the range in the total out-of-pocket spending incurred in 2023 by males and females. Additional data is presented below.

Distribution of cost sharing per member by age and sex, 2023

Age	Sex	5th percentile	25th percentile	Median	75th percentile	95th percentile	Average
<18	Male	\$0	\$56	\$253	\$820	\$3,089	\$716
18-34	Male	\$0	\$47	\$250	\$893	\$3,230	\$766
35-54	Male	\$0	\$102	\$417	\$1,249	\$3,738	\$973
55-64	Male	\$18	\$242	\$774	\$2,059	\$5,039	\$1,463
<18	Female	\$0	\$55	\$230	\$749	\$2,903	\$662
18-34	Female	\$0	\$123	\$505	\$1,455	\$4,004	\$1,079
35-54	Female	\$8	\$225	\$745	\$1,869	\$4,545	\$1,336
55-64	Female	\$33	\$340	\$984	\$2,315	\$5,268	\$1,631

Distribution of cost sharing per member by chronic condition, 2023

Chronic condition	5th percentile	25th percentile	Median	75th percentile	95th percentile	Average
AIDS/HIV	\$150	\$548	\$1,136	\$2,516	\$5,239	\$1,747
Arthritis	\$265	\$804	\$1,633	\$3,469	\$8,105	\$2,585
Asthma	\$132	\$448	\$981	\$2,071	\$4,772	\$1,559
Cancer	\$133	\$588	\$1,453	\$2,881	\$5,575	\$2,026
Cardiovascular conditions	\$50	\$305	\$826	\$1,970	\$4,434	\$1,384
Diabetes	\$146	\$586	\$1,238	\$2,383	\$5,175	\$1,755
Epilepsy	\$180	\$655	\$1,489	\$2,946	\$6,096	\$2,111
Multiple Sclerosis	\$270	\$1,025	\$2,325	\$3,800	\$7,500	\$2,961
Psychosis	\$150	\$533	\$1,126	\$2,187	\$4,757	\$1,627
Renal disorders	\$59	\$372	\$974	\$2,240	\$4,811	\$1,549
Substance use	\$30	\$277	\$794	\$1,969	\$4,547	\$1,384
Multiple conditions	\$248	\$889	\$1,904	\$3,468	\$6,728	\$2,523

3.4.4 Cost sharing as a percentage of household income and average out-of-pocket spending per member by community income decile, 2023

Medical and pharmacy claims were combined and collapsed to the member level as described above. Following this, the HPC calculated average cost sharing per member by zip code, and this average was

multiplied by 2.4 (representing average household size of 2.4 people) to estimate total cost sharing incurred by a household. The ratio of average household cost sharing to median income (gathered from ACS data) by zip code was calculated. The weighted average of this ratio was calculated by income decile weighted by the number of members in each zip code. Average cost sharing per individual member by income decile is reported in the final exhibit.

3.4.5 Percentage of members with utilization by service category, 2023

Utilization for each service category and subcategory of care was examined at the appropriate unit of analysis, e.g., inpatient care was analyzed at the stay level. For all categories, the percentage of members with any utilization represents the total number of unique members with utilization in each category divided by the total number of members with health care spending in the 2023 data year.

Inpatient care was examined at the stay level. Pharmacy claims were examined by 30-day fills. E&M services, physical therapy, major surgery, minor surgery, emergency department care, and anesthesia services were examined at the episode level (same patient, same date of service). Labs/tests, imaging, chemotherapy, and injections/infusions were examined at the procedure code-encounter level (same patient, same date of service, same procedure code).

Additional data on service category utilization is provided below, including average spending and cost sharing at the unit of analysis described above (rather than per member per year averages).

Average spending, cost sharing, and utilization per service unit by service category, 2023

Category	Subcategory	Average spending per service	Average cost sharing per service	Utilization PMPY	Average number of services used by members with utilization
Pharmacy	Pharmacy	\$123	\$15	13.3	15.9
Inpatient	Inpatient	\$31,874	\$1,119	0.0	1.2
Ambulatory	Chemotherapy/radiation oncology	\$2,120	\$12	0.1	14.4
Ambulatory	Major surgery	\$8,702	\$691	0.1	1.1
Ambulatory	ED visits	\$1,056	\$289	0.1	1.2
Ambulatory	Anesthesia	\$883	\$89	0.1	1.2
Ambulatory	Physical therapy	\$105	\$41	1.4	10.0
Ambulatory	Injections/infusions (nononcologic)	\$489	\$12	0.7	2.4
Ambulatory	Colonoscopies, endoscopies, and minor procedures	\$879	\$144	0.5	1.8
Ambulatory	Imaging	\$320	\$94	1.6	3.4
Ambulatory	Labs/Tests	\$57	\$15	8.0	10.3
Ambulatory	E&M	\$196	\$36	7.1	7.6

3.4.6 Distribution of cost sharing for maternity and non-maternity inpatient stays, 2023

Inpatient facility claims and professional claims with a site of service of 21 were collapsed to create stays on a member-stay level. Cost sharing was summed across claims for each stay including deductible amounts.

Inpatient facility claims are assigned an APR-DRG (version 38) using the Solventum (previously 3M) Core Grouping Software. Stays with an APR discharge major diagnostic category (MDC) of 14 (Pregnancy, Childbirth, and the Puerperium) or 15 (Newborns and Other Neonates with Conditions Originating in the Perinatal Period) were considered maternity stays. Maternity stays thus include newborns.

For both maternity and non-maternity stays, stays were grouped into categories based on total cost sharing incurred during the stay. The distribution represents the number of stays in each category over total stays for maternity and non-maternity stays separately. The portion of cost sharing attributed to the deductible represents total deductible spending for all stays in the group divided by total cost sharing for all stays in the same group.

3.4.7 Distribution of cost sharing for emergency department (ED) visits, 2023

ED episodes were constructed at the patient-date of service level to capture all relevant professional claims spending that may have occurred during the ED visit. ED episodes that resulted in an inpatient or observation stay were excluded. For episodes to be included, both a professional and a facility ED claim had to be present during the stay. To account for the potential of either claim being billed on adjacent days, additional steps were taken to identify the professional ED claim for the same patient if there was not a professional ED claim billed on the same day as the facility ED claim. Notably, the HPC did not require that the ED procedure code be the same when identifying the facility and professional claim as long as the procedure codes were in the 99281-99285 series.

Once the corresponding facility and professional ED claims were matched for the same person, the HPC tagged the ancillary services that occurred during the stay for the same patient based on the ambulatory subcategories described above (e.g., labs). ED episodes were subsequently collapsed to sum cost sharing including for the ancillary services for the same stay and patient. Tags for ancillary services were retained to identify ED episodes where certain services were provided.

For ED episodes where there were no ancillary services provided and for episodes that had labs and imaging provided (but no other services), episodes were grouped into categories based on the total cost sharing incurred during the stay. The distribution represents the number of episodes in each category over total episodes for episodes without ancillary services and with labs and tests separately. The portion of cost sharing attributed to the deductible represents total deductible spending for all episodes in the group divided by total cost sharing for all episodes in the same group.

3.4.8 Distribution of cost sharing for evaluation and management (E&M) problem visits for ten common clinical diagnoses, 2023

The ten most common diagnoses were found by identifying problem E&M claims with procedure codes 99201-99215 and producing a count of the principal diagnosis code in 2023. Importantly, diagnosis codes were counted based on the first three digits of the code only (e.g., F41 for “other anxiety disorders”). E&M

claims were also retained later based on the first three digits of the principal diagnosis code. This allowed for examination of the broader diagnosis category and a larger retention of claims. See the table below for the list of diagnosis codes included in this analysis.

E&M episodes were created based on claims for the same patient and same date of service as a problem E&M procedure code (CPT 99201-99215). Claims for other services that occurred during the visit for the same person were retained to tag the services provided and sum cost sharing incurred during the visit. Visits where one of the following services occurred for the same patient on the same day were excluded: ED services, observation services, critical care services, major surgery, chemotherapy/radiation oncology, and any preventative E&M care. E&M visits with one of the ten diagnosis codes identified above as the principal diagnosis code were retained. Ancillary services that occurred during the visit were tagged with the same ambulatory subcategories described above.

For E&M episodes where there were no ancillary services, imaging services only, and labs/tests only episodes were grouped into categories based on the total cost sharing incurred during the stay. The distribution represents the number of episodes in each category over total episodes for a given category. The portion of cost sharing attributed to the deductible represents total deductible spending for all episodes in the group divided by total cost sharing for all episodes in the same group.

Ten most common diagnosis codes among problem E&M episodes, 2023

Description	Diagnosis code	Episodes (N)
Other anxiety disorders	F41	118,542
Acute pharyngitis	J02	91,423
Attention-deficit hyperactivity disorders	F90	73,290
Major depressive disorder, recurrent	F33	68,966
Other joint disorder, not elsewhere classified	M25	65,726
Essential (primary) hypertension	I10	60,946
Dorsalgia	M54	54,026
Cough	R05	48,109
Suppurative and unspecified otitis media	H66	41,615
Overweight and obesity	E66	38,812

3.4.9 Distribution of cost sharing for a diagnostic test for bacterial vaginosis (BV), 2023

The HPC began with ambulatory claim lines previously tagged as labs and tests based on the categorization described above. Claim lines billed for CPT 81514 (Infectious disease, bacterial vaginosis and vaginitis, DNA algorithmic analyses) were retained and collapsed to a procedure code-encounter level (same person, same procedure code, same date of service) to sum both professional and facility allowed amounts and cost sharing if both were present for an encounter. Encounters that were billed on the same day for the same person as an ED visit and price outliers were excluded. An encounter was considered a price outlier if the allowed amount for an encounter was greater than ten times the median statewide price for the service or less than 20% of the median statewide price for the service.

Once at the procedure code-encounter level, encounters were grouped into categories based on total cost sharing incurred for the service. The distribution represents the number of encounters in each category over total encounters for the service. The portion of cost sharing attributed to the deductible represents total deductible spending for all encounters in the group divided by total cost sharing for all encounters in the same group.

3.4.10 Average total price with cost sharing for a knee replacement (2022) and a course of PT (2019-2023)

An analytic file of knee replacement and PT encounters was created based on previous HPC methodology. Please see the 2024 Cost Trends Report [Technical Appendix](#) for methods on how to identify knee replacements and PT for people with a diagnosis for knee osteoarthritis.

The total cost with cost sharing for a knee replacement (including all services that occurred on the same day e.g., anesthesia) was calculated by summing all claims for the same person on the same date as a knee replacement claim. Patients were flagged as having a knee replacement if a knee replacement was the only treatment they received (apart from PT) within one year of diagnosis with knee osteoarthritis. The price and cost sharing reflects the average in 2022.

The total price with cost sharing for a course of PT reflects procedure code-encounters (same person, same procedure code, and same date of service) to sum all relevant professional and facility claims if present. PT codes retained in this analysis included CPT 97110, 97112, 97116, 97140, 97530. These encounters reflect care received by patients whose only form of treatment for knee osteoarthritis within one year of diagnosis was PT (i.e., these patients did not receive a knee replacement or surgery during the study period). These encounters were then collapsed to the member level to sum spending and cost sharing for all PT encounters received by individual members i.e., a “course of PT.” A course of PT was considered to be between 10 and 20 encounters of PT within the year of claims retained for each patient. On average, patients who only received PT as treatment had 19 PT encounters. The 50th percentile of PT encounters received was 12 PT encounters. The total price and cost sharing amount was the average of the total spending incurred for a course of PT for people who received 10-20 encounters within a year of diagnosis from 2019 to 2023.

3.4.11 Modeling

To model the financial impact of capping commercial deductible spending at \$500 per person, the HPC first calculated the dollar amount that would need to be redistributed across services in the form of copayments. This was done by finding how much a person’s deductible spending was more than \$500 in 2023. All medical and pharmacy claims for 2023 were combined and were collapsed to the member level to sum deductible spending for each individual person in the sample (as described above). At the member level, if a person had more than \$500 in deductible spending the excess (the amount over \$500) was summed for all individual in 2023. The total amount that was in excess of \$500 per person in 2023 was \$317,225,667.

To ensure that this amount could be redistributed, average copayments were calculated for each category and subcategory of care described above (except for “other” and “out-of-network” care) and following the methods in section 3.4.5 to calculate copays at appropriate units of analysis. Copays for each category of care were incrementally increased until the excess in deductible spending was reached (new copay times utilization for each category in 2023 minus previous spending).

For the exercise of removing deductible spending on primary care E&M services, the HPC started with problem E&M claims for established patients (99211-99215), removing any that occurred on the same day for the same person as an ED/Observation/critical care service, major surgery, chemotherapy, and any preventative care. Claims provided by a primary care provider were retained. Claims were collapsed to the procedure code-encounter level (same person, same code, same date of service). Total deductible spending on these encounters were summed for 2023 which reflects the amount that would either need to be offset or be added to insurer spending (premium increase). This amount (\$17,667,343) over total insurer paid amounts in 2023 (about \$5 billion in the HPC's sample of the APCD) reflects the potential premium increase of eliminating deductible obligations on primary care E&M visits.



MASSACHUSETTS
HEALTH POLICY COMMISSION

TECHNICAL APPENDIX 4

Preventive Care Cost Sharing

ADDENDUM TO THE 2025 COST TRENDS REPORT

4.1 Summary

This appendix describes the Health Policy Commission's (HPC) approach to examining cost sharing for a set of preventive services among commercially-insured Massachusetts residents: colonoscopy, diabetes screening, sexually-transmitted infection (STI) screening, contraception (including oral contraceptive prescriptions and contraception service encounters), pre-exposure prophylaxis for HIV prevention (PrEP), and preventive visit episodes.

4.2 Data source and ambulatory file creation

4.2.1 Data Source

For analysis of cost sharing for preventive services, the HPC used CHIA's All Payer Claims Database (APCD) v2023, for calendar years 2019-2023.

Analyses include data from seven commercial payers in the Commonwealth: Blue Cross Blue Shield of Massachusetts, Harvard Pilgrim Health Care, Tufts, Mass General Brigham Health Plan (formerly AllWays Health Partners), United, Elevance (formerly Anthem), and Health New England. Elevance was excluded from prescription drug analysis due to carveouts.

4.2.2 Ambulatory file creation

To evaluate cost sharing for services provided for prevention (i.e., rather than diagnosis or treatment), the HPC constructed a claim-line-level file including only services provided in ambulatory settings in which preventive services would reasonably be available.

To create the ambulatory claim-line file, the HPC first identified professional and facility claim lines for services provided in hospital inpatient, hospital outpatient observation, emergency department, ground ambulance, home, urgent care facility, birthing center, skilled nursing facility, nursing facility, inpatient psychiatric facility, inpatient rehabilitation facility, or end-stage renal disease treatment facility settings. Claim lines billed for the same person (based on a unique person identifier) on the same date of service as claim lines at any of these sites of service were excluded. Claim lines with a missing procedure code or individual person identifier were also excluded, as were claims billed by non-Massachusetts providers (providers with a missing state were retained).

After these exclusions, the HPC identified professional and facility claims for services provided at offices, hospital outpatient departments, retail clinics, independent laboratories, and ambulatory surgery centers (ASCs). Claim lines billed for the same person on the same day as claim lines at any of these sites of service were retained for analysis. This procedure was used to construct a separate claim-line-level file for each year of data, from 2019-2023.

4.3 Analyses

4.3.1 General methodology

Analysis of all services started with the ambulatory claim-line-level file described above. Analysis of prescription drugs started with the APCD pharmacy claims. The sections below summarize the methods for analytic file creation and analysis for each preventive service.

4.3.2 Analysis summary

The analyses for exhibits “Share of preventive services with cost sharing, 2019 and 2023” and “Average cost sharing amounts per service among services with any cost sharing, 2019 and 2023” are described in the below sections.

Share of preventive services with cost sharing by payer, 2023.

Service	BCBSMA	Elevance	HNE	HPHC	MGBHP	Tufts	United
Contraceptive visits	4%	9%	4%	30%	5%	27%	4%
STI screening	11%	8%	1%	8%	15%	18%	10%
PrEP	24%		98%	1%	19%	9%	1%
Colonoscopy	8%	25%	4%	29%	16%	28%	15%
Diabetes screening	35%	20%	35%	18%	2%	48%	47%
Preventive visits	26%	24%	18%	35%	37%	37%	44%

4.3.2 Colonoscopy

The HPC used CHIA's All Payer Claims Database (APCD), 2018 -2023, to identify colorectal screening encounters taking place in ambulatory settings.

4.3.2.1 Definitions and exclusions

Colorectal cancer (CRC) screening encounters were defined as preventive procedures to screen patients of average risk for colorectal cancer. This analysis focused exclusively on CRC screening procedures that visually inspect the colon, including colonoscopy, sigmoidoscopy, and CT colonography. These are all simply referred to as "colonoscopy" in the chapter.

Only patients with average risk of CRC are considered for screening. Average risk patients were defined as having no personal or family history of CRC, no chronic conditions that may be associated with increased colonoscopies (e.g., irritable bowel disease, ulcerative colitis), and where the colonoscopy was not intended to investigate specific symptoms (e.g., bleeding).

Exclusions included: patients aged 65 and above; screening encounters occurring in inpatient, emergency department, observation, and urgent care sites, as well as those that included ambulance services (likely emergent); diagnostic (unless converted from screening originally) or surveillance procedures; and incomplete procedures or those with reduced services. Direct visualization procedures where the type of anesthesia could not be determined were included in spending per screening but excluded from exhibits by screening modality.

4.3.2.3 Identification

The HPC identified all outpatient ambulatory claims for colonoscopy services. Colonoscopy claims were grouped into encounters for all care taking place for the same member on the same date of service. This analysis took an "intent to screen" approach. A screening was defined either as: 1) a colonoscopy encounter with a procedure modifier indicating a USPSTF compliant screening or indicating a screening converted to diagnostic AND a screening diagnosis code, or 2) a colonoscopy encounter with a screening-specific procedure code (G-code).

Screenings, diagnostic or surveillance procedures, anesthesia use and provider type, as well as incomplete or reduced services were identified with a combination of CPT procedure codes, ICD-10 diagnosis codes, and procedure modifiers (see below):

- Colorectal cancer procedures (CPT): *Colonoscopy*—44388, 44389, 44390, 44391, 44392, 44393, 44394, 44397, 44401, 44402, 44403, 44404, 44405, 45355, 45378, 45379, 45380, 45381, 45382, 45383, 45384, 45385, 45386, 45387, 45388, 45389, 45390, 45391, 45392, 45393, 45398, G0105, G0121, G6019, G6024. *Sigmoidoscopy*—45330, 45331, 45332, 45333, 45334, 45335, 45336, 45338, 45339, 45341, 45342, 45345, 45346, 45347, 45349, G0104. *CT Colonography*—74261, 74262, 74263.
- Preventive screening diagnosis codes (ICD-10; specific and non-specific to colorectal cancer): Z0000, Z0001, Z00111, Z00121, Z00129, Z005, Z006, Z008, Z0120, Z01411, Z01419, Z01810, Z01812, Z01818, Z0184, Z0189, Z03818, Z0389, Z049, Z08, Z09, Z110, Z111, Z112, Z113, Z114, Z1151, Z1152, Z1159, Z118, Z120, Z1210, Z1211, Z1212, Z122, Z1231, Z124,

Z125, Z1272, Z1283, Z1289, Z129, Z130, Z131, Z13220, Z13228, Z1331, Z1339, Z136, Z1371, Z13810, Z13811, Z13818, Z13820, Z1388, Z1389, Z139

- Preventive screening procedure modifiers: 33 (USPSTF compliant screening), PT (screening converted to diagnostic)
- Diagnostic diagnoses to investigate symptoms (ICD-10): D500, D501, D508, D509, D62, D6489, D649, K5140, K51411, K51412, K51413, K51414, K51418, K51419, K5521, K560, K561, K5660, K567, K5721, K5731, K5733, K5741, K5751, K5753, K5781, K5791, K5900, K5901, K591, K5902, K5903, K5939, K5904, K5909, K625, K6289, K920, K921, K922, R150, R151, R152, R159, R194, R195, R197, R198, R630, R634, R636
- Surveillance diagnoses for high-risk patients (ICD-10): K5000, K50011, K50012, K50013, K50014, K50018, K50019, K5010, K50111, K50112, K50113, K50114, K50118, K50119, K5080, K50811, K50812, K50813, K50814, K50818, K50819, K5090, K50911, K50912, K50913, K50914, K50918, K50919, K5100, K51011, K51012, K51013, K51014, K51018, K51019, K5120, K51211, K51214, K51218, K51219, K5130, K51311, K51312, K51313, K51314, K51318, K51319, K5140, K51411, K51412, K51414, K51418, K51419, K5150, K51511, K51512, K51514, K51518, K51519, K5180, K51811, K51812, K51814, K51818, K51819, K5190, K51911, K51912, K51914, K51918, K51919, K520, K521, K5221, K5222, K5229, K523, K5281, K5282, K52831, K52832, K52838, K52839, K5289, K529, Z800, Z8042, Z8371, Z85030, Z85038, Z85040, Z85048, Z85060, Z85068, Z8546, Z86010
- Anesthesia and sedation:
 - Procedure codes (CPT): 99151, 99152, 99153, 99155, 99156, 99157, G0500, G9654, G9655, G9656
 - Drug codes (CPT): 00731, 00732, 00811, 00812, 00813, J2704, J3010, J2250, J2060, J3360, J2001, J2175, J1200, J3490, J1170, J2270, J2274, J2060, J3360, J2550, J2405, J1100, J2765, J1630, J2310, J2370
 - Revenue codes: 0370, 0371, 0372, 0374, 0379
 - Provider procedure modifiers: AA, QX, QY, QZ, QS, G8, G9, P1, P2, P3, P4, P5
 - Provider revenue codes: 0963, 0964
- Incomplete or reduced diagnosis codes (ICD-10): Z5309, Z5320, Z538, Z539
- Incomplete or reduced procedure modifiers: 52, 53, 73, 74
- BETOS (Berenson-Eggers Type of Service, RCBS) and CCSR (Clinical Classification Software Refined) codes were also used to aid with categorization

4.3.2.3 Analyses

Among preventive claims with any cost-sharing (e.g. cost sharing > \$0), the shares with copay, coinsurance, and deductible spending was calculated along with the mean copay, coinsurance, and deductible spending amounts for 2019 and 2023.

4.3.3 Diabetes screening

4.3.3.1 Definitions and exclusions

Preventive diabetes screenings were defined as encounters where asymptomatic, non-pregnant individuals with overweight or obesity were screened for diabetes or prediabetes. Mirroring USPSTF guidance, the population for this analysis included adults between the ages of 40 and 64 for 2019 through 2022, and between the ages of 35 to 64 in 2023.

X.3.3.2 Identification of preventive screenings

Medical claims from the ambulatory claim analytic file were used for this analysis. Individuals without a full year of commercial insurance coverage were excluded from this analysis. The HPC considered procedures to be preventive screenings if a diagnosis code for overweight or obesity was present on the claim for diabetes screening and excluded claims with diagnosis codes for pregnancy or diabetes. The HPC identified all ambulatory claims for preventive diabetes screenings using a combination of CPT procedure codes and ICD-10 diagnostic codes.

- Diabetes screening procedures (CPT): 82947, 82948, 82950, 82951, 82952, 83036
- Overweight or obesity (ICD-10): E66.x, Z68.2x, Z68.3x, Z68.4x
- Diabetes (ICD-10): E08.x, E09.x, E10.x, E11.x, E13.x
- Pregnancy (ICD-10): Z34.x, Z33.1x, Z33.3, 009.x

Additionally, the HPC also performed a more conservative analysis that explored diabetes screenings only for those age 40 and older and with a diagnosis code specifying that the procedure was a screening (as opposed to a diagnostic procedure). The ICD-10 codes Z13.1x and Z13.2x were used to identify these screenings.

4.3.3.3 Analyses

For the exhibit, “Share of claims for diabetes screening with cost sharing by USPSTF status and average cost sharing amount for USPSTF-eligible diabetes screenings, by component, among claims with any cost sharing, 2019 and 2023,” claims for all diabetes screenings (CPT codes 82947, 82948, 82950, 82951, 82952, and 83036) were identified, along with the subset that were identified as preventive (as described above). The share of claims with any cost sharing were identified. Among preventive claims with any cost-sharing, the shares with copay, coinsurance, and deductible spending was calculated, along with the mean copay, coinsurance, and deductible spending amounts for 2019 and 2023.

4.3.4 Sexually-transmitted infection screening

4.3.4.1 Definitions and exclusions

Preventive screenings for sexually-transmitted infections (STIs) were defined as encounters where asymptomatic individuals were screened for one of the following infections: chlamydia, gonorrhea, hepatitis B, hepatitis C, human immunodeficiency virus (HIV), or syphilis. The population recommended for preventive screening varies for each STI, but across all analyses, the HPC restricted the analytic population to adults age 18 to 64 without symptoms that would indicate that a procedure was diagnostic:

- Chlamydia and gonorrhea: women under 25 and women over 25 at increased risk
- Hepatitis B: Adults at increased risk and all pregnant individuals
- Hepatitis C: All adults
- HIV: Pregnant individuals and adults at increased risk

- Syphilis: Pregnant individuals and adults at increased risk

4.3.4.2 Identification of preventive screenings

Medical claims from the ambulatory claim analytic file were used for this analysis. Individuals without a full year of commercial insurance coverage were excluded from this analysis. Behaviors that increase an individual’s risk of acquiring an STI, such as high-risk sexual behavior, are rarely captured in claims data; the HPC instead used a conservative approach to identify services that are likely to be preventive by identifying all claims within each demographic (e.g., all women, instead of women at increased risk) and excluding claims that had diagnosis codes for common STI symptoms. The populations, CPT codes, and ICD-10 codes used to identify presumed screenings are below:

Populations, procedure codes, and diagnosis codes used to identify preventive STI screenings.

STI	POPULATION	CPT CODE	REQUIRED ICD-10 CODES
Chlamydia	All women	86631, 86632, 87110, 87270, 87320, 87490, 87491, 87810	N/A
Gonorrhea	All women	87590, 87591, 87592, 87850	N/A
Hepatitis B	Pregnant adults	80055, 80081, 86704, 86705, 86706, 86707, 87340, 87341	Z34.x, Z33.1x, Z33.3x, 009.x
Hepatitis C	All adults	86803, 87520, 87521, 87522	N/A
HIV	All adults	86689, 87601, 86702, 86703, 87389, 87390, 87391, 87534, 87535, 87536, 87537, 87538, 87539, 87806	N/A
Syphilis	Pregnant adults	80055, 80081, 86592, 86593, 86780	Z34.x, Z33.1x, Z33.3x, 009.x

Additionally, encounters with the following ICD-10 codes for common STI symptoms were excluded: R59.x, R21.x, R20.2x, R20.8x, R3x, N7x, N5x, R10.2x, and N8x.

4.3.4.3 Analyses

For the exhibit “Average cost sharing amount per STI screening, among USPSTF-eligible STI screening claims with any cost sharing, 2019 and 2023,” claims for preventive STI screenings with any cost-sharing were identified (as described above). The mean copay, coinsurance, and deductible amounts among these claims were calculated for 2019 and 2023.

For the exhibit “Share of claims with cost sharing by test type, 2023,” claims for each type of preventive STI screening were identified, and the share of claims for each test type with any cost-sharing were identified.

For the exhibit “Share of claims with cost sharing by payer, 2023,” claims for preventive STI screenings were identified, and the share of claims covered by each payer with any cost-sharing were identified. The HPC notes that “payers varied in the rate of cost sharing by test type.” These results are presented below:

Share of claims with cost sharing by payer and test type, 2023.

Test Type	BCBSMA	Elevance	HNE	HPHC	MGBHP	Tufts	United
Chlamydia	8%	7%	0%	3%	12%	24%	17%
Gonorrhea	8%	6%	0%	5%	11%	18%	17%
Hepatitis B	1%	2%	1%	0%	1%	1%	2%
Hepatitis C	15%	13%	1%	0%	19%	2%	2%
HIV	14%	5%	2%	20%	11%	33%	11%
Syphilis	2%	3%	0%	39%	49%	36%	4%

4.3.5 Contraception

4.3.5.1 Oral contraceptive prescriptions

For analysis of cost sharing for oral contraceptive prescriptions, the HPC retained patients ages 14-45 with 12 months of medical and pharmacy coverage and with at least one prescription for oral contraception. Oral contraceptive medications were identified using Micromedex ® RED BOOK ® (“RED BOOK”) therapeutic class for "contraceptive," and by using generic and brand names. Estrogen-based treatments, treatments for endometriosis, and emergency contraception were excluded.

Generic and brand names and National Drug Codes (NDCs) of oral contraceptive prescriptions included for analysis.

MEDICATION	NDC
Altavera	70700011685
Alyacen	68462039429, 68462055629
Amethia	51862004791
Amethyst	52544029528
Apri	555904358
Aranelle	555906667
Ashlyna	68462064693
Aubra	50102022023
Aurovela, Aurovela Fe	65862093574, 65862093488, 65862094188, 65862094088
Aviane	555904558
Aygestin	51285042410
Azurette	51862089006
Balcoltra	75854060203
Balziva	555903458
Beyaz	50419040703
Blisovi, Blisovi Fe	68180086473, 68180086673, 68180086573

Briellyn	68462031629
Camila	51862088403
Camrese	93313482, 93614882
Charlotte Fe	68462085229
Chateal	50102023023
Cryselle-28	555904958
Cyred	50102025423
Dasetta	16714034804, 16714034604
Daysee	68180084613
Desogestrel/ethinyl estradiol	378729653
Dolishale	50742065984, 50742065928
Drospirenone/ethinyl estradiol/levomefolate	781410315
Elinest	16714036504
Enpresse	555904758
Enskyce	68180089173
Errin	51862088603
Estarylla	70700011985
Ethynodiol diacetate/ ethinyl estradiol	378730753
Falmina	16714035904
Femynor	69238155106
Finzala	93821062
Fyavolv	68180082873, 68180082773
Gemmily	70700015285
Generess Fe	23603003
Hailey, Hailey Fe	68462050481, 68462073129, 68462050329, 68462041929
Isibloom	70700011385
Jaimiess	70700012387
Jasmiel	50102024023
Jinteli	93312242, 93312298
Jolessa	555912366
Joyeaux	70700017785
Juleber	16714046404
Junel, Junel Fe	555902742, 555902542, 555902858, 555902658, 93532862, 93532828

Kaitlib	68180090373
Kariva	555905058
Kelnor	555906458, 93807316
Kurvelo	68180084473
Larin, Larin Fe	16714040703, 16714040803, 16714041603, 16714040504, 16714040604
Larissia	69238153106
Layolis Fe	52544006431
Lessina	555901467
Levonest	16714034004
Levonorgestrel and ethinyl estradiol	68462063729, 68180085773, 378728753, 378655053, 378728490, 68462067295, 378728153, 68180085473
Levora	51862009706
Lillow	69238155406
Loestrin, Loestrin Fe, Lo loestrin Fe	430042014, 51285012797, 51285013197, 51285012870, 51285012570
Lojaimiess	70700012487
Loryna	70700011485
Low-ogestrel	51862056401, 51862056406
Lo-zumandimine	59651002988
Lutera	51862002806
Marlissa	68462038829
Merzee	43386037132
Mibelas Fe	68180091173
Microgestin, Microgestin Fe	51862087206, 51862086806, 51862064803, 51862087006, 51862086606
Mili	65862077685
Minastrin Fe	430054050
Mono-linyah	16714036004
Natazia	50419040903
Necon	51862089203
Nextstellis	51862025801
Nikki	68180088673
Nora-be	52544062928
Norethindrone/ethinyl estradiol	70700010185, 378727453, 68462013281, 68462065790, 378728353, 378729753, 51862047106

Norethindrone/ethinyl estradiol/ferrous fumarate	378728853, 68462084929
Norethindrone acetate/ethinyl estradiol	68462065629
Norgestimate/ethinyl estradiol	68462030929, 68180083873
Nortrel	555900867, 555901058, 555901258
Nylia	65862089888, 65862089788
Nymyo	51862064506
Ocella	555913167
Philith	16714034704
Pimtrea	16714040404
Pirmella	68180089373, 68180089273
Portia-28	555902058
Reclipsen	93330416
Rivelsa	93603182
Seasonique	51285008787
Setlakin	16714036603
Simpesse	65862086495
Slynd	642747001
Sprintec 28	555901658
Sronyx	51862054506
Syeda	70700011585
Tarina, Tarina Fe	50102022423, 50102012803, 50102022823
Taytulla	23586230
Tilia fe	51862089603
Tri femynor	69238160706
Tri-estarylla	70700012185
Tri-legest Fe	555903270
Tri-linyah	16714036304
Tri-lo-estarylla	70700012085
Tri-lo-marzia	68180083773
Tri-lo-mili	65862077885
Tri-lo-sprintec	93214062
Tri-mili	65862077785
Tri-nymyo	51862064606
Tri-previfem	254203080
Tri-sprintec	555901858
Trivora-28	51862051006

Tri-vylibra	50102023313
Tri-vylibra lo	50102023113
Turqoz	68180089513
Tyblume	642747101
Tydemy	68180090473
Velivet	555905167
Vestura	93400062
Vienva	70700011885
Viorele	68462031829, 68462031884
Volnea	70700012285
Vyfemla	68180087573
Vylibra	50102023513
Wera	16714037003
Wymzya Fe	68180087373
Xulane	378334053
Yasmin 28	50419040203
Yaz	50419040503
Zafemy	65162035803
Zovia	51862089406, 51862026006
Zumandimine	59651003085

Prescriptions and associated spending and cost sharing amounts were standardized to 28-day supplies, and prescriptions for units of less than whole weeks or for more than one year were excluded (approximately 2000 prescriptions excluded in 2023). Prescriptions with allowed amounts lower than 20% of the median or higher than 10 times the median were excluded as outliers.

4.3.5.2 Contraceptive service encounters

For analysis of cost sharing for contraceptive service encounters, the HPC retained patients ages 14-45 with 12 months of medical coverage from the ambulatory claims analytic file. Current Procedural Terminology (CPT) and International Classification of Diseases (ICD-10) codes were used to identify contraceptive service encounters for subdermal contraceptive implant (including insertion, removal, and the device), intra-uterine device (IUD) (including insertion, removal, and the device), contraceptive options counseling, and IUD follow-up services, the latter of which are received at a separate appointment from the appointment at which an IUD is placed. Services were identified as claims with applicable CPT codes, CPT codes along with a relevant ICD-10 code, or (in the case of IUD follow-up care) a relevant ICD-10 code on its own.

Current Procedural Terminology (CPT) and International Classification of Diseases (ICD-10) codes used to identify contraceptive services.

SERVICE	CPT CODES	ICD-10 CODES
Subdermal contraceptive implant	11981-11983, 11976, J7306, J7307 99381-99387, 99391-99397, 99202-99215	NA Z30.017
Intra-uterine device	58300, 58301, J7296-J7298, J7300-J7302, S4989 99381-99387, 99391-99397, 99202-99215	NA Z30.014, Z20.430-Z30.433
Contraceptive options counseling	99401-99404	Z30.09
Intra-uterine device follow-up care	NA	Z30.431

Same person, same day encounters including any of the above codes were identified for analysis because multiple contraceptive services may occur during the same clinical encounter. Services with allowed amounts lower than 20% of the median or higher than 10 times the median were excluded as outliers.

For the exhibit, “IUD follow-up encounters with cost sharing by payer, 2023,” encounters for IUD follow-up care that had any cost sharing were identified, and the share of IUD follow-up encounters covered by each payer that had any cost sharing was calculated.

4.3.6 Pre-exposure prophylaxis

4.3.6.1 Definitions and exclusions

Pre-exposure prophylaxis (PrEP) is the use of antiretroviral medications to prevent HIV infection. It is recommended for individuals who are at high risk of HIV infection. Two oral medications are currently approved for use as PrEP: emtricitabine/tenofovir disoproxil fumarate (200/300mg) (TDF) and emtricitabine/tenofovir alafenamide (200/25mg) (TAF). TDF is available in both branded (Truvada) and generic forms, while TAF is only available as a branded medication (Descovy). Because these medications can also be prescribed in tandem with other antiretroviral therapies (ART) for post-exposure prophylaxis (PEP) and to treat HIV infection, individuals diagnosed with HIV/AIDS or receiving ART for HIV infection were excluded from this analysis.

4.3.6.2 Identification of PrEP prescriptions

Prescription drug claims from the APCD were used for this analysis. Individuals without a full year of commercial pharmacy and medical coverage were excluded from this analysis. As with STI screenings (4.3.4.2), behaviors that increase an individual’s risk of HIV infection are not commonly coded in pharmaceutical claims. Therefore, the HPC included claims for PrEP medications for all adults aged 18 to 64 in this analysis, and excluded individuals with a diagnosis of HIV/AIDS or a claim for a different antiretroviral medication used to treat HIV. Claims for 30-, 60-, 90-, and 120-days’ supplied are included.

National drug codes (NDCs) used to identify PrEP prescriptions.

MEDICATION	NDC
Descovy	61958200201, 61958200202
Truvada	35356007003, 50090087000, 50090087002, 50090087003, 52959096903, 61919066902, 61958070101, 61958070101, 67296123703, 67296123704, 68071211203
Generic	00093760756, 00093770456, 00378193093, 00904717207, 16714053401, 31722056030, 33342010607, 42291043930, 42385095330, 42385095390, 42543071904, 50090595701, 50090649401, 51407011230, 60219209503, 60505420203, 60687071925, 60687071995, 64380071904, 65862035430, 67296143303, 67296144003, 67296144007, 67296145903, 67296183007, 67296189505, 67296189508, 68071369503, 68180028701, 68180028706, 69097020902, 69097074102, 69238209503, 70710136702, 70710136703, 70710136704, 70710136709, 70771170902, 70771170903, 70771170904, 70771170909, 71205077603, 71205077607, 71205077630, 71205077660, 71205077690, 72189015602, 72189022702, 72189031203, 72189040303, 76282067730, 82009010930, 53002165301, 53002165302, 53002165303, 53002165305, 53002165306, 53002165307, 53002165309, 82982006803

National drug codes (NDCs) used to identify other ART for HIV treatment.

DRUG	NDC
abacavir	00121089715, 00121089720, 00378410591, 00904652306, 00904687404, 00904687406, 31722055760, 31722056224, 35356007506, 35356007560, 35356011606, 49702021718, 49702022118, 49702022144, 49702022248, 50268004911, 50268004912, 51079020401, 51079020406, 64380071701, 64380071703, 64980040524, 65862007360, 65862008924, 68084002111, 68084002121, 68180028601, 68180028602, 68180028607, 69097051403, 70518127400, 72865016760
abacavir/dolutegravir/lamivudine	49702023113, 49702025837, 49702027259
abacavir/lamivudine	35573040230, 35573043030, 42385096218, 42385096230, 42385096290, 49702020613, 65862033510, 65862033530, 65862090030, 66993048230, 68180028806, 68180028809, 68180028833, 69097036202, 70710104903, 70710104909, 70771105303, 70771105309
atazanavir	00003362212, 00003362412, 00003363112, 00003363810, 00093552606, 00093552706, 00093552856, 00904687504, 16714086001, 16714086101, 16714086201, 31722065310, 31722065331, 31722065360, 31722065410, 31722065431, 31722065460, 31722065505, 31722065530, 31722065531, 35356011406, 35356011430, 35356020760, 42385092006, 42385092048, 42385092060, 42385092106, 42385092148, 42385092160, 42385092206, 42385092230, 42385092237, 51407017160, 51407017260, 51407017330, 54898485400, 60687039995, 65862071003, 65862071005, 65862071010, 65862071060, 65862071103, 65862071105, 65862071110, 65862071118, 65862071160, 65862071203, 65862071205,

	65862071210, 65862071218, 65862071260, 65862071303, 65862071305, 65862071310, 65862071330, 65862071390, 69097044403, 69097044503, 69097044602, 69238113506, 69238113606, 69238113706, 69238113803, 70710105001, 70710105006, 70710105101, 70710105106, 70710105201, 70710105203, 70771159101, 70771159106, 70771159201, 70771159206, 70771159301, 70771159303
atazanavir/cobicistat	00003364111
bictegravir/emtricitabine/tenofovir alafenamide	50090624700, 61958250101, 61958250102, 61958250103, 61958250501, 61958250601
cabotegravir	49702024501, 49702024813, 49702028063
cabotegravir/rilpivirine	49702024015, 49702025315
cobicistat/darunavir	50090172300, 59676057530
cobicistat/darunavir/emtricitabine/tenofovir alafenamide	59676080030, 59676080099
cobicistat/elvitegravir/emtricitabine/tenofovir alafenamide	61958190101
cobicistat/elvitegravir/emtricitabine/tenofovir disoproxil fumarate	61958120101
darunavir	00480773606, 31722056760, 31722056860, 35356028460, 43598070405, 43598070460, 43598070505, 43598070530, 59651008560, 59651008630, 59676056201, 59676056301, 59676056401, 59676056501, 59676056630, 60219114406, 60219114503, 60687080811, 60687080821, 60687081911, 60687081921, 68180034507, 68180034606, 68180034609, 69097024402, 69097024803, 70771174505, 70771174506, 70771174508, 70771174603, 70771174605, 70771174609, 72205018460, 72205018530, 72578014705, 72578014714, 72578014728, 72578014805, 72578014806, 72578014816, 76282073760, 76282073830
dasabuvir/ombitasvir/paritaprevir/ritonavir	00074309328
didanosine	13411019102, 13411019103, 13411019106, 13411019109, 13411019110, 13411019202, 13411019203, 13411019206, 13411019209, 13411019210, 13411019302, 13411019303, 13411019306, 13411019309, 13411019310, 65862031030, 65862031130, 65862031230, 65862031330
dolutegravir	49702022613, 49702022713, 49702022813, 49702024213, 49702025537, 53002181006, 67296181803, 67296181805, 67296181807
dolutegravir/lamivudine	49702024613, 49702024633, 49702024661, 49702024662
doravirine	00006306901, 50090623700, 50090626800
doravirine/lamivudine/tenofovir disoproxil fumarate	00006500701

efavirenz	00056047030, 00056047492, 00056051030, 00378223393, 31722050425, 31722050430, 33342001307, 35356006990, 35356011506, 42543088904, 51407038230, 64380088904, 64980040603, 64980040709, 65862004910, 65862004930, 65862010410, 65862010430, 65862010510, 65862010530, 65862010609, 65862010610, 65862010630, 65862010690, 65862077430, 69097030102, 72865017225, 72865017230
efavirenz/emtricitabine/tenofovir disoproxil fumarate	00093523456, 15584010101, 31722073630, 33342013807, 42385091530, 42385091590, 65862049730, 69097021002, 76282067830
efavirenz/lamivudine/tenofovir disoproxil fumarate	42385092830, 42385092890, 42385092918, 42385092930, 42385092931, 42385092982, 42385092990, 42385092991, 49502042577, 49502042593, 49502047577, 49502047593
emtricitabine	35356020530, 61958060101, 61958060201, 65862030105, 65862030130, 69097064202, 69097064215
emtricitabine/rilpivirine/tenofovir alafenamide	50090234000, 61958210101
emtricitabine/rilpivirine/tenofovir disoproxil fumarate	61958110101
emtricitabine/tenofovir disoproxil fumarate (dosages other than 200/300mg)	59651016530, 59651016630, 59651016730, 61958070301, 61958070401, 61958070501, 61958200501, 69238209203, 69238209303, 69238209403, 70710136402, 70710136403, 70710136404, 70710136409, 70710136502, 70710136503, 70710136504, 70710136509, 70710136602, 70710136603, 70710136604, 70710136609, 70771162002, 70771162003, 70771162004, 70771162009, 70771162102, 70771162103, 70771162104, 70771162109, 70771162202, 70771162203, 70771162204, 70771162209
enfuvirtide	00004038101, 00004038140
etravirine	42291047312, 42291047460, 59676057001, 59676057101, 59676057201, 60219172007, 60219172107, 60219172206, 69238172007, 69238172107, 69238172206, 69315028520, 69315028606, 80005011212, 80005011309
fosamprenavir	00378352091, 35356006760, 49702020718, 49702020853, 63304058301, 63304058330, 63304058360
fostemsavir	49702025018
ibalizumab-uiyk	62064012201, 62064012202
lamivudine	00173066200, 00173066300, 00378516893, 00378516991, 00378517093, 00904658304, 10135060571, 31722000102, 31722000160, 31722075206, 31722075231, 31722075232, 31722075260, 31722075306, 31722075331, 31722075332, 31722075360, 31722075406, 31722075430, 31722075431, 31722075432, 33342000109, 33342000207, 35356006530, 49702020318, 49702020413, 49702020548, 50268045915, 50268046013, 50742062360, 50742062430, 50742062460, 51293083268, 52959050802, 52959050804, 52959050806, 52959050808, 52959050814, 52959050815, 52959050860,

	54838056670, 57237027424, 60429035360, 60429035430, 60505325006, 60505325106, 60505325108, 60505325203, 60505325208, 60687036211, 60687036221, 60687072011, 60687072021, 62135070637, 64380071003, 64380071104, 65862002510, 65862002560, 65862002610, 65862002630, 65862005524, 65862055260, 65862055330, 66993047860, 68084057811, 68180060201, 68180060207, 68180060306, 69097016603, 69097016702
lamivudine/tenofovir disoproxil fumarate	49502045077, 49502045093, 72606000201
lamivudine/zidovudine	00378518091, 31722050605, 31722050660, 31722073905, 31722073931, 31722073960, 33342000309, 42291036360, 43063090006, 49702020218, 49999006206, 49999006210, 49999006260, 50268045611, 50268045612, 50436059701, 52959054602, 52959054603, 52959054604, 52959054606, 52959054608, 52959054610, 52959054614, 52959054615, 52959054620, 52959054628, 55887023106, 60760059504, 60760059514, 61919006102, 63629487201, 64380070703, 65862003610, 65862003660, 65862059760, 66267050906, 68071090806, 68071445006, 68084041611, 68084041621, 68084041695, 68180028407, 68788729801, 68788729802, 68788729803, 68788729804, 68788729806, 68788729808, 68788729809, 71335014101, 71335014102, 71335014103, 71335063901, 71335063902, 71335063903, 71335191601, 71335191602, 71335191603, 72865014460, 76282011505, 76282011560, 76519100506
lenacapavir	61958300101, 61958300102, 61958300201, 61958300401
lopinavir/ritonavir	00074052260, 00074157521, 00074260521, 00074300860, 00074395646, 00074401412, 00074679922, 00074679930, 00527194748, 31722055612, 31722055631, 31722055632, 31722055660, 31722060312, 31722060360, 33342016309, 33342016409, 35356011160, 35356011201, 35356011230, 42385093360, 42385093412, 52959096812, 55289094712, 68071234802, 68071294902
maraviroc	31722057960, 31722058060, 35356020960, 49702022318, 49702022418, 49702023308, 49702023508, 49702023748, 49702023755, 49702026055, 50090623800, 68554307900, 68554308000, 72319002402, 72319002502, 72865023160, 72865023260, 73141002402, 73141002502
nelfinavir	35356011701, 49999043103, 52959028906, 63010001030, 63010002770
nevirapine	00054045058, 00054045921, 00378405091, 00378489093, 00378695077, 00597004646, 00597004724, 00597012330, 00597012990, 00781589331, 31722050501, 31722050505, 31722050510, 31722050560, 33342000409, 33342023807, 42571013129, 42571013160, 47781010060, 47781031730, 51991033106, 55289039203, 60505378806, 60505405803, 61442047060, 64380070903, 65162020906, 65862002710,

	65862002760, 65862005711, 65862005724, 65862093290, 65862093330
raltegravir	00006022761, 00006047361, 00006047761, 00006308001, 00006360301, 00006360360, 00006360361, 35356011006, 50090108500, 50090108501, 50090108502, 53002168601, 53002168604, 53002168605, 53002168606, 61919070602, 61919070606, 67296123507, 68071211306, 71205077706, 71205077714, 71205077730, 71205077760, 71205077790, 82982005506
rilpivirine	49702024302, 49702024902, 59676027801, 59676028001, 59676028090
ritonavir	00054040713, 00069134511, 00069173511, 00069308511, 00074194063, 00074234030, 00074333330, 00074339930, 00074663330, 31722059712, 31722059730, 60687036495, 60687042025, 60687042095, 65162006106, 65162006132, 65862068701, 65862068705, 65862068730, 65862068799, 69097065502, 69097065508
stavudine	00378504091, 00378504191, 00378504291, 00378504391, 31722051560, 31722051660, 31722051760, 31722051860, 64980035406, 64980035506, 64980035606, 64980035706, 65862004660, 65862004760, 65862011160, 65862011260, 68084046011
tenofovir disoproxil fumarate	00904682104, 16714082001, 31722053501, 31722053505, 31722053510, 31722053530, 31722053560, 33342009607, 35356007306, 35356007330, 42291080030, 42385090103, 50090720200, 50268075811, 50268075812, 60687036695, 61958040101, 61958040301, 61958040401, 61958040501, 61958040601, 62135046630, 63629972901, 64380071404, 65862042130, 65862081803, 65862081830, 65862081903, 65862081930, 65862082003, 65862082030, 67184051901, 67184051902, 67184052001, 67184052002, 67184052101, 67184052102, 69076010503, 69097053302, 69097053315, 70518367700, 70518367701, 71335236401, 72789036107
tipranavir	00597000302
zidovudine	00378610691, 00527190506, 31722050960, 49702021120, 49702021248, 49702021301, 49702021326, 49999038618, 52343004401, 52343004560, 52959050906, 52959050912, 52959050918, 52959050920, 52959050924, 52959050928, 52959050930, 63304092060, 65862002410, 65862002460, 65862004824, 65862010701, 65862010710, 68084046111

Individuals were excluded from this analysis if they had a medical claim with a diagnosis code for HIV/AIDS (B20.x or Z21.x).

4.3.6.3 Analyses

For the exhibit “Total claims for any oral PrEP medication per 10,000 individuals, standardized to a 30-day supply, and share of claims with any form of cost sharing, 2019-2023,” the HPC identified claims for oral

PrEP medications (as described above) and standardized each to 30-day increments (for example, a claim for a 60-day supply of medication is counted as two 30-day prescriptions, with cost sharing and allowed amounts equal to half of each value on the original claim). The number of 30-day equivalent claims and share with any cost sharing were identified.

For the exhibit “Total claims for PrEP per 10,000 individuals and share of claims with any form of cost sharing, by drug, normalized to 30-day supply, 2019-2023,” claims for each of the three types of oral PrEP medication were identified and standardized to 30-day increments (as described above), The number of 30-day increments, along with the share of each with any cost-sharing, were calculated. Results by payer are presented below:

PAYER	SHARE OF CLAIMS FOR DESCOVY	SHARE OF CLAIMS FOR TRUVADA	SHARE OF CLAIMS FOR GENERIC	SHARE OF DESCOVY CLAIMS WITH COST-SHARE	SHARE OF TRUVADA CLAIMS WITH COST-SHARE	SHARE OF GENERIC CLAIMS WITH COST-SHARE
Allways	19%	0%	81%	99%	N/A	0%
BCBSMA	24%	0%	76%	97%	100%	0%
HNE	14%	0%	86%	100%	N/A	98%
HPHC	20%	1%	79%	20%	25%	3%
Tufts	13%	0%	87%	68%	N/A	0%
United	7%	0%	93%	9%	N/A	1%

Clinical guidelines indicate that PrEP must be taken daily to be effective. Medication adherence was characterized using Proportion of Days Covered (PDC), which was calculated using prescription fill dates and number of days supplied. A new-user design was employed to measure adherence between 2021 and 2023; individuals needed at least two PrEP claims and could not have a claim for PrEP three months prior to entry into this analytic cohort. Discontinuation was defined as having a 60-day gap in PrEP supply after exhausting all available medication. Individuals with a PDC \geq 80% were considered adherent.

4.3.7 Preventive visits

4.3.7.1 Definitions and exclusions

For analysis of cost sharing for preventive visits, the HPC retained patients ages 0-64 with 12 months of medical coverage from the ambulatory claim analytic file. Preventive visits episodes were defined as all services taking place at same person, same day encounters that included any Current Procedural Terminology (CPT) code indicating a preventive visit (99381-99387, 99391-99397, G0438, G0439, 99432, 99461, 99420, 99429). Preventive visit episodes were retained for analysis. Encounters that included a preventive visit code but that reflected services for newborns as part of labor-and-delivery care

were excluded. Preventive visit episodes with allowed amounts lower than 20% of the median or higher than 10 times the median were excluded as outliers.

4.3.7.2 Analysis

For the exhibit, “Share of preventive visit episodes with any cost sharing and average cost sharing amounts for preventive visits with any cost sharing, 2019 and 2023,” preventive visit episodes with any cost sharing were identified and share of preventive visit episodes with cost sharing and mean copay, coinsurance, deductible, and total cost sharing amounts among preventive visit episodes with any cost sharing were calculated for 2019 and 2023.

For the exhibit, “Share of preventive visit episodes with cost sharing by payer, 2023,” preventive visit episodes with any cost sharing were identified, and the share of preventive visit episodes covered by each payer that had any cost sharing was calculated.

For the exhibit, “Share of preventive visit episodes including codes for preventive visits, problem-based visits, lab services, behavioral health services, and other services, and share of each with cost sharing, 2023,” the share of preventive visit episodes including each service type and the share including each service type that had cost sharing for the associated service were calculated. Preventive visit codes were identified as described above. Problem-based visit codes billed during preventive visit episodes were identified using CPT codes 99201-99214, 99241-99245. Berenson-Eggers Type of Service (BETOS) codes were used to identify CPT codes indicating labs and tests (using the BETOS category “test”) and behavioral health services (using the BETOS subcategory “behavioral health”).



MASSACHUSETTS
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TECHNICAL APPENDIX 5

Primary Care and Behavioral Health Chartpack

ADDENDUM TO THE 2025 COST TRENDS REPORT

5.1 Summary

This appendix describes the Health Policy Commission’s (HPC) approach to examining **Primary Care and Behavioral Health (PCBH)** in the 2025 Cost Trends Report Chartpack.

5.2 Primary Care Analyses

5.2.1 Data Source

The HPC’s primary care analyses use the Center for Health Information and Analysis (CHIA) All-Payer Claims Database (APCD). Unless otherwise noted, the analyses included seven commercial payers: Blue Cross Blue Shield of Massachusetts, Tufts Health Plan, Harvard Pilgrim Health Care, Health New England, Mass General Brigham Health Plan (formerly AllWays Health Partners), United Health, and Elevance (formerly Anthem and includes Wellpoint, a GIC offering). Patients were restricted to those under 65 to eliminate those who may have Medicare and have secondary commercial insurance.

5.2.2 Primary care definition

The definition of primary care largely follows the PCBH methodology developed by CHIA, and the code list can be [downloaded from CHIA’s website](#). Specifically, primary care claims are identified based on two criteria:

Nature of the visit: Must be a professional claim containing a primary care service procedure code, which includes office-type visits (e.g., sick visit), preventive visits (e.g., wellness exam), vaccines, and other services.

Provider type: In addition to the primary care service procedure code, the service must also be provided by a primary care provider. CHIA’s code list provided taxonomy codes to identify such providers. The HPC supplemented this method with providers identified through HPC’s primary care provider attribution methodology. Details of the methodology can be found in the technical appendix for the Provider Organization Performance Variation Chartpack.

HPC varied their definition in two main ways. First, HPC examined both primary care taxonomy codes as well as primary care providers identified through HPC’s attribution methodology (see **Technical Appendix 8: Provider Organization Performance Variation** for more detail). Second, HPC did not include obstetric care as primary care even though CHIA does include this care in their payer data collection.

5.2.3 Analyses

The sections below summarize the methods for each primary care exhibit.

5.3.1 Primary care spending compared to other medical spending

For exhibit “**Commercial Medical Spending by Category Per Member Per Year, 2019-2023**”, aggregate spending from the APCD medical claims was categorized into primary care spending, behavioral health spending, and spending for other medical services. Pharmacy spending is not included. Per member spending was calculated by dividing aggregate spending by member years in each year of the APCD.

For exhibit “**Commercial Spending on Primary Care and Behavioral Health as a Percent of Total Medical Spending by Payer, 2019-2023**”, aggregate spending from the APCD medical claims was categorized into primary care spending, behavioral health spending, and spending for other medical services. Pharmacy spending is not included.

For exhibit “**Percent of Commercially-Insured Residents with No Primary Care Visits by Income of Member’s Zip Code, 2023**”, the HPC excluded members that had partial year coverage and members without prescription drug coverage. Members with no primary care visits include members without any kind of medical or pharmacy utilization.

Income decile	No primary care visits		No utilization		Have utilization but no primary care visits	
	Adults	Children	Adults	Children	Adults	Children
Lowest income	29.8%	11.4%	12.1%	5.0%	17.7%	6.4%
2	28.8%	11.8%	11.4%	4.7%	17.4%	7.1%
3	26.8%	10.5%	9.8%	3.8%	17.0%	6.7%
4	25.0%	7.2%	8.8%	2.8%	16.2%	4.4%
5	23.9%	6.1%	8.1%	2.1%	15.8%	4.0%
6	24.3%	6.4%	8.3%	2.2%	16.0%	4.2%
7	23.4%	5.5%	7.3%	1.9%	16.1%	3.6%
8	23.0%	5.2%	6.9%	1.7%	16.1%	3.5%
9	21.3%	4.6%	6.1%	1.2%	15.2%	3.4%
Highest income	19.9%	4.0%	4.9%	1.0%	15.0%	3.0%

For the exhibit “**Share of Ambulatory Service Revenue by Category and Provider type, 2023**”, the HPC calculated the share of provided by primary care providers and specialist providers by type of service provided. Services were restricted to those provided in ambulatory settings (for more detail on the creation of the ambulatory analytic file, see **Technical Appendix 6: Commercial Price Trends**). The HPC excluded allowed amounts that were more than 10 times the statewide median or less than 20% of the statewide median for a given procedure code and site of service.

Providers were identified using National Provider Identification (NPI) numbers, and were flagged as primary care providers if:

- 1) They were listed as a primary care provider in the 2023 Registration of Provider Organizations (RPO),
- 2) Their payer-reported taxonomy was one of the following: 207Q00000X (family medicine), 207QA0000X (family medicine - adolescent medicine), 207QA0505X (family medicine – adult medicine), 207QG0300X (family medicine – geriatric medicine), or 208000000X (pediatrics), or
- 3) Their specialty was reported as “family medicine,” “general medicine,” or “pediatrics” in the 2023 IQVIA, Inc. Office Based and Hospital Based Providers (IQVIA, Inc.) dataset.

Services were attributed to these primary care providers if their NPI matched the rendering NPI on the professional component of a claim.

Services were categorized using the Restructured Berenson-Eggers Type of Service (BETOS) Classification System (RBCS). RBCS is a taxonomy that groups CPT codes into clinically meaningful categories and subcategories. RBCS is updated annually by a technical expert panel, and this analysis is based on the 2023 version of RBCS.

For the exhibits **“Price Ratio for 30 Minutes of Work Time for Select Specialty Services to 30 Minutes of Primary Care Services, 2023”** and **“Trends in Price for 30 Minutes of Work Time for Psychotherapy, Primary Care Visits, and Select Specialty Services, 2019-2023,”** the HPC constructed a price index to compare the average price for a basket of common specialty procedures to the average price for 30 minutes of primary or behavioral health care delivered in ambulatory settings (for more detail on the creation of the ambulatory analytic file, see Commercial Price Trends - 4.1, Ambulatory analytic file creation). For all calculations, the HPC excluded allowed amounts that were more than 10 times the statewide median or less than 20% of the statewide median for a given procedure code and site of service. Due to the large share of behavioral health claims paid via capitation, all claims from MGBHP are excluded from the analysis shown in **“Trends in Price for 30 Minutes of Work Time for Psychotherapy, Primary Care Visits, and Select Specialty Services, 2019-2023.”**

To present a meaningful comparison of an “average” service provided by primary care physicians and behavioral health providers, average prices for 99213 (20-minute E&M visit, established patient) and 90837 (60-minute individual psychotherapy session) are presented alongside the specialty service composite. While these calculations are not restricted to specific provider types/specialties, the HPC has previously characterized price variation for these services and has found that average allowed amounts do not differ significantly across provider types within procedure codes.

The basket of specialty services was identified by first identifying the 15 most common physician specialty types, excluding general practitioners, family practitioners, and pediatricians, by volume in the ambulatory claim file (based on the taxonomy code reported on the professional component of each claim). These specialties are as follows:

allergy/immunology, anesthesiology, dermatology, emergency medicine, hospitalist, internal medicine, OB/GYN, ophthalmology, otolaryngology, pathology, physical medicine/rehab, psychiatry and neurology, radiology, surgery, and urology

For each physician specialty, the HPC included the ten most common procedures (as identified using the RBCS taxonomy) that can be safely performed in either an office or hospital outpatient department (commonly referred to as “crossover services”) and excluded procedures with fewer than 300 claims across specialty types. Crossover services were identified using the ambulatory payment classification system groupings in the [June 2022 MedPAC report](#), Chapter 6 (“Aligning fee-for-service payment rates across ambulatory settings”). This restriction to crossover services is intended to exclude specialty services that require intensive equipment and technology. For example, common lower-acuity procedures such as destruction of benign skin lesions, diagnostic laryngoscopies, and nasal endoscopies were included, but higher-intensity services such as joint replacements, colonoscopies, and inpatient procedures were not. After exclusions and de-duplication, 77 distinct procedures were included:

10005, 10060, 11042, 11102, 11104, 11402, 11900, 11980, 11982, 12032, 17000, 17110, 17311, 19000, 19281, 19285, 20526, 20550, 20551, 20552, 20553, 20600, 20605, 20610,

20611, 29075, 30140, 30520, 30901, 31231, 31237, 31575, 31579, 42830, 46600, 51700, 51728, 52000, 52310, 54200, 55250, 55700, 56605, 57454, 57456, 57500, 58100, 58301, 58322, 58323, 59025, 62321, 62323, 64400, 64405, 64415, 64445, 64447, 64450, 64483, 64490, 64493, 64612, 64615, 64616, 64642, 65855, 66761, 66821, 67028, 67145, 67800, 68761, 69210, 69433, 69436, 97597

In order to standardize comparisons between these procedures, average prices for each were scaled to 30-minute increments, using CMS physician work time estimates for 2025. The median pre-service, intra-service, and post-service work time estimates were identified for each procedure code of interest, and average allowed amounts were multiplied by the ratio of 30 minutes (the median pre-, intra- and post-service work time for 99213) to the sum of this value.

Several sensitivity analyses were performed to explore the validity of this index. While the restriction to “crossover services” was intended to ensure that only procedures that could be safely performed in either offices or hospital outpatient departments (HOPDs), the HPC observed several procedures that had very little/no office volume in 2023. When excluding these procedures (19281, 30140, 30520, 42830, 69436), the average price for the specialty index in 2023 was \$471, or \$54 lower than the average reported in the chartpack.

Prices for the same procedure vary by site of service. When restricting to claims for procedures performed in offices, the average price for the specialty index in 2023 was \$296, or \$229 lower than the average reported in the chartpack. Likewise, when restricting to claims for procedures performed in HOPDs, the average price for the specialty index was \$906, or \$381 higher than the average reported in the chartpack.

5.3 Behavioral Health Analyses

5.3.1 Data Sources

HPC’s behavioral health analyses use four different data sources: Center for Health Information and Analysis (CHIA) All-Payer Claims Database (APCD), CHIA’s Acute Hospital Case Mix databases (both inpatient and emergency department discharges), and CHIA’s Annual Report on the Performance of the Massachusetts Health System. Unless otherwise noted, the analyses included seven commercial payers: Blue Cross Blue Shield of Massachusetts, Tufts Health Plan, Harvard Pilgrim Health Care, Mass General Brigham Health Plan (formerly AllWays Health Partners), United Health, and Elevance (formerly Anthem and includes Wellpoint, a GIC offering). Patients were restricted to those under 65 to eliminate those who may have Medicare and have secondary commercial insurance.

5.3.2 Analyses

The sections below summarize the methods for each behavioral health exhibit.

5.3.2.1 Psychotherapy utilization

For exhibits “**Psychotherapy Utilization by Commercial Members, by Community Income, 2019-2023**” and “**Psychotherapy utilization by MassHealth members and Commercial members living lowest income communities, 2019-2023**”, psychotherapy utilization was identified using the following Current Procedural Technology (CPT) codes: 90832, 90833, 90834, 90836, 90837 and 90838. Psychotherapy encounters were created by collapsing claim-lines in which services were provided on the same day, to the same patient, with the same CPT code, into psychotherapy visits. Individuals included in the analysis were those ages 0 to 64 years by the end of each calendar year, with 12 full months of enrollment in health insurance

with any of the seven commercial payers included in the APCD or with MassHealth ACO-A/MCO plans, as well as 12 full months of behavioral health coverage.

To ensure inclusion of only ambulatory services, inpatient facility claims were excluded for this analysis, as were emergency department, inpatient, and residential sites of service (professional claim site of service codes 13, 14, 21, 23, 31, 33, 34, 51, and 61), as well as facility claims with HCCI outpatient facility category 1 (emergency department).

Psychotherapy services provided via telehealth were identified using a combination of professional claim site of service codes, and CPT code modifiers (see table).

Table. Identifying Telehealth Claims

Type of code	Code
Professional claim site of service code	2
	10
CPT code modifier	GT
	95
	GQ
	G0
	FR
	FQ
	V3
	93

5.3.2.3 Opioid-related Acute Care Hospital Utilization

For exhibit “Opioid-related Acute Care Hospital Utilization per 100,000 Population, 2022”, HPC used data from AHRQ FastStats opioid-related hospital utilization. Only states that had data reported for both ED and inpatient visits were used in these analyses.

Opioid Overdose Death Rates and All Drug Overdose Death Rates per 100,000 Population (Age-Adjusted)

State	2021	2022	Change
Rhode Island	35.9	30.7	-14.5%
Colorado	21.7	19.4	-10.6%
Alaska	27.6	25.1	-9.1%
West Virginia	77.2	70.5	-8.7%
Maryland	38.5	35.3	-8.3%
Florida	28.9	26.5	-8.3%
Iowa	8.6	7.9	-8.1%
Kentucky	44.8	41.8	-6.7%
Indiana	34.2	32.0	-6.4%
Virginia	26.0	24.6	-5.4%
Ohio	40.1	38.0	-5.2%
Arizona	28.8	27.4	-4.9%
Utah	14.1	13.5	-4.3%
Michigan	26.0	24.9	-4.2%
Connecticut	38.3	36.8	-3.9%
South Dakota	5.7	5.5	-3.5%
Pennsylvania	32.8	31.8	-3.0%
New Mexico	37.2	36.5	-1.9%
New Jersey	28.6	28.1	-1.7%
Mississippi	20.3	20.0	-1.5%
Tennessee	45.5	45.3	-0.4%
Missouri	27.1	27.1	0.0%
Wisconsin	25.9	25.9	0.0%
Arkansas	13.7	13.8	0.7%
Massachusetts	32.5	33.1	1.8%
California	17.8	18.4	3.4%
Louisiana	30.5	31.6	3.6%
Delaware	48.1	50.2	4.4%

Minnesota	17.9	18.7	4.5%
South Carolina	35.0	36.6	4.6%
Illinois	23.7	24.9	5.1%
Nevada	18.9	20.0	5.8%
North Carolina	33.3	35.7	7.2%
New York	24.5	26.7	9.0%
Georgia	17.1	18.7	9.4%
Vermont	37.4	40.9	9.4%
Nebraska	6.0	6.6	10.0%
Alabama	21.2	23.4	10.4%
Montana	11.1	12.3	10.8%
Texas	9.4	10.6	12.8%
New Hampshire	28.4	32.1	13.0%
Maine	42.4	48.2	13.7%
Idaho	12.8	14.7	14.8%
Kansas	15.7	18.2	15.9%
Wyoming	12.4	14.4	16.1%
Hawaii	6.1	7.1	16.4%
Oregon	18.1	22.4	23.8%
Washington	20.5	25.9	26.3%
North Dakota	10.2	13.4	31.4%
Oklahoma	12.1	19.8	63.6%

Source: [Kaiser Family Foundation State Health Facts](#)

For exhibit “**Number of Opioid-related ED visits and inpatient stays (combined) at Acute Care Hospitals, FY2016-FY2023**” and exhibit “**Massachusetts Opioid-Related ED Visits and Inpatient Stays (Combined) by Race/Ethnicity per 100,000 residents, FY2016-FY2023**”, the HPC used AHRQ’s list of diagnosis codes for opioid-related hospitalizations. HPC examined both primary and secondary diagnoses for opioid-related diagnoses and excluded secondary diagnoses that indicated that a patient was in remission or underdosing.

The following ICD-10-CM codes were used to identify opioid-related visits:

- F11 series: Opioid-related disorders
 - All codes are included except F11.11, F11.21, and F11.91
- T40 series: Poisoning by, adverse effect of, and underdosing of narcotics
 - 0X1, 0X2, 0X3, 0X4, 0X5: Opium
 - 1X1, 1X2, 1X3, 1X4: Heroin
 - 2X1, 2X2, 2X3, 2X4, 2X5: Other opioids
 - 3X1, 3X2, 3X3, 3X4, 3X5: Methadone
 - 4X1, 4X2, 4X3, 4X4, 4X5: Other synthetic narcotics (through 2020 Q3)
 - 411, 412, 413, 414, 415: Fentanyl or fentanyl analogs (beginning 2020 Q4)
 - 421, 422, 423, 424, 425: Tramadol (beginning 2020 Q4)
 - 491, 492, 493, 494, 495: Other synthetic narcotics (beginning 2020 Q4)
 - 601, 602, 603, 604, 605: Unspecified narcotics
 - 691, 692, 693, 694, 695: Other narcotics
 - Codes with a sixth digit of “6”, indicating underdosing, are excluded



MASSACHUSETTS
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TECHNICAL APPENDIX 6

COMMERCIAL PRICE TRENDS

ADDENDUM TO THE 2025 COST TRENDS REPORT

6.1 Summary

This appendix describes the Health Policy Commission's (HPC) approach to the analyses contained in the **Commercial Price Trends Chartpack**.

6.2 Data sources

Unless otherwise stated, the HPC used the Center for Health Information and Analysis (CHIA) Massachusetts All-Payer Claims Database (APCD) V2023, including data from 2019 to 2023, for the compilation of this Chartpack.

Many of the inpatient research findings included in this report were produced using the Solventum™ (previously 3M) APR-DRG software. Inpatient analyses specify if they use MS-DRG, Solventum™ APR-DRG software, MassHealth APR-DRG weights, or some combination of systems to compare inpatient utilization and prices.

The HPC's APCD analytic files contain seven of the largest commercial payers in the state: Blue Cross Blue Shield of Massachusetts, Tufts Health Plan, Harvard Pilgrim Health Care, Elevance (previously Anthem and includes Wellpoint, a GIC offering), Health New England, Mass General Brigham Health Plan, and UnitedHealthcare. These seven payers represent approximately 43% of the commercial market (including ConnectorCare/subsidized plans) and primarily include claims for members enrolled in fully insured plans.

6.3 Inpatient Payment Trends

6.3.1 Inpatient stay analysis

The HPC constructed a dataset of inpatient stays in which all APCD claims were combined into inpatient stays based on member id, hospital id, and overlapping admission, discharge and service dates on the claims. The total payment for each discharge was defined as the total of allowed amounts for facility and professional claims associated with the discharge. Each facility claim originally had one Medicare Severity Diagnosis Related Groups (MS-DRG) assigned using CMS MS-DRG software and All-Payer Diagnosis Related Groups (APR-DRG with severity level) assigned using Solventum™ APR-DRG software.

Inpatient stays that had both maternity and newborn facility claims based on the associated DRGs were further split into separate mother and newborn stays. In rare instances when there were still different DRGs or severity levels on the claims that constituted a stay, the HPC picked the DRG with the highest DRG-weight to be associated with the entire stay.

To compare commercial prices to what a public payer would have paid HPC assigned Medicare and MassHealth facility prices to every commercial admission based on its APR-DRG in case of MassHealth payment or based on its MS-DRG in case of Medicare price. Medicare prices for the calendar year 2023 were estimated using [IPPS payment rules for fiscal year 2023](#) and [2024](#), and MassHealth prices were estimated using [Masshealth payment rules for fiscal year 2023](#) and [2024](#), depending on the date of service.

The total price for an inpatient stay included both the facility and professional payments for services received during the stay, unless stated otherwise (e.g. "facility price"). Since each inpatient stay may vary in total services received (e.g., inpatient stay spending included both the facility DRG claim and any professional components delivered during the inpatient stay), this analysis refers to inpatient stay as price

even though each inpatient stay may be comprised of different services as it is part of one inpatient episode.

The sample used for the price calculations in all the inpatient stay analysis excludes outliers in length of stay (LOS) defined as stays with LOS outside of LOS trim points for a given APR-DRG and severity combination as defined in Solventum™ APR-DRG software. In addition, extreme price outliers that were above 500% of the median price or below 20% of the median price were excluded. Transfers out of the hospital into another acute care hospital are also excluded since those represent incomplete payment for a given APR-DRG. The research findings included within this report were produced using the Solventum™ (previously 3M) APR DRG Software.

6.3.2 Cumulative change in prices, spending, acuity, volume, and payments per discharge for non-maternity acute commercial stays, 2019-2023

The purpose of this exhibit is to explain the trend in spending on inpatient care per member by decomposing it into utilization, complexity and price change over the same time period.

Spending is measured as the sum of facility and professional spending per year, and total payment per discharge is the average of the same variable. In contrast, the price variable is the facility payment adjusted with the Solventum™ APR-DRG weight version 38 that corresponds to the APR-DRG and a severity level assigned to a given stay. The recorded acuity variable represents average APR-DRG weight for the inpatient stays each year. The slide also reports the cumulative change in total spending that includes maternity stays, since maternity stays had relatively stable volume and acuity trend and adding those reduced the growth in overall spending. This number was calculated using the same method while including stays with maternity MDC, while still excluding newborns.

The data used for this exhibit excluded maternity, newborn and psychiatric stays. Average payment per stay includes both facility and professional claims. Unlike the other inpatient price analyses, the spending data in this exhibit does not exclude potential outliers in price and length of stay in order to correctly represent the trends in spending and utilization. At the same time, outliers and transfers are excluded from the calculation of price in order to develop a more robust price trend. Therefore, additional factor that effects growth in spending per member is the change in the proportion of price and length-of-stay outliers. Acuity adjusted payment is calculated as the average of payment divided by commercial APR-DRG weight for each stay, while acuity is measured as average APR-DRG weight. The entire analysis utilized Solventum™ APR-DRG weights using version 38 of Solventum™ APR-DRG software.

6.3.3 Commercial facility price for an inpatient stay of median complexity compared to Medicare and MassHealth facility rates by hospital, 2023

To enhance comparability to Medicare payments, the sample for this exhibit included only non-maternity inpatient stays and excluded children and psychiatric admissions. The top 50 hospitals by commercial volume were presented on the exhibit, while Children's hospital was also excluded due to the lack of comparability to Medicare payments. To create a comparable price across the hospitals with different severity case mix HPC developed facility price for a commercial admission of median severity as follows: commercial facility payments were adjusted for the APR-DRG 3M weight of each admission and multiplied by the median state-wide commercial APR-DRG weight for the selected sample (weight=0.94). In contrast,

CTR report 2024 applied mean APR-DRG weight to estimate hospital prices for the discharge of average complexity. HPC decided to use median this year as it is more comparable to typical discharges in most community hospitals.

To enhance comparability, stays identified as cost outliers according to either Medicare or MassHealth payment rules were excluded for this analysis. HPC estimated Medicare and MassHealth prices for each commercial admission while using hospital-specific Medicare and MassHealth payment formulas and input data. The percent differences between commercial facility price and public rates (Medicare or MassHealth) were averaged at the hospital level and applied to commercial hospital price estimate to obtain Medicare and MassHealth equivalents to the commercial facility hospital rate for the discharge of median complexity. MassHealth provided details on inpatient supplemental rate add-on payments which can also be found [here](#). HPC include these supplemental payment rate add-on for MassHealth, which in 2023 represented a fixed amount of \$1,856 added to the price of admission regardless of its complexity. According to MassHealth, in 2023, the total allocated amount to supplemental payment rate add-ons was \$585 million of which 47% were allocated to inpatient care and distributed across approximately 148 thousand discharges. Note that in addition to rate add-on amounts there were other incentive-based or lump-sum supplemental payments disbursed to hospitals by MassHealth which were not accounted for in the inpatient price estimate.

5.3.4 Average per year inpatient facility price growth (non-maternity), 2019-2023

Commercial facility payment was divided by a corresponding APR-DRG weight to derive complexity-adjusted price for each stay, which was then averaged for each hospital and calendar year. HPC calculated price growth over the 2019-2023 time period as annualized change in complexity-adjusted price over 2019-2023 time period for each hospital. The trend in top 50 hospitals by volume in 2023 were shown on the exhibit.

5.3.5 Inpatient prices for low-complexity vaginal delivery by hospital, 2023

Low-complexity vaginal delivery is defined here as APR-DRG 506 and severity levels 1 and 2. In commercial population the differences in payment and length of stay for these two severity levels are minimal and their relative shares in hospital low-complexity deliveries are 54% for level 1 and 46% for level 2. HPC used their share as a weighting factor to arrive at the average price of a low-complexity delivery. Hospitals with at least 30 commercial stays with APR-DRG 560 for vaginal delivery at severity levels 1 and 2 were selected for this exhibit. Commercial prices are estimated as a weighted average of actual unadjusted facility, professional and total commercial payments for severity level 1 and severity level 2 deliveries in each hospital. The data used in this exhibit excludes LOS and price outliers, as well as transfers out of the hospital (see 5.3.1 for details).

The MassHealth facility rate is based off the MassHealth FFS, while MassHealth professional payments are an estimate of actual professional payments to MassHealth patients based on claims data. MassHealth professional price was derived from MassHealth APCDv2023 as professional payment per stay with APR-DRG 506 and severity level 1 or 2. Sensitivity testing did not discover consistent or significant differences in professional payment between the two severity levels and the payment was combined across them. professional price was derived from MassHealth APCDv2023 as professional payment per stay with APR-

DRG 506 and severity level 1 or 2. Sensitivity testing didn't discover consistent or significant differences in professional payment between the two severity levels and the payment was combined across them.

6.4 Emergency Department (ED), Office, and Hospital Outpatient Department (HOPD) Price Trends

6.4.1 Ambulatory analytic file creation

To evaluate service prices across a range of services in different ambulatory settings (primarily office-based settings and HOPDs), the HPC constructed an encounter-level file that allows for evaluation of prices using a uniform definition of a procedure code encounter across ambulatory settings. In this case, a procedure-encounter is used, defined as claim lines billed for the same person (patient), on the same day (date of service), and under the same procedure code (CPT).

To create an ambulatory service encounter file for analysis, the HPC began with all professional claims billed in ambulatory settings identified according to site of service (for the purpose of these analyses: Office (11), Hospital Outpatient Department (19, 22), Ambulatory surgical center (24), and Independent Laboratory (81)) and all facility claims. Encounters were defined as mentioned previously by grouping (collapsing) claim lines for the same person (based on a unique person identifier), that occurred on the same day (same date of service) and were billed with the same procedure code (CPT). Importantly, the place of service delivery can determine the billing conventions. For example, services billed in office-based settings typically only bill with professional claims, while the same service billed in a HOPD often bills facility claims in addition to professional claims for the same service. The total cost of the service in the HOPD setting is the sum of allowed amounts for relevant claims (most often two distinct claim lines composed of one facility and one professional claim if present). This was completed for commercial medical claims for each year of data, 2019 to 2023, the most recent commercial data available to the HPC at the time of publication.

There were several exclusion criteria. Claim lines missing a procedure code were excluded, as were any claim lines billed by out of state providers. Claim lines billed for the same person on the same date as an emergency department visit (site of service 23, CPT 99281-99285 and 99291-99292, revenue center 0450-0459 and 0981), observation care (Restructured Berenson-Eggers Type of Service (BETOS) Classification System (RBCS) "Observation Care Services" classification, CPT 99217-99220, revenue center 0760, 07762, 0769), or inpatient stay (site of service 21 and inpatient facility claims) were excluded. Additional steps were taken for imaging and endoscopy services to exclude encounters that may have received a discount due to the Multiple Procedure Payment Reduction rule. This included identifying imaging encounters using RBCS ("Imaging" classification) and endoscopy encounters using Agency for Health Care Research and Quality (AHRQ) Clinical Classifications Software (CCS) (70, 76, 77) and retaining the highest paid encounter in cases where more than one imaging/endoscopy service was billed on the same day for the same person.

When computing average prices, the HPC excluded values that were more than 10 times the statewide median or less than 20% of the statewide median for a given procedure code.

Unless specified otherwise, the unit of analysis for all ambulatory care encounters is the procedure code encounter and therefore includes all payments made for the same procedure code (including relevant facility and professional payments which can often be billed separately). The example procedures used in

this Chartpack vary greatly by volume and number of hospitals providing that care. Because of that, the HPC chose different reasonable minimum service thresholds for inclusion.

6.4.2 ED visit creation

ED visits that encompass facility and professional claim lines for the services rendered during an ED visit were created in several steps:

- 1) First, all facility claims with ED revenue codes (in the range of 045X, 068X) or ED E&M procedure codes (in the range of 99281-99288, 99291 and 99292) were identified. These services were grouped into a visit if they were provided on the same day and at the same hospital to a given patient.
- 2) Professional ED E&M claim lines were added to the ED visit if their date matched the date of an ED visit determined in step 1. Of those professional ED E&M claim lines that didn't have a matching date in the facility ED claims, only those that happened on a day before or day after the determined date of an ED visit were rolled into a visit. Remaining professional ED claim lines dropped out since most of those were part of an inpatient stay that followed an ED visit.
- 3) Additional outpatient professional and facility services (such as imaging and labs) rendered on the date of an ED visit were considered ancillary ED services unless provided in a different hospital from the one identified based on ED-specific procedure or revenue codes.
- 4) Total cost of an ED visit was constructed as a sum of the allowed amount on all the claim lines that were determined as an ED visit in steps 1 through 3. The costs were divided into professional versus facility and ED-specific vs ancillary buckets.
- 5) Facility and professional claims often have different evaluation and management CPT codes for ED visits. Since facility fee complexity levels are usually higher than professional, HPC relies on facility's claim to assign ED complexity level to the entire ED visit.

6.4.3 Payments for emergency department visits for commercially insured patients for the most common complexity levels, 2019-2023

The exhibit shows the total average cost of an ED visit for the years 2019 through 2023, as well as trends for the four common levels of ED visit severity. The cost of an ED visit is divided into two categories: ancillary and E&M services. Ancillary services include facility and professional payments for the additional tests and procedures provided during the ED visit, such as imaging, EKG or advanced tests. The E&M category includes facility and professional payments for ED-specific evaluation and management codes.

6.4.4 Commercial price for a level 4 complexity ED visit, by hospital, 2023

This exhibit shows E&M and ancillary portion of the ED visit price and includes both facility and professional components of payments. The sample includes ED visits that had E&M procedure code 99284 (level 4) on a facility claim (the professional complexity level often differs from the facility one and is generally higher). ED visits only include those visits that were not admitted to an inpatient stay. The exhibit includes top 50 hospitals by ED volume in 2023.

6.4.5 Average annual ED price growth (E&M portion) by hospital, 2019-2023

For the exhibit “Average Annual ED price growth(E&M) by hospital, 2019-2023”, data includes emergency E&M procedure facility and professional claims in the range of 99281-99285. To estimate change in ED E&M spending due to change in prices, HPC produces an estimate of hypothetical ED E&M spending in 2023 if prices remained unchanged from the base year (2019) with the same distribution of codes in professional and facility claims as in 2023. Comparing actual spending to the hypothetical one for each hospital produces the estimate of overall price growth over the period. The data excludes claim types and levels of which a hospital had fewer than 20 claims in both years. The formula for hospital-level price growth is as follows:

$$Price\ change\ 2019\ to\ 2023 = \frac{\sum Pi2023 * Ni2023}{\sum Pi2019 * Ni2023}$$

where i is each ED E&M code and type (professional and facility) for which sample has 20 or more observation in both years for each hospital. This resulting price change from 2019 to 2023 is then annualized to represent average annual price growth over the period.

6.4.6 Average annual HOPD price growth by hospital, 2019-2023

HOPD encounters were defined as described in [5.4.1.](#), combining professional and facility fees delivered on the same day for the same procedure. Prices for physical therapy procedures were adjusted for quantity at the encounter level. Imaging procedures that were secondary on the day of the main imaging procedure were excluded. The formula for hospital-level price growth is as follows:

$$Price\ change\ 2019\ to\ 2023 = \frac{\sum Pi2023 * Ni2023}{\sum Pi2019 * Ni2023}$$

where i is each CPT code for which sample has 20 or more observation in both years for each hospital. This resulting price change from 2019 to 2023 is then annualized to represent average annual price growth over the period.

6.4.7 Average commercial price for outpatient knee arthroplasty by provider, 2023

HPC identified surgical encounters as all surgical, anesthesia and other services on the day of major surgical procedure conducted in outpatient setting. Major surgical procedure is defined as surgery flag=2 in [HCUP surgery flag software](#). Whenever an encounter had multiple surgical procedures performed on the same day, the procedure with the highest work RVU value and the highest payment was designated to be the main surgical procedure on the encounter. Surgical encounters that coincided with ED visits or inpatient stays were excluded. For the exhibit “Average commercial price for outpatient knee arthroplasty by provider, 2023” HPC selected the knee replacement surgeries where main surgical procedure was CPT 27446 or 27447, since those two procedures had very similar pricing and were most common.

Average knee arthroplasty price for the providers with at least 25 surgeries are shown in the exhibit. Note that [HPC datapoints issue #26](#) compared ASC and HOPD prices in 2021 and found that prices for eye surgeries, colonoscopies, arthroscopies and other common ASC services were significantly lower at ASCs with a notable exclusion of joint replacement surgeries.

6.4.8 Average commercial price of a standard dose of Keytruda by hospital, 2023

For the exhibit “Average commercial price of a standard dose of Keytruda by hospital, 2023”, data are for Keytruda (CPT J9271, ‘Injection, pembrolizumab, 1 mg’) and reflect the price for a 200-milligram dose. To calculate the total cost of a 200-milligram dose, the HPC calculated encounter level unit prices by dividing the total dollar amount billed (spending) by the total number of units billed (quantity). The average commercial price of a standard dose represents the average unit price (for hospitals with sufficient volume) multiplied by 200 units, which was the median units billed for Keytruda in 2023.¹ To eliminate data errors or unusual billing practices, the HPC excluded encounters where the units billed were more than the 95th percentile or less than the 5th percentiles of units billed for Keytruda. Facilities listed are limited to those with at least 20 commercial encounters delivered in 2023 after exclusions.

The Medicare price was calculated using the Medicare payment limit for Keytruda (CPT J9271) as reported by CMS in the Average Sales Price (ASP) Drug Pricing files. Payment limits are unit prices for administrated drugs and reflect ASP plus 6%. The 2023 Medicare price reflects the October 2023 payment limit multiplied by 200 to reflect the total cost of 200 units.

6.4.9 Average price and distribution of volume for common ambulatory services by setting, 2023

For the exhibit “Average price and distribution of volume for common ambulatory services by setting, 2023”, data are for Ocrevus (CPT J2350, ‘Injection, ocrelizumab, 1 mg), colonoscopy with removal of lesions (CPT 45385, ‘Colonoscopy, flexible; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique’), and lipid panel (CPT 80061 ‘Lipid panel’). All prices reflect procedure code encounters to capture the potential for both facility and professional claims billed on the same day. Distribution of volume reflects encounter volume.

For Ocrevus, the steps outlined in section 5.4.8 were followed to calculate the price of a standard dose of Ocrevus in office settings and HOPDs. The price reflects the total cost of a 600-milligram dose of Ocrevus, which was the median units billed for Ocrevus in 2023.²

For colonoscopy, ASCs were primarily identified using a list of licensed ASC providers in Massachusetts from the Massachusetts Department of Public Health, matched on National Provider IDs (NPIs). Professional claims associated with ASCs were identified with a place of service code of 24.

6.5 Commercial Price Indices

6.5.1 Defining commercial price indices

Unless otherwise specified, the following methodology applies to the following exhibits: “Cost of the HOPD market basket per 100 patients by hospital, 2023”, “Cost of the HOPD market basket per 100 patients by payer, 2023”, “Cost of the lab market basket per 100 patients, including cost sharing, by Massachusetts

¹ A dose of Keytruda varies between 200 or 400 milligrams billed by the milligram i.e., if 200 milligrams are administered to a patient then 200 units of the drug are billed. For more information on dosing regimens for Keytruda see relevant [prescribing information](#).

² A dose of Ocrevus varies between 300 or 600 milligrams billed by the milligram. For more information on dosing regimens for Ocrevus see relevant [prescribing information](#).

provider, 2023”, and “Cost of the crossover services market basket per 100 patients by payer and setting of care, 2023”.

The HPC created three Laspeyres Price Indices (i.e., a market basket of services) for (1) services occurring in HOPDs, (2) laboratory services occurring in HOPDs, offices, and independent labs, and (3) services occurring in offices and HOPDs (crossover services).

Included services

The price indices vary in the creation of each market basket. Refer to the sections below on specific methodology on each market basket.

HOPD services market basket

For a CPT code to be a candidate code for inclusion in the HOPD services market basket, it had to be present with sufficient volume (at least 20 encounters) at outpatient departments of 50 Massachusetts hospitals in 2023. The set of services included in the HOPD commercial price index was defined by first only including hospital-procedure code pairs where a hospital had at least 20 encounters for any individual CPT code. The HPC then ranked these codes in descending order based on aggregate statewide HOPD spending and then selected the top 50 procedure codes. Sensitivity analyses increasing the size of the code set did not demonstrably change the results. The set of 50 codes was chosen to include a range of typical HOPD services (e.g., visits, procedures, lab services, etc.).

Codes for evaluation and management services (CPT codes 99202-99499) were not considered for inclusion because of varying billing practices across payers in the APCD (for example, BCBSMA no longer reimburses facility fees for many evaluation and management visits).

See section 5.5.4 for the final code list included in the HOPD services market basket.

Laboratory services market basket

For a CPT code to be a candidate code for inclusion in the lab service market basket it had to be present with sufficient volume (at least 12% of aggregate statewide volume) at each setting of interest (offices, independent labs, and HOPDs) based on individual providers having sufficient volume of each code (at least 20 encounters). The set of services included in the laboratory price index was defined by first only including codes where each setting of care had at least 12% of the service volume for any individual CPT code. The HPC then ranked these codes in descending order based on aggregate statewide spending and then selected the top 50 procedure codes. Sensitivity analysis increasing the size of the code set did not demonstrably change the results.

Specific to the lab services analytic file, if an encounter was composed of more than two claim lines it was excluded from analysis (less than 1% of encounters). Encounters billed with modifier 26 (professional component) were excluded as well. Additionally, providers in the laboratory services analytic file were not restricted to Massachusetts providers to account for the possibility of lab samples being sent out of state for testing.

See section 5.5.4 for the final code list included in the lab services market basket.

Crossover services market basket

CPT codes that were considered for inclusion were limited to those that were previously identified by the HPC as “crossover services” that are considered services that can be safely provided in office and HOPD

settings. Crossover services were identified based on [methodology developed by the Medicare Payment Advisory Commission](#) (MedPAC).

For a CPT code from the crossover service list to be a candidate code for inclusion in the crossover services market basket it had to be present with sufficient volume at office and HOPD setting (at least 15% of aggregate statewide volume) based on payer-setting combinations having sufficient volume of each code (at least 20 encounters) (e.g., sufficient volume billed by BCBSMA for a given code provided at office settings). The HPC then ranked these codes in descending order based on aggregate statewide spending and selected the top 25 procedure codes.

Codes for evaluation and management services (CPT codes 99202-99499) were not considered for inclusion because of varying billing practices across payers in the APCD.

See section 5.5.4 for the final code list included in the crossover services market basket.

Service quantities

The HPC defined the quantity of each code for use in each index to be the statewide utilization rate of each code per 100 commercially insured members observed in the APCD, as described earlier. Thus, the final market basket represents expected spending per 100 commercially insured members in each year for the services in each index. The quantities are fixed, for all entities and all years, at observed levels in 2023. In accordance with a Laspeyres index, the quantities do not vary by entity, and as a result, the output of the index represents how much it would cost for the identical utilization pattern occurring at provider A versus provider B or for payer X versus payer Y.

Service prices

Average prices are computed by averaging the price for each service for the given unit in question (hospital, payer, etc.). Price trimming as described above in section 5.4.1 is applied to outlier prices.

For physical therapy services in the HOPD and crossover services baskets, the price reflects the total cost of the service calculated as the product of the unit price and the statewide average number of units billed for a given physical therapy code. For the lab price index, average cost sharing is also reported, which is a component of the allowed amount for an encounter.

Because a key focus of the index was prices at hospitals/providers, the HPC used its standard method of computing the mean price only where a hospital/provider contained at least 20 instances of the given procedure code in the given year. For hospitals/providers without sufficient volume of these procedures, HPC used two different imputation methods as described below.

6.5.2 Imputation methods for missing procedure codes

Prices for missing procedure codes were imputed using price ratios for non-missing procedure codes at a given entity (hospital or other provider). This method involved the following steps:

- 1) For each non-missing procedure, calculate the ratio of the entity's average procedure price and the statewide average price for that procedure code. For example, a hospital with an average price of procedure code X that is 10 percent higher than the statewide average would have a value of 1.1 for this ratio.
- 2) Calculate the simple average of the ratios from step 1 across all the entity's non-missing procedures in a given market basket. For example, if a hospital had two missing codes and ratios of 1.1 and 1.0 for the two codes, this average of ratios would be 1.05.

- 3) Multiply the statewide average price for the missing procedure by the result from step 2) to impute a missing procedure price.

See additional data in section 5.5.4 for a count of hospitals/providers with sufficient volume for each code in the HOPD and lab basket. For the crossover services index, each payer-setting combination had sufficient volume, so no imputation occurred.

6.5.3 Computing the index

The price index was computed for each entity as well as statewide for 2023. The price indices therefore are calculated as the weighted sum of the average entity-specific price for each code in a given basket times the statewide fixed quantity of each code. The HPC calculated the statewide average HOPD index similarly using statewide average procedure prices. The formula for the calculation of the price index is represented below where j indexes entities (e.g., hospitals) in Massachusetts, i indexes the procedure codes selected for inclusion in each index. $\mu_{i,j}$ represents the entity-specific (“j-th”) average price for procedure code i , and k_i represents the statewide utilization rate for procedure code i .

$$Price\ Index_j = \sum_{i=50\ or\ 25}^j \mu_{i,j} * k_i$$

$$Price\ Index_j = \sum_{i=50\ or\ 25}^j \mu_{i,j} * k_i$$

For the lab market basket, the Medicare cost was derived using the same procedures as above and with rates from the Centers of Medicare and Medicaid Services, Clinical Laboratory Fee Schedule (CLFS) for 2023. All codes included in the lab index are paid on the CLFS except for a general health panel (CPT 80050). To construct the Medicare cost of the basket, the Medicare rate for a general health panel was manually constructed by summing the rate from the CLFS for a comprehensive metabolic panel (CPT 80053), thyroid stimulating hormone test (CPT 84443), and a complete blood count (CPT 85025).

6.5.4 Additional data

HOPD Services Commercial Price Index Contents, 2023

CPT	Description	Hospitals with ≥20 encounters (out of 56)	Statewide mean price (\$), 2023	Aggregate statewide spending (\$), 2023	Utilization per 100 members per year, 2023
45385	Colsc flx prox splenic flx rmvl les snare tq	52	2527	44,522,964	1.3
77067	Bilateral breast mammography	53	329	43,300,204	9.3
45378	Colonoscopy flx dx w/wo collj specimens	53	2063	34,495,892	1.2
45380	Colonoscopy w/biopsy single/multiple	50	2395	30,389,026	0.9
88305	Level iv surg pathology grossµscopic exam	55	345	27,779,726	5.7

93306	Echo tthrc r-t 2d w/wom-mode compl spec&colr d	56	1275	26,910,946	1.5
74177	Ct abdomen & pelvis w/contrast material	54	1414	23,282,904	1.2
97110	Therapeutic px 1/> areas each 15 min exercises	54	192	20,250,308	8.2
43239	Edg transoral biopsy single/multiple	50	2051	19,743,634	0.7
77063	Screening digital breast tomosynthesis, bilateral	52	91	11,890,513	9.2
96365	Iv infusion therapy/prophylaxis /dx 1st to 1 hr	49	441	10,973,093	1.8
80050	General health panel	49	142	9,774,647	4.9
80061	Lipid panel	51	32	8,861,322	19.9
84443	Assay of thyroid stimulating hormone tsh	50	55	8,372,331	10.8
71046	Radiologic examination, chest; 2 views	56	171	6,939,381	2.9
85025	Blood count complete auto&auto difrntl wbc	56	30	6,923,603	16.6
80053	Comprehensive metabolic panel	55	29	6,628,845	16.4
76642	Ultrasound, breast, limited	53	245	6,528,286	1.9
93017	Cv strs tst xers&/or rx cont ecg trcg only	49	554	6,198,713	0.8
83036	Hemoglobin glycosylated a1c	50	30	5,848,739	13.7
88342	Imhistochem/cytchm 1st sep ident antibody slide	52	391	5,639,303	1.0
77065	Diagnostic mammography, unilateral	50	313	5,229,420	1.2
93005	Ecg routine ecg w/least 12 lds trcg only w/o i&r	53	126	5,098,184	2.9
76536	Us soft tissue head & neck real time imge docm	56	316	5,055,777	1.1
71250	Ct thorax w/o contrast material	54	502	4,770,636	0.7
77066	Diagnostic mammography, bilateral	48	428	4,570,201	0.8
97140	Manual therapy tq 1/> regions each 15 minutes	51	128	4,441,220	2.6
76830	Ultrasound transvaginal	50	338	4,020,042	0.8
97161	Physical therapy evaluation, low complexity	49	216	3,973,085	1.3
77080	Dxa bone density study 1/> sites axial skel	51	263	3,946,718	1.1
76700	Us abdominal real time w/image documentation	53	363	3,478,383	0.7

76705	Ultrasound abdominal real time w/image limited	55	312	3,246,872	0.7
76856	Us pelvic nonobstetric real-time image complete	52	335	3,120,371	0.7
85027	Blood count complete automated	51	20	3,100,609	11.0
82728	Assay of ferritin	50	47	3,060,199	4.6
71271	CT, thorax, low dose for screening	51	355	3,058,431	0.6
00812	Anesthesia service during colonoscopy	47	530	2,935,274	0.4
80048	Basic metabolic panel calcium total	55	23	2,832,863	8.8
73630	Radex foot complete minimum 3 views	54	173	2,735,041	1.1
93971	Dup-scan xtr veins unilateral/limited study	50	372	2,522,443	0.5
72100	Radex spine lumbosacral 2/3 views	51	236	2,277,864	0.7
82607	Cyanocobalamin vitamin b-12	49	44	2,268,197	3.7
73030	Radex shoulder complete minimum 2 views	54	172	1,807,879	0.7
84439	Assay of free thyroxine	48	31	1,786,572	4.0
73610	Radex ankle complete minimum 3 views	50	175	1,743,761	0.7
73130	Radex hand minimum 3 views	49	199	1,580,162	0.6
83735	Assay of magnesium	53	26	1,513,371	4.2
73502	Radiologic examination, hip, unilateral; 2-3 views	50	169	1,422,658	0.6
G0279	Diagnostic digital breast tomosynthesis	49	91	1,355,384	1.1
88304	Level iii surg pathology grossµscopic exa	46	148	1,347,092	0.7

Laboratory Services Commercial Price Index Contents, 2023

CPT	Description	Providers with ≥20 encounters (out of 56)	Statewide mean price (\$), 2023	Aggregate statewide spending (\$), 2023	Utilization per 100 members per year, 2023
80050	General health panel	54	97	14,065,239	10.3
80061	Lipid panel	56	24	13,323,644	39.5
84443	Assay thyroid stim hormone	56	41	11,010,194	19.0
87491	Chlmyd trach dna amp probe	54	69	10,814,323	11.1

87591	N.gonorrhoeae dna amp prob	54	68	10,152,254	10.5
85025	Complete cbc w/auto diff wbc	56	22	8,587,500	27.2
83036	Hemoglobin glycosylated a1c	56	22	8,427,768	27.6
80048	Metabolic panel total ca	55	19	3,936,734	14.5
86803	Hepatitis c ab test	53	32	3,770,443	8.4
84153	Assay of psa total	55	36	3,757,026	7.3
82607	Vitamin b-12	54	32	3,245,699	7.1
80307	Drug test prsmv chem anlyzr	56	90	3,033,063	2.4
87636	Sarscov2 & inf a&b amp prb	48	179	1,985,183	0.8
G0480	Drug test def 1-7 classes	51	130	1,899,406	1.0
86780	Treponema pallidum	53	33	1,760,678	3.8
80076	Hepatic function panel	55	20	1,462,915	5.2
84702	Chorionic gonadotropin test	55	34	1,392,802	2.9
87340	Hepatitis b surface ag ia	53	22	1,320,644	4.2
83002	Assay of gonadotropin (lh)	55	42	1,116,855	1.9
82570	Assay of urine creatinine	54	12	1,083,157	6.4
82043	Ur albumin quantitative	56	13	1,079,777	5.7
87081	Culture screen only	54	15	905,504	4.2
87631	Resp virus 3-5 targets	45	231	886,298	0.3
86706	Hep b surface antibody	49	23	821,037	2.5
84460	Alanine amino (alt) (sgpt)	56	11	799,598	5.0
83655	Assay of lead	51	21	785,433	2.6
82565	Assay of creatinine	56	11	768,698	5.1
86704	Hep b core antibody total	49	24	722,706	2.1
84144	Assay of progesterone	48	41	709,903	1.2
84270	Assay of sex hormone globul	49	42	707,344	1.2
86762	Rubella antibody	51	33	661,509	1.4
85610	Prothrombin time	56	11	597,034	3.8
87660	Trichomonas vagin dir probe	51	46	478,038	0.7
87801	Detect agnt mult dna ampli	50	99	455,996	0.3
83013	H pylori (c-13) breath	52	99	437,095	0.3
87480	Candida dna dir probe	51	44	408,737	0.7
83690	Assay of lipase	55	18	373,698	1.5
83921	Organic acid single quant	48	45	299,931	0.5
82274	Assay test for blood fecal	53	27	286,203	0.7

87510	Gardner vag dna dir probe	50	45	254,371	0.4
82947	Assay glucose blood quant	56	8	248,687	2.1
84165	Protein e-phoresis serum	48	31	234,332	0.5
82040	Assay of serum albumin	53	11	206,067	1.3
86431	Rheumatoid factor quant	53	13	194,743	1.1
86708	Hepatitis a antibody	49	25	191,053	0.5
82310	Assay of calcium	54	13	187,605	1.0
87493	C diff amplified probe	46	76	178,786	0.2
0202U	Nfct ds 22 trgt sars-cov-2	43	688	168,550	0.0
G0481	Drug test def 8-14 classes	45	189	166,272	0.1
83721	Assay of blood lipoprotein	52	18	156,698	0.6

Crossover Services Commercial Price Index Contents, 2023

CPT	Description	Service volume in HOPDs, 2023	Statewide mean price (\$), 2023	Aggregate statewide spending, 2023	Utilization per 100 members per year, 2023
77067	Bilateral breast mammography	73%	314	55,740,371	12.6
93306	Echo tthrc r-t 2d w/wom-mode compl spec&colr d	62%	967	32,827,370	2.4
77063	Screening digital breast tomosynthesis, bilateral	73%	86	15,014,045	12.4
80050	General health panel	80%	126	10,864,603	6.1
80061	Lipid panel	76%	28	10,418,335	26.3
76830	Ultrasound transvaginal	33%	272	9,746,448	2.5
97161	Physical therapy evaluation, low complexity	28%	143	9,291,449	4.6
71046	Radiologic examination, chest; 2 views	63%	132	8,457,343	4.5
87491	ladna chlamydia trachomatis amplified probe tq	71%	89	8,011,346	6.4
87591	ladna neisseria gonorrhoeae amplified probe tq	74%	89	7,538,949	6.0
20610	Arthrocentesis aspir&/injection major jt/bursa	15%	196	7,145,850	2.6
83036	Hemoglobin glycosylated a1c	70%	25	7,019,304	19.6
73630	Radex foot complete minimum 3 views	42%	117	4,330,382	2.6
97162	Physical therapy evaluation, moderate complexity	24%	136	3,414,438	1.8
96372	Therapeutic prophylactic/dx injection subq/im	30%	61	3,400,548	3.9

92134	Computerized ophthalmic imaging retina	19%	91	3,328,950	2.6
86803	Hepatitis c antibody	80%	39	3,079,863	5.7
73030	Radex shoulder complete minimum 2 views	41%	114	2,935,537	1.8
84153	Assay of prostate specific antigen total	69%	45	2,856,840	4.5
92567	Tympanometry	32%	45	1,376,577	2.2
82043	Albumin urine microalbumin quantiative	80%	16	879,374	3.8
82570	Creatinine other source	78%	15	874,141	4.2
87081	Cul prsmptv pthgnc organism scrn w/colony estimj	51%	17	734,319	3.0
82565	Creatinine blood	70%	11	706,245	4.7
82947	Glucose quantitative blood xcpt reagent strip	60%	8	213,072	1.9

Cost of the HOPD market basket by payer, 2022 and 2023

Payer	2022	2023
United	\$47,127	\$47,954
Tufts	\$35,417	\$36,385
HPHC	\$33,028	\$34,179
MGBHP	\$31,765	\$32,220
HNE	\$29,271	\$30,541
Elevance	\$28,391	\$29,932
BCBSMA	\$28,664	\$29,450

6.6 Other analyses

6.6.1 Annual percentage increase in aggregate commercial prices by setting, 2019-2023

For the exhibit, “Annual percentage increase in aggregate commercial prices by setting, 2019-2023”, outpatient encounters were divided into mutually exclusive care settings (office and HOPD) as described in section 5.4.1 and inpatient stays were analyzed as described in section 5.3.1. All three care categories were summarized at the appropriate aggregate unit of analysis (e.g., CPT for outpatient services).

For office and HOPD settings, total spending and average prices were computed for each CPT for each year included in the analysis by setting. Yearly summarized files at the aggregate CPT level were merged to retain procedure codes that were billed in both years for a given period of analysis (e.g., codes that were billed in both 2019 and 2020 for the 2019-2020 period). Price growth in a given period was calculated as the sum of spending for all procedure codes in the more contemporary year divided by the sum of the product of the average price in the prior year and total utilization in the more contemporary year for all procedure codes. Price growth includes both facility and professional spending, where applicable.

Procedure codes with fewer than 20 encounters in either year during the period were excluded. For administered drugs and physical therapy services, average unit prices were evaluated. Administered drug claims billed by UnitedHealthcare were excluded due to coding anomalies.

For inpatient price growth HPC calculated severity-adjusted prices by dividing the total payment (facility plus professional) by the Solventum (previously 3M) APR-DRG weight that corresponds to a given APR-DRG assigned to a stay. Although technically APR-DRG weights are developed to adjust only the facility portion of the inpatient payment, HPC applied the weight to adjust the total price as a reasonable approximation. For consistency, HPC applied version 38 of APR-DRG software across the entire 2019 to 2023 period. The sample used for estimating price growth eliminated behavioral health stays, outliers in LOS, and transfers.

6.6.2 Cumulative change in risk score for three large commercial payers, 2013-2023

The exhibit “**Cumulative change in risk score for three large commercial payers, 2013-2023**” uses CHIA’s Annual Report and CHIA’s Total Medical Expenditure data books (2016-2025).

Average HSA total medical expenditure (TME) per member per month (PMPM) and average unadjusted TME PMPM were calculated for commercial full claims from three payers (Blue Cross Blue Shield Massachusetts, Harvard Pilgrim Health Care, and Tufts) for each calendar year 2013-2023. A risk score for each payer in each year was then calculated by dividing unadjusted TME by adjusted TME. Next, the growth from year to year by payer was calculated and then normalized to 1 in 2013. Growth for these three payers was aggregated and reported in terms of percent change.

Other payers in the CHIA data books were not included in this analysis due to data quality issues.



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TECHNICAL APPENDIX 7

HOSPITAL AND PAC UTILIZATION

ADDENDUM TO THE 2025 COST TRENDS REPORT

7.1 Summary

This technical appendix describes the Health Policy Commission’s (HPC) approach to examining hospital utilization in the 2024 Cost Trends Report Chartpack. Exhibits where the HPC processed and analyzed data are described below. For exhibits where data is compiled from other reports, please see the exhibit notes and sources for more detail.

7.2 Patient Pathways through the hospital, 2024

7.2.1 Data

The HPC utilized the Emergency Department Database (EDD), Outpatient Observation Database (OOD), and Hospital Inpatient Discharge Database (HIDD) from CHIA to identify the sources and discharge destinations for patients arriving at hospitals in 2024. These datasets are part of CHIA’s Massachusetts Acute Hospital Case Mix Database.

7.2.2 Exclusions

Due to data quality issues for discharge status, MetroWest Medical Center – Framingham Campus, Saint Vincent Hospital, and MetroWest Medical Center – Morse Campus were excluded from this analysis. In addition, visits at or that resulted in admission to specialty hospitals were excluded.

7.2.3 Analysis

Emergency department visits were identified using emergency department, outpatient observation, and inpatient stay data, the latter two used to identify ED visits that resulted in an admission to observation or inpatient care. Likewise, observation stays were identified using the outpatient observation and inpatient stay data, with the latter database used to identify observation stays that resulted in inpatient admissions. Transport information was only available for ED visits identified in emergency department data (i.e., not admitted to observation or inpatient). Ambulance transport category includes ambulance and helicopter; non-ambulance and non-walk-in transport category includes law enforcement and “other.” Against Medical Advice destination category includes against medical advice and eloped.

7.3 Emergency department (ED) utilization

7.3.1 Data

For the exhibits below, the HPC used the Emergency Department Database (EDD) from the Center of Information and Analysis (CHIA) for federal fiscal year 2016 through federal fiscal year 2023 (October 1 through September 30 of the following year), along with interim data for FY2024 the first two quarters of federal fiscal year 2025. 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, mode of transportation, and hospital and practitioner information.

- **All ED visits, potentially avoidable ED visits, and behavioral health ED visits per 1,000 residents, 2016-2024**
- **Percentage of “treat & release” ED visits that resulted in boarding (≥12 hours), by type, July 2019 to December 2024**

For the exhibit “All ED visits, potentially avoidable ED visits, and behavioral health ED visits per 1,000 residents, 2016-2024”, the HPC used U.S. Census Bureau Annual Estimates to calculate population rates.

7.3.2 Exclusions

Due to irregular emergency department length of stay data, discharges from the following hospitals were excluded from analyses of “Percentage of “treat & release” ED visits that resulted in boarding (≥12 hours), by type, July 2019 to December 2024”: Metrowest Medical Center - Framingham, Metrowest Medical Center - Morse, St. Vincent, HealthAlliance–Clinton – Clinton Campus, HealthAlliance-Clinton – Leominster Campus, UMass Memorial Medical Center – Memorial, UMass Memorial Medical Center – University, Marlborough, and North Adams Regional Hospital.

7.3.3 Analysis

7.3.3.1 Avoidable Emergency Department and Behavioral Health 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.).

Potentially avoidable ED visits are based on the "patched" Billing’s 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 To improve classification rate, diagnosis codes unclassified by the “patched” Billing’s algorithm were sequentially truncated and shortened codes were re-classified using the same algorithm. Injury-related ED visits were also identified using the Billings algorithm.

Behavioral health ED visits were identified by as any ED visit with a primary diagnosis classified as “mental, behavioral, or neurodevelopmental disorders” with the prefix of “MBD” from AHRQ’s Clinical Classification Software Refined (CCSR).

¹ Billings et al (1993). “Impact of Socioeconomic Status on Hospital Use in New York City, Health Affairs (Spring 1993).

² Johnston, K. J., Allen, L., Melanson, T. A., & Pitts, S. R. (2017). A “Patch” to the NYU emergency department visit algorithm. Health services research, 52(4), 1264-1276.

7.3.3.2 ED Boarding

For exhibit “**Percent of Behavioral Health ED Visits that Resulted in Boarding (≥12 hours) by Type, July 2019 to December 2024**”, the HPC used CHIA’s Acute Care Hospital Emergency Department Discharge Database to identify emergency department visits that did not result in an observation stay or inpatient admission. Behavioral health ED visits were defined as any ED visit with a primary diagnosis classified as “mental, behavioral, or neurodevelopmental disorders” from AHRQ’s Clinical Classification Software Refined (CCSR). ED boarding was defined as any visit with a length of stay equal to or exceeding 12 hours.

7.4 Inpatient admissions

7.4.1 Data

For the exhibits below, the HPC used the CHIA Hospital Inpatient Discharge Database (HIDD). This dataset is part of CHIA’s Massachusetts Acute Hospital Case Mix Database. The HIDD database contains all discharges from Massachusetts acute hospitals for fiscal year 2016 through fiscal year 2024, along with interim data for the first two quarters of fiscal year 2025. This data set contains comprehensive patient-level information including socio-demographics, admission type, clinical data, and charge data.

- **Inpatient percentage change in average length of stay, ICU/CCU days per discharge, and case mix index (3 QTR moving average), Jan 2016- Dec 2024**
- **Percentage of inpatient and ED stays taking place at community hospitals, by discharge type, 2016 - 2024**

7.4.2 Exclusions

For “**Inpatient percentage change in average length of stay, ICU/CCU days per discharge, and case mix index (3 QTR moving average), Jan 2016- Dec 2024**”, discharges from Shriners’ Hospital – Boston were excluded due to missing data in FY2025Q1. Discharges from MelroseWakefield Hospital – Lawrence were excluded due to irregular length of stay data in FY2025.

For “**Percentage of inpatient and ED visits at community hospitals, by discharge type, 2016 – 2024**”, discharges from MetroWest Medical Center – Morse Campus and Mercy Medical Center were excluded due to irregular admission source or payer data for at least one quarter of the study period.

7.4.3 Analysis

For “**Inpatient percentage change in average length of stay, ICU/CCU days per discharge, and case mix index (3 QTR moving average), Jan 2016- Dec 2024**”, “casemix index” was defined using the EOHHS’ Masshealth (Medicaid) all- payer refined diagnosis related groups (APR-DRG) weights v34.³ The data is comprised of all medical inpatient stays at acute care hospitals in Massachusetts, excluding behavioral health stays and extremely long lengths of stay (5 times the geometric mean by APR-DRG severity group, and/or length of stay greater than or equal to 180 days), because these cases are usually not paid on a DRG basis. Other exclusions include transfers, patients who died, patients who went to Shriners Hospital for Children (Springfield and Boston), and discharges with some APR coding restrictions based on discrepancies with CMS major diagnostic categories. Additionally, due to the volatile nature of the trends, the HPC calculated a three-quarter moving average of the values. It was calculated by taking the average of

³ EOHHS – [Masshealth APR DRG weights v34](#).

the previous, current and next quarters, for example: For FY2023Q2, the value will be an average of FY2023Q1-FY2023Q3.

For “**Percentage of inpatient and ED stays taking place at community hospitals, by discharge type, 2016-2024**”, “Community hospitals” are general acute care hospitals that do not support large teaching and research programs. HPC combines CHIA’s community hospitals and community-high public payer hospitals into one community hospital category for purposes of this analysis. Stays for newborns were identified by using major diagnosis category 15 (Newborns & Other Neonates with Conditions Originating in the Perinatal Period). For ED stays, the EDD Case Mix database was used to calculate the share of ED stays occurring at community hospitals.

7.5 ED visits admitted to inpatient stays

7.5.1 Data

For the exhibit, “**Percentage of all ED visits that were admitted for an inpatient hospital stay, by state, 2022**”, the HPC used the Healthcare Cost and Utilization Project’s (HCUP) Summary Trends Tables data. HCUP is set of discharge databases from the Agency for Healthcare Research and Quality on hospital care in the nation and for partner states. Summary Trend Tables include monthly or quarterly data on hospital utilization derived from the HCUP State Inpatient Databases (SID), State Emergency Department Databases (SEDD), National Inpatient Sample (NIS), and Nationwide Emergency Department Sample (NEDS). Summary trend tables include data for all ages and payers.

7.5.2 Definitions

ED visits that were admitted for an inpatient hospital stay represent the share of all visits originating in an ED that were ultimately admitted to an inpatient unit. Inpatient admissions originating in an ED were labelled “Non-elective inpatient stays, admitted through the ED” and represent all admissions with an indicator that ED services were provided at the same hospital as the inpatient stay. ED visits were labelled “All ED Visits” and include all treat-and-release ED visits and ED visits that result in an admission to the same hospital.

7.6 Percentage of ED visits for select conditions that were admitted to an inpatient stay

7.6.1 Data

For the exhibit, “**Percentage of ED visits for select conditions that were admitted to an inpatient stay (adjusted), 2024**”, the HPC used Center for Health Information and Analysis (CHIA) Hospital Inpatient Discharge Database (HDD), Emergency Department Database (EDD), and Outpatient Observation Databases (OOD), CY2024. HPC used [Agency for Health Research and Quality \(AHRQ\) Clinical Classification Software Refined \(CCSR\)](#) to group diagnoses into smaller groups of similar diagnoses. HPC [used AHRQ Elixhauser Comorbidity Software Refined, 2024](#), for information on comorbid conditions present during patient care.

7.6.2 Definitions

An ED admission is a visit beginning in the ED and resulting in admission and discharge from an inpatient unit. This may include visits where the patient was sent to observation status and then admitted to the inpatient unit. Also included were two other types of “admissions”: transfers to other acute hospitals from the ED and observation status longer than 48 hours. Transfers-out to other acute hospitals were included because these visits are likely to result in an inpatient admission at the receiving hospital. For this reason, transfers-in from other acute hospitals were excluded from the analysis to avoid double-counting.

Patients under observation status for lengths of stay (LOS) over 48 hours were included due to resource utilization resembling a typical inpatient discharge. Some have found that observation status has become a substitute for an inpatient stay in some cases, particularly in response to CMS rules governing the length of stay for such stays (e.g. “2-midnight rule”).

Discharge originating in the ED: any ED revenue code (0450, 0451, 0456, 0459, 0981) or ED flag code “1” or “2” in HIDD; an ED flag code “1” or “2” or source of visit “R” in OOD; or any record contained in the EDD Case Mix database.

Discharge that included observation status: any observation status revenue code (0762, 0769) or any record contained in the OOD Case Mix database.

Discharge transferred to another hospital: Any discharge in EDD with a departure status of “3”.

Select conditions for analysis: select conditions used for analysis were identified through CCSR codes and included chest pain, heart failure (CHF), pneumonia, chronic obstructive pulmonary disease (COPD), urinary tract infection (UTI), and abdominal pain. These conditions were selected based on prior HPC and peer-reviewed research finding these to be high volume and high variability conditions that are indicative of variation in clinical discretion.

Comorbid conditions: comorbidities were identified by examining all the secondary diagnosis codes using the AHRQ Elixhauser Comorbidity Software Refined, 2024. Comorbidities are conditions that affect patient care (e.g., chronic conditions), potentially increasing the intensity of services provided, length of stay, costs and overall spending. They are often predictors of both readmissions and mortality.

7.6.3 Exclusions

The exclusions for this analysis included:

- Children (ages 0-17)
- Those transferred into the inpatient unit (see above; admission source code “4” or “7”)
- Trauma, behavioral health, maternity, rehabilitation and unclassified diagnoses
- Those with long lengths of stay (>180 days)
- All patients dead on arrival or expired during visit, patients who eloped or met personal physician, or discharges missing a diagnosis code.
- Specialty hospitals (Children’s, Shriners, Dana Farber, Mass Eye and Ear, New England Baptist)
- Hospitals missing data during study period (Signature Healthcare Brockton, Steward Nashoba Valley, Steward Norwood, Steward Carney, North Adams Regional Hospital)
- Hospitals with inconsistent reporting of the ED flag in the observation unit (Cape Cod and Falmouth) or other issues with data quality (MetroWest, St. Vincent)

7.6.4 Patient adjustment

All ED admission rates were adjusted for patient characteristics, including age, gender, race, payer, median community income (based on zip code), comorbidities, whether the visit took place on a weekend, and drive time to nearest ED from their residence zip code. Adjustments were conducted using ordinary least squares (OLS) regression in STATA 18.

Inflation-adjusted estimates of median income by zip code were attributed to patients using American Community Survey data (2023; 5-year estimates). For zip codes that were missing an income value, the HPC imputed income using an average of median incomes of the remaining zip codes within the same city or town (e.g. if a city/town had multiple zip codes but one was missing income, the median income of the remaining zip codes would be used as the income value).

Comorbidities were identified through secondary diagnosis codes (ICD 10) on the discharge record using the Elixhauser Comorbidity Software Refined, 2024. There were 38 comorbid conditions considered, including AIDS, leukemia, cerebrovascular disease, diabetes, and hypertension, among others.

Drive time analysis was conducted using ArcMap 10.8, ArcGIS Pro, and STATA. Zip codes were matched to nearest the nearest acute care emergency department using ArcMap's "Near" function. EDs were identified as acute care hospital "facilities licensed by the state to have an emergency department open 24 hours a day, seven days a week." See the MassGIS website's "[Acute Care Hospitals](#)" for more information.

Drive times between zip codes and nearest ED were calculated using STATA's "georoute" function, which uses an API to calculate distances in real time. Distances were calculated in miles using the [STATA Georoute module](#).

7.7 Share of Medicare services provided in a HOPD vs an office setting, MA and U.S., 2022

7.7.1 Data

For the exhibit, "**Share of Medicare services provided in a HOPD (facility) vs an office setting, top 25 procedures by volume, MA and U.S., 2022**", the HPC used the Centers for Medicare and Medicaid Services (CMS) Medicare Physician and Other Practitioners – By Geography and Service public use files, 2022, to identify services provided to Medicare beneficiaries either in a facility or office location. Spending data for rankings and cost estimates were sourced from the Medicare Physician Fee Schedule (MPFS) and Medicare Outpatient Procedure Payment Fee Schedule (OPPS). Enrollment data from Medicare Monthly Enrollment.

7.7.2 Definitions

Analysis based on services provided to Original Medicare (fee-for-service) Part B (Medical Insurance) beneficiaries by physicians and other healthcare professionals. "Facility" here includes all settings with payments covered under the Medicare Outpatient Prospective Payment or Ambulatory Surgical Center System.

Total procedure spending was calculated using average spending (physician and facility components) and total utilization data for each procedure or service. US spending was calculated by first weighting spending

by state total utilization for each procedure. US comparison data does not include Massachusetts utilization, spending, or enrollment data.

CMS pays separately for professional services and the facility component of spending for services provided during an outpatient visit. The Physician and Other Practitioners data only provides average professional spending by procedure, with no inclusion of this facility component. Facility fees were modelled using Metro Boston prices for 2022 OPSS Ambulatory Payment Classifications data (APCs; Addendum A).

Facility fees are composed of a non-labor portion (40%) and labor-related portion (60%). For the labor-related portion, procedures are mapped to an APC and all procedures within a given APC are paid at the same payment rate. Procedures that were unable to be mapped to an APC were assigned the payment rate for Hospital outpatient clinic visit (HCPCS procedure code G0463). The labor-related portion is adjusted for geographic factors, such as area wages (“wage index”). The 2022 wage index for Metro Boston was 1.2673. No further adjustments were made, such as policy adjustments for qualifying hospitals (e.g., the 7.1% add-on for critical access hospitals).

The final modelled facility fee was calculated as follows:

Facility fee= non-labor portion + labor-related portion = (40% * APC payment) + (60% * wage index * APC payment)

7.7.3 Exclusions

Procedures specific to inpatient, ED, rehabilitation, and nursing were excluded. Procedures taking place predominantly in only one setting, defined as less than 5% or more than 95% of the time, were excluded.

7.7.4 Analysis

HPC ranked the top 25 “cross-over” procedures (services that are clinically appropriate in both facility and office sites of care) based on their total spending in Massachusetts. Procedures were designated as cross-over procedures if they did not take place predominantly in only one setting, defined as less than 5% or more than 95% of the time. Procedures were identified by their Current Procedural Terminology code (CPT). The top cross-over procedures in 2022 were:

Rank of total spending in MA	Procedure code	Procedure	Facility share in MA	Facility share in US	Difference
1	99214	Established patient, 25 mins	18.05%	7.86%	10.19%
2	66984	Removal of cataract	34.21%	38.21%	-4.01%
3	99213	Established patient, 15 mins	12.36%	6.54%	5.82%
4	93306	Ultrasound examination of heart	66.48%	56.72%	9.76%
5	99215	Established patient, 40 mins	36.71%	19.13%	17.58%
6	74177	CT scan of abdomen and pelvis, with contrast	84.49%	79.38%	5.11%
7	88305	Microscope examination of tissue	41.79%	32.46%	9.33%
8	92014	Eye exam, established patient, 1 or more visits	5.15%	1.34%	3.80%
9	90834	Psychotherapy, 45 minutes	8.78%	6.97%	1.81%

Rank of total spending in MA	Procedure code	Procedure	Facility share in MA	Facility share in US	Difference
10	99204	New patient, 45 mins	19.67%	10.11%	9.56%
11	78452	Nuclear medicine study of heart	57.34%	44.96%	12.38%
12	45385	Polyp removal, endoscopic	90.80%	95.73%	-4.93%
13	45380	Biopsy of large bowel, endoscopic	89.27%	95.32%	-6.05%
14	99203	New patient, 30 mins	11.32%	6.82%	4.50%
15	43239	Biopsy of small bowel, endoscopic	93.76%	96.08%	-2.32%
16	71046	X-ray of chest, 2 views	74.04%	52.12%	21.91%
17	66982	Removal of cataract, complex	53.20%	49.26%	3.94%
18	77067	Mammography of both breasts	60.81%	48.76%	12.05%
19	99205	New patient, 60 mins	38.45%	22.52%	15.93%
20	70553	MRI scan of brain, with contrast	62.16%	63.16%	-1.00%
21	71260	CT scan chest, with contrast	76.21%	67.75%	8.46%
22	74176	CT scan of abdomen and pelvis, without contrast	90.68%	83.06%	7.63%
23	66821	Removal of recurring cataract, with laser	35.48%	38.79%	-3.31%
24	29827	Repair of shoulder rotator cuff, endoscopic	90.01%	97.64%	-7.62%
25	99212	Established patient, 10 mins	12.48%	8.14%	4.34%

7.8 Share of inpatient services

7.8.1 Data

For the exhibit “Share of inpatient services provided in the Six largest hospital systems”, the HPC estimated hospital inpatient volume using the Center for Health Information and Analysis’ (CHIA) Hospital Inpatient Discharge Database (HIDD) federal fiscal years 2016-2025 (October 1 through September 30 of the following year through 2024, and first half of FY 2025). Inpatient care volume is measured in hospital discharges for general acute care services.

7.8.2 Analysis

Each hospital was assigned to a hospital system based on ownership or affiliation relationship in the current year. Whenever a hospital changed membership, its volume entered the new system and was only shown if it was one of the top 6 largest systems by volume.

The labelled system names reflect the most recent version. For example, Partners HealthCare changed its name to Mass General Brigham (MGB) in 2019 and the exhibit labelled it “MGB” for the entire period. FY

2019 reflects the formation of Beth Israel Lahey Health (BILH) following the merger of Beth Israel Deaconess and Lahey Health systems.

7.9 Post-Acute Care

7.9.1 Data

For the exhibits below, the HPC used the Center for Health Information and Analysis' (CHIA) Hospital Inpatient Discharge Database (HIDD) federal fiscal years 2017-2024 (October 1 through September 30 of the following year) to compare rates of PAC discharges. Data from October 2024 through December 2024 is preliminary data.

- **Use of post-acute care in Massachusetts and the U.S., all DRGs, 2022**
- **Post-acute care in Massachusetts following hospital discharge, all DRGs, 2017 to 2024**
- **Average length of stay (days) for scheduled stays and admissions from the ED (combined) by discharge destination, 2017 to 2024**

7.9.2 Analysis

For the exhibit **“Average length of stay (days) for scheduled stays and admissions from the ED (combined) by discharge destination, 2017 to 2024”**, the HPC included only admissions from the ED and scheduled admissions. This analysis excludes pediatric, maternity, behavioral health, and rehabilitation admissions, as well as admissions with length of stay greater than 180 days. COVID-related discharges were included. Length of stay is based on patient discharge date. Two hospitals with at least one quarter of irregular length of stay data (MelroseWakefield Hospital, Lawrence and Shriners’s Hospital - Boston) were excluded for the entire study period.

For the exhibit, **“Use of post-acute care in Massachusetts and the U.S., all DRGs, 2022,”** the HPC used the Healthcare Cost and Utilization Project’s (HCUP) 2021 Massachusetts State Inpatient and National Inpatient Sample to assess to where patients were discharged. Using HCUP’s discharge destinations, the HPC created the following categories:

- Routine: (“routine”)
- Home health care: (“home health care”)
- Institutional: (“skilled nursing facilities (SNF)”, “intermediate care facility (ICF)” and “another type of facility” such as an inpatient rehabilitation facility)

The HPC evaluated the distribution of discharges by total discharges and grouped results by payer (Medicaid, Medicare, and Commercial). The following discharge were excluded in the analysis: discharged to a short-term hospital or unknown destination, or where the patient expired or left against medical advice.

For the exhibit **“Post-acute care in Massachusetts following hospital discharge, all DRGs, 2017 to 2024”**, the HPC limited the sample to Massachusetts residents who were at least 18 years of age with the following discharge destinations in HIDD: home/routine, long-term care hospital, rehabilitation facility or hospital, rehabilitation hospital, skilled nursing facility, intermediate care facility, home health agency, and home/IV therapy. Discharges were excluded from specialty hospitals, except New England Baptist. COVID-19 field hospitals were excluded due to small discharge size. One hospital with at least one quarter of missing payer data (Mercy Medical Center) was excluded for the entire study period.

Based on input from providers, the HPC concluded that distinctions between discharges to “skilled nursing facility” “inpatient rehabilitation facility” versus “long-term care hospital” were not coded accurately enough to ensure meaningful results by this level of provider type. Therefore, the HPC grouped Case Mix discharges into the following categories:

1. Routine: (“home/routine”)
2. Home health care: (“home health agency” and “home/IV therapy”)
3. Institutional: (“long-term care hospital” / “rehabilitation facility or hospital”/ “rehabilitation hospital”/ “skilled nursing facility”/ “intermediate care facility”)

For the adjusted PAC rate per year, HPC adjusted for change in HIDD over time. To do so, HPC used ordinary least squares (OLS) to estimate a time trend, controlling for age, sex, and changes in the mix of diagnosis-related groups (DRGs) over time. Time effects were modeled on a per-year basis.



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TECHNICAL APPENDIX 8

Provider Organization Performance Variation

ADDENDUM TO THE 2025 COST TRENDS REPORT

8.1 Summary

This appendix describes the Health Policy Commission’s (HPC) approach to examining Provider Organization Performance Variation in the 2025 Cost Trends Report Chartpack.

8.2 Unadjusted total medical expenditures (TME) per member per year from 2015 to 2023, by provider organization

8.2.1 Data

For the exhibits “Total health care spending per member per year by attributed provider organization for the nine largest provider groups, 2015-2023” the HPC used the Center for Health Information and Analysis’ (CHIA) Annual Report Alternative Payment Methods (APM) Databook from 2025 (for calendar years 2021-2023), 2024 (for calendar years 2020-2022), 2023 (for calendar years 2019-2021), 2022 (for calendar years 2018-2020), 2021 (for calendar years 2017-2019), 2019 (for calendar years 2016-2018), and 2018 (for calendar years 2015-2017).

8.2.2 Analysis

CHIA’s 2018 through 2025 Annual Report APM Databooks report unadjusted total medical expenditures (TME) (referred to as total medical spending in the exhibit). To calculate unadjusted TME per member per year, the HPC examined all commercial payers except for Tufts Public Plan and BMC Health Net due to poor data quality. The HPC excluded non-full commercial claims and pediatric physician practices. The HPC restricted this analysis to the nine largest provider groups, identified by calculating the average member months for each provider group for 2021, 2022, and 2023. HPC took the average unadjusted TME for each provider group, weighted by member months, by provider group and year across all versions of the Annual Report APM Databook.

To standardize across CHIA Annual Report Databook years, the HPC calculated the growth rates between the first two years of data in each version of the Annual Report Databooks with the exception of the 2025 Databook, where the growth rate was calculated for the final two years of data (calendar years 2022 and 2023). For each provider group, the HPC used data for calendar years 2021 through 2023 from the 2025 Annual Report Databook and used the growth rates for prior years to calculate the unadjusted TME for calendar years 2015 to 2020.

8.3 Patient Attribution Methodology

8.3.1 Data

The HPC used the 2023 Registration of Provider Organizations (RPO) and the 2025 IQVIA, Inc. Office Based and Hospital Based Providers (IQVIA, Inc.) dataset, which has information about 2023 providers, to identify providers and create a “Provider File.” The HPC then used the CHIA All-Payer Claims Database v2023 (APCD) to attribute patients observed in the APCD to provider organizations in Massachusetts in 2023. The HPC’s APCD has data from seven commercial payers in the state: Blue Cross Blue Shield of Massachusetts, Tufts Health Plan, United Healthcare, Harvard Pilgrim Health Care, Mass General Brigham Health Plan (formerly AllWays), Health New England, and Elevance (formerly Anthem and includes Wellpoint, a GIC offering).

8.3.2 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 2023 RPO data with 2025 IQVIA, Inc data. After excluding any providers missing NPIs and removing duplicate entries of providers who may appear in both files, the final provider file includes 55,974 providers, 24,784 from RPO and 31,190 from IQVIA, Inc.

Primary care provider (PCP) 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 a PCP and a specialist. The HPC identified PCPs from the IQVIA, Inc file by using these self-reported specialties: Family practitioner, General practitioner, Internal medicine, Pediatrician, Adolescent Medicine, Internal Medicine & Pediatrics. The PCP file also includes Nurse Practitioners from IQVIA, Inc (NPs are not included in the RPO data) who self-reported a primary care specialty.

The final PCP file includes 15,209 PCPs.

8.3.3 Attribution Methodology

These steps describe the attribution methodology that relies on the primary care provider file created in 8.3.2 above.

Individuals with a payer-reported PCP in the member eligibility file

There are 1,618,021 unique members in the HPC's 2023 commercial analytic file of the APCD. The member eligibility file enables assignment of 72.6% (1,174,724) 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, 99381-99387, 99391-99397, 99401-99404, 99411-99412, 99420, 99429, 99432, and 99461. Well visits were also identified if they contained a procedure code modifier of 33.

Several Affordable Care Act (ACA) preventative measures were also operationalized as well visits including for:

- Alcohol misuse screening and counseling
- Blood pressure screening
- Cholesterol screening for adults of certain ages or at higher risk*
- Colorectal cancer screening for adults 45 to 75
- Depression screening
- Diabetes (Type 2) screening for adults 40 to 70 years who are overweight or obese
- Diet counseling for adults at higher risk for chronic disease*
- HIV screening for everyone age 15 to 65, and other ages at increased risk*
- Immunizations for adults

- Sexually transmitted infection (STI) prevention counseling for adults at higher risk*
- Syphilis screening for adults at higher risk
- Tobacco use screening for all adults and cessation interventions for tobacco users
- Lung cancer screening annual tomograph

*where applicable, as “high risk” is not always able to be identified in medical claims

And for women specifically:

- For women who are pregnant or may become pregnant
 - Breastfeeding support and counseling
 - Birth control
 - Gestational diabetes screening
 - Postpartum depression screening
 - Rh incompatibility screening
- All Women:
 - Genetic breast cancer testing
 - Bone density screening for all women over age 65 or women age 64 and younger that have gone through menopause
 - Cervical cancer screening for women ages 21-65
 - Breast cancer mammography screenings

These were considered as a well visit claim line for the purposes of this analysis, but after defining the ACA measures, any claim lines with any cost sharing / copayment above 0 were not considered to be a well visit or preventive visit (only 11% of those coded as ACA preventive care had any cost sharing greater than \$0).

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 1,278,388 individuals attributed to a provider organization in 2023. For the Chartpack, the HPC then restricted analyses to the 10 (non-specialty) provider organizations with at least 15,000 attributed commercial members. This resulted in a patient population of 1,052,185 attributed members in 2023.

8.4 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. The HPC reports on the 10 largest provider organizations as they exist in the most current data years available. Then the study population is further limited to 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 categorical spending (8.5.2), HOPD (8.5.6), and low value care (8.5.7) 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 final underlying data on the commercial member population reflection by provider organization is below:

Attributed members by provider organization, 2023

Provider organization	2023 Attributed commercial adults
Atrius	78,562
Baystate	42,318
BILH	8,925
BMC	136,023
MGB	22,819
Reliant	184,201
South Shore	25,375
Steward	7,605
Tufts	25,156
UMass	10,281
Total	702,925

8.5 Analyses

8.5.1 Emergency Department Utilization

Emergency department (ED) visits were identified in the 2023 commercial medical claims using procedure codes (CPT) that indicate a professional service was delivered in the emergency department (99281-99285), and any outpatient facility claim lines using the Health Care Cost Institute’s methodology, indicating that a claim line is from a facility claim originating from an ED.¹

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 (see details below) to identify potentially avoidable ED 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.

Overall Emergency Department Utilization

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 8.4. The rate of overall ED utilization is reported as an adjusted rate of ED visits per 1,000 attributed patients for comparability

¹ For more information see: [Health Care Cost Institute’s methodology to identify types of outpatient facility claims](#).

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 patient-level and community-level variables (see more below).

Potentially Avoidable Emergency Department Utilization

The Billings algorithm is based on 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.).

Potentially avoidable ED visits 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)ⁱⁱ for more information. To improve classification rate, diagnosis codes unclassified by the "patched" Billings algorithm were sequentially truncated and shortened codes were re-classified using the same algorithm.

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 8.4. 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.

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.ⁱⁱⁱ In prior years, the HPC did not receive claim lines with substance use diagnoses. In APCD v2023, however, substance use claim lines are included; although this analysis is restricted to mental health-related ED visits only, increases in volume from the 2024 Cost Trends Report may be attributed to

the inclusion of claim lines with a mental health-related primary diagnosis and a substance use-related secondary diagnosis, which were previously not included.

8.5.2 Unadjusted Medical Spending per Member per Year by Category and Provider Organization, 2023

In addition to restricting the patient population of analysis to commercially-insured adults who are at least 18 years old with continuous enrollment (12 months of insurance coverage) in the 10 largest provider organizations, a further exclusion was added for categorical spending analysis to ensure individuals had continuous prescription enrollment (12 months of prescription insurance coverage). The resulting patient population distribution by provider organization is listed below. This was done to ensure that only those who were eligible and covered for prescription insurance were included in the calculations for categorical per member per year spending.

Attributed members with 12 months of prescription insurance coverage by provider organization, 2023

Provider organization	2023 Attributed commercially-insured adults
Atrius	57,947
Baystate	29,602
BILH	6,701
BMC	91,800
MGB	17,534
Reliant	147,740
South Shore	18,611
Steward	5,520
Tufts	19,040
UMass	7,313
Total	51,741

To calculate per member per year spending for each of the five categories (inpatient, outpatient, professional, other, and prescription spending), total spending by provider organization was calculated for each category. Then the provider total for each category was divided by the number of individuals in each provider patient population.

8.5.3 Non-Maternity Inpatient Stays per 1,000 Attributed Patients, 2023

Distinct from encounters, the HPC identified inpatient stays in the commercial claims in the APCD, which reflect a patient's entire stay in the inpatient setting. Maternity stays were identified using APR-DRGs from 539 through 640 and MS-DRGs 768 through 833 and then removed from the results.

APR-DRGs used to identify maternity stays

Code	Description
539	CESAREAN SECTION W STERILIZATION
540	CESAREAN SECTION W/O STERILIZATION

541	VAGINAL DELIVERY W STERILIZATION &/OR D&C
542	VAGINAL DELIVERY W O.R. PROCEDURE EXCEPT STERILIZATION &/OR D&C
543	ABORTION W D&C, ASPIRATION CURETTAGE OR HYSTEROTOMY
547	ANTEPARTUM W O.R. PROCEDURE
548	POSTPARTUM & POST ABORTION DIAGNOSIS W O.R. PROCEDURE
560	VAGINAL DELIVERY
561	POSTPARTUM & POST ABORTION DIAGNOSES W/O PROCEDURE
564	ABORTION W/O D&C, ASPIRATION CURETTAGE OR HYSTEROTOMY
566	ANTEPARTUM W/O O.R. PROCEDURE
580	NEONATE, TRANSFERRED <5 DAYS OLD, NOT BORN HERE
581	NEONATE, TRANSFERRED < 5 DAYS OLD, BORN HERE
583	NEONATE W ECMO
588	NEONATE BWT <1500G W MAJOR PROCEDURE
589	NEONATE BWT < 500G, OR BWT 500-999G & GESTATIONAL AGE <24 WKS, OR BWT 500-749G W MAJOR ANOMALY OR W/O LIFE SUSTAINING IN
591	NEONATE BIRTHWT 500-749G W/O MAJOR PROCEDURE
593	NEONATE BIRTHWT 750-999G W/O MAJOR PROCEDURE
602	NEONATE BWT 1000-1249G W RESP DIST SYND/OTH MAJ RESP OR MAJ ANOM
603	NEONATE BIRTHWT 1000-1249G W OR W/O OTHER SIGNIFICANT CONDITION
607	NEONATE BWT 1250-1499G W RESP DIST SYND/OTH MAJ RESP OR MAJ ANOM
608	NEONATE BWT 1250-1499G W OR W/O OTHER SIGNIFICANT CONDITION
609	NEONATE BWT 1500-2499G W MAJOR PROCEDURE
611	NEONATE BIRTHWT 1500-1999G W MAJOR ANOMALY
612	NEONATE BWT 1500-1999G W RESP DIST SYND/OTH MAJ RESP COND
613	NEONATE BIRTHWT 1500-1999G W CONGENITAL/PERINATAL INFECTION
614	NEONATE BWT 1500-1999G W OR W/O OTHER SIGNIFICANT CONDITION
621	NEONATE BWT 2000-2499G W MAJOR ANOMALY
622	NEONATE BWT 2000-2499G W RESP DIST SYND/OTH MAJ RESP COND
623	NEONATE BWT 2000-2499G W CONGENITAL/PERINATAL INFECTION
625	NEONATE BWT 2000-2499G W OTHER SIGNIFICANT CONDITION
626	NEONATE BWT 2000-2499G, NORMAL NEWBORN OR NEONATE W OTHER PROBLEM
630	NEONATE BIRTHWT >2499G W MAJOR CARDIOVASCULAR PROCEDURE
631	NEONATE BIRTHWT >2499G W OTHER MAJOR PROCEDURE
633	NEONATE BIRTHWT >2499G W MAJOR ANOMALY
634	NEONATE, BIRTHWT >2499G W RESP DIST SYND/OTH MAJ RESP COND
636	NEONATE BIRTHWT >2499G W CONGENITAL/PERINATAL INFECTION

639	NEONATE BIRTHWT >2499G W OTHER SIGNIFICANT CONDITION
640	NEONATE BIRTHWT >2499G, NORMAL NEWBORN OR NEONATE W OTHER PROBLEM

MS-DRGs used to identify maternity stays

Code	Description
768	VAGINAL DELIVERY WITH O.R. PROCEDURES EXCEPT STERILIZATION AND/OR D&C
769	POSTPARTUM AND POST ABORTION DIAGNOSES WITH O.R. PROCEDURES
770	ABORTION WITH D&C, ASPIRATION CURETTAGE OR HYSTEROTOMY
776	POSTPARTUM AND POST ABORTION DIAGNOSES WITHOUT O.R. PROCEDURES
779	ABORTION WITHOUT D&C
783	CESAREAN SECTION WITH STERILIZATION WITH MCC
784	CESAREAN SECTION WITH STERILIZATION WITH CC
785	CESAREAN SECTION WITH STERILIZATION WITHOUT CC/MCC
786	CESAREAN SECTION WITHOUT STERILIZATION WITH MCC
787	CESAREAN SECTION WITHOUT STERILIZATION WITH CC
788	CESAREAN SECTION WITHOUT STERILIZATION WITHOUT CC/MCC
796	VAGINAL DELIVERY WITH STERILIZATION AND/OR D&C WITH MCC
797	VAGINAL DELIVERY WITH STERILIZATION AND/OR D&C WITH CC
798	VAGINAL DELIVERY WITH STERILIZATION AND/OR D&C WITHOUT CC/MCC
805	VAGINAL DELIVERY WITHOUT STERILIZATION OR D&C WITH MCC
806	VAGINAL DELIVERY WITHOUT STERILIZATION OR D&C WITH CC
807	VAGINAL DELIVERY WITHOUT STERILIZATION OR D&C WITHOUT CC/MCC
817	OTHER ANTEPARTUM DIAGNOSES WITH O.R. PROCEDURES WITH MCC
818	OTHER ANTEPARTUM DIAGNOSES WITH O.R. PROCEDURES WITH CC
819	OTHER ANTEPARTUM DIAGNOSES WITH O.R. PROCEDURES WITHOUT CC/MCC
831	OTHER ANTEPARTUM DIAGNOSES WITHOUT O.R. PROCEDURES WITH MCC
832	OTHER ANTEPARTUM DIAGNOSES WITHOUT O.R. PROCEDURES WITH CC
833	OTHER ANTEPARTUM DIAGNOSES WITHOUT O.R. PROCEDURES WITHOUT CC/MCC
789	NEONATES, DIED OR TRANSFERRED TO ANOTHER ACUTE CARE FACILITY
790	EXTREME IMMATUREITY OR RESPIRATORY DISTRESS SYNDROME, NEONATE
791	PREMATURITY WITH MAJOR PROBLEMS
792	PREMATURITY WITHOUT MAJOR PROBLEMS
793	FULL TERM NEONATE WITH MAJOR PROBLEMS
794	NEONATE WITH OTHER SIGNIFICANT PROBLEMS
795	NORMAL NEWBORN

8.5.4 CT and MRI Utilization per 1,000 Attributed Patients, 2023

For an analysis of adjusted CT and MRI rates by provider organization attributed member groups, the HPC first restricted medical claims to commercially-insured adults who are at least 18 years old and have continuous enrollment (12 months of insurance coverage). Additionally, these members had to have been attributed to one of the 10 largest provider organizations in the state (see 8.3 Patient Attribution Methodology).

After identifying eligible claim line services using the BETOS subcategory classifications for CT and MRI services, the HPC collapsed the analysis level from the claim line level to the encounter level. All claims were collapsed on the same unique member identifier, same date of service, and same procedure code. Then the results were collapsed to an individual level and adjusted for patient-level and community-level variables.

8.5.5 Unadjusted Medical Spending per Member per Year by Imaging Category and Provider Organization, 2023

To calculate per member per year spending for each of the four categories (MRI, CT, X-Ray, and Ultrasound) using BETOS classification codes, total spending calculated for each category by provider, then the provider total for each category was divided by the number of individuals in each provider patient population.

Along with the MRI and CT services, the X-Ray and ultrasound services were identified using the BETOS imaging subcategories.

8.5.6 Percent of Select Service Encounters Occurring at a Hospital Outpatient Department (HOPD) that Could Be Safely Performed at a Physician Office, Adjusted, 2023

The HPC conducted an analysis of HOPD utilization by provider organization attributed patient groups. This analysis used a smaller patient population based on services received. The HPC selected 458 common professional and outpatient laboratory procedure codes that often took place at HOPD service locations. In order to be considered a “cross-over” procedure (procedures taking place in both the HOPD and office), at least 20% of all encounters had to take place in a HOPD and at least 20% of all encounters had to take place in an office. The 458 codes are the final numbers of relevant procedure codes.

HOPD procedure codes: 10005 10140 10160 11042 11043 11104 11105 11403 11404 11406 11420 11421 11422 11423 11441 11442 11981 12001 12034 12041 12042 12051 12052 13101 14040 14060 16020 17311 17312 17313 20552 20553 20606 20610 26055 27093 27096 29065 29075 29125 29130 29405 29515 29580 29581 31231 31237 31575 31579 36415 36475 37765 41010 46221 46600 51600 51700 51701 51720 51728 51729 51741 51784 51797 52000 52310 54235 55250 55700 56605 57452 57455 57456 57522 58100 58340 58555 58558 59025 59820 59841 62321 62323 64405 64450 64479 64483 64484 64490 64491 64492 64493 64494 64495 64612 64615 64616 64633 64634 64635 64636 64642 65855 66761 66821 67028 67145 67228 67840 69220 69801 70160 70220 70360 70544 70551 70553 71046 71100 71101 72040 72050 72052 72070 72072 72100 72110 72114 72141 72146 72148 72156 72157 72158 72170 72195 72202 72220 73000 73010 73020 73030 73060 73070 73080 73090 73100 73110 73120 73130 73140 73218 73221 73501 73502 73503 73521 73522 73523 73552 73560 73562 73564 73565 73590 73600 73610 73620 73630 73650 73660 73718 73720 73721 73722 74018 74019 74170 74176 74183 74740 76377 76512 76519 76536 76641 76700 76706 76770 76775 76801 76802 76805

76811 76813 76815 76816 76817 76818 76819 76820 76830 76856 76857 76870 76872 76881
76885 77002 77063 77067 77080 77081 77085 77417 78452 80050 80061 80307 81002 81015
82040 82043 82274 82310 82465 82565 82570 82670 82747 82947 82948 82962 83002 83013
83014 83036 83655 83718 83721 83921 84132 84144 84153 84270 84295 84436 84466 84681
84702 84703 85004 85014 85041 85379 85651 86308 86593 86663 86666 86703 86705 86708
86803 87081 87101 87147 87177 87209 87210 87255 87430 87480 87481 87491 87510 87511
87591 87625 87640 87660 87661 87798 87801 87808 88112 88175 88305 88312 88344 89055
89261 89310 89320 89322 90473 90670 90675 90716 90734 90746 90853 90970 91065 91110
91200 92025 92060 92134 92235 92285 92504 92522 92523 92524 92526 92537 92540 92550
92553 92555 92556 92557 92567 92579 92582 93225 93227 93228 93270 93272 93280 93282
93283 93284 93288 93294 93295 93296 93297 93298 93303 93306 93308 93320 93325 93351
93880 93922 93923 93925 93926 93970 93971 93978 94010 94060 94375 94621 94664 94729
94760 95018 95816 95874 95885 95886 95908 95909 95910 95911 95912 95913 95992 96112
96116 96372 96374 96401 97018 97113 97116 97161 97162 97163 97165 97166 97167 97168
97597 97760 97763 97802 97803 97804 98926 99204 99205 99211 99212 99215 99241 99242
99244 99245 99403 A9500 A9502 A9552 A9575 G0008 G0009 G0010 G0108 G0180 G0250 G0279
G0328 G0480 G0481 J0129 J0178 J0561 J0585 J0897 J1100 J1200 J1580 J1745 J1756 J1885 J2182
J2323 J2357 J2778 J2785 J2795 J2920 J2930 J3262 J3490 J7030 J7040 J7050 J9035 J9250 J9312
L1830 L3670 L3808 L3913 L4350 Q0091 Q9966 S0119 S9443 S9485 V5264

After establishing the 458 procedure codes, only encounters (same person, same day, same procedure) with those codes were kept for the analysis, and all other codes and individuals without any of those specific 458 procedure code encounters were removed from the analysis.

8.5.7 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 low value care (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 HPC consultation with a clinical expert.

Analysis Timeframe

The HPC measured low value services that occurred in 2023 claims data. Claims from 2022 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 2022 and subsequently received a T3 test in August 2022 and March 2023, only the March 2023 T3 test was included in the calculation of low value use and spending for the purpose of reporting on LVC in 2023.

Adult Low Value Care

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 specific procedure code in the eligible population.

As previously mentioned, these LVC spending estimates only include the 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.

Spending on a PMPY basis for the exhibit “**Low Value Spending per 100 Attributed Commercial Patients, 2023**” was calculated by finding the total spending among the LVC services and then divided by the attributed population for each provider organization. Unlike most of the other analyses, the only restrictions on this attributed population size by provider organization is that individuals are attributed to one of the largest 10 provider organizations. There is no restriction on having 12 months of coverage for this analysis.

Measure Source and Specification for Adult Low Value Care Measures

Measure	Source	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.	Starting 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.	Starting 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.	Starting 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

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.

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: 002 003 069 004 007 Z33 008 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

Preoperative EKG, chest X-ray, and pulmonary function testing
 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.

Starting population: All members 2 years and older with a low-risk surgery. BETOS: P1 P3D P4A P4C P5C P5D P8A P8G
 CPT: 19120 19125 47562 47563 49560 58558
Exclusions:
 Members with an evaluation and management visit for emergency care, observation, or urgent care on or within one day prior to the pre-operative testing. CPT: 99217 99218 99219 99220 99224 99225 99226 99281 99282 99283 99284 99285
 Members with pre-operative testing that is not 30 days prior to surgery.

Members with a diagnosis of cardiovascular risk factors within 90 days prior to pre-operative testing. ICD-10: Z136

Members with signs and symptoms of cardiovascular and cardiopulmonary disease within 30 days prior to pre-operative testing. ICD-10: R071 R060 R002

Members with a diagnosis of underlying pulmonary disease within 90 days prior to pre-operative testing. ICD-10: I26 I27 I28

Numerator: Pre-operative test. CPT: 71045 71046 71047 71048 71100 71101 71111 71120 71130 93229 96417 96418 96419 96421

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, High-Volume Health Services Contribute The Most To Unnecessary Health Spending. Health Aff (Millwood). 2017 Oct 1;36(10):1701-1704.

Starting population: Patients without significant systemic disease undergoing low-risk surgery. 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

<p>Outpatient epidural, facet, or trigger point injections for lower back pain</p>	<p>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.</p>	<p>Starting 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</p> <p>Exclusions: Patients with radicular back pain. ICD-10: M4716 M4710 M519 M5106 M5430 M5414 M5107 M5415 M5416 M5417 J1438</p> <p>Numerator: Spinal injections. CPT: 62311 64483 20552 20553 64493 64475</p>
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Imaging

<p>DEXA Screening for Osteoporosis</p>	<p>Mafi JN, Reid RO, Baseman LH, et al. Trends in low-value health service use and spending in the US Medicare fee-for-service program, 2014-2018. JAMA Network Open. 2021;4(2):e2037328. doi:10.1001/jamanetworkopen.2020.37328</p>	<p>Starting population: All women under 65 years of age and men 50-69 DEXA CPT: 77080, 77081, 77085, 77086</p> <p>Exclusions: Patients with a diagnosis of osteoporosis on the day of the DEXA or a far back in the claims (as possible) before the DEXA screening. Osteoporosis ICD-10 diagnosis codes starting with: M80, M81, M83, M84, or M85. Competing diagnosis or risk factor diagnosis before the DEXA scan as far as possible in the claims.</p>
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Diagnosis codes starting with:
 Vertebral compression: M485
 Maladaptive syndrome diagnosis: K90
 rheumatoid arthritis diagnosis: M05 and M06
 Hyperthyroidism: E05
Numerator: Those who had a DEXA screening with an office visit 30 days prior to the DEXA screening

Brain Imaging Studies (CT or MRI) for Simple Syncope	Mafi JN, Reid RO, Baseman LH, et al. Trends in low-value health service use and spending in the US Medicare fee-for-service program, 2014-2018. JAMA Netw Open. 2021;4(2):e2037328. doi:10.1001/jamanetworkopen.2020.37328	<p>Starting population: All individuals 18 or older a diagnosis of syncope. CT scan procedure codes: 70450 70460 70470. MRI procedure codes: 70551 70552 70553 70554 70555 70557 70558 70559. Syncope diagnosis codes starting with: "R55".</p> <p>Exclusions: An inpatient admission within the time period from the diagnosis of syncope to the brain imaging. Inpatient site of service codes: 21 31 51 61. A competing diagnosis (CVA, intracranial hemorrhage, brain tumors, etc.) Intracranial Hemorrhage: diagnosis code starting with I62 Stroke: diagnosis codes starting with I63 G459 I693 Z8673 Head and neck tumor diagnosis within 1 year prior to imaging Tumor diagnosis codes starting with: C71 D330 D331 D332 D333 C760 D234 D233 D3611 Head injury withing 7 days prior to imaging Diagnostic code starting with SO Members with a neurological deficit Diagnosis codes starting with R298 R299</p> <p>Numerator: Those with a brain imaging study (CT or MRI) within 30 days of the syncope diagnosis</p>
Back Pain Imaging	Mafi JN, Reid RO, Baseman LH, et al. Trends in low-value health service use and spending in the US Medicare fee-for-service program, 2014-2018. JAMA Network Open. 2021;4(2):e2037328. doi:10.1001/jamanetworkopen.2020.37328	<p>Starting population: All members 18+ years old with a low back pain diagnosis. ICD-10: M545</p> <p>Exclusions: Members with a diagnosis of low back pain within 180 days prior to imaging. CPT: 72020 72040 72050 72052 72070 72072 72074 7280 72081 72082 72083 72084 72100 72110 72114 72120 72125 72126 72127 72128 72129 72130 72131 72132 72133 72141 72142 72146 72147 72148 72149 72156 72157 72158 72159 Members with lumbar spine surgery within 90 days prior to imaging. CPT: All codes in the range 62263 and 63746 Members with an inpatient admission within 6 weeks prior to imaging. ICD-10: non-missing admitting diagnosis</p>

Members with a back MRI with neurological deficits diagnosis. ICD-10: R298 R299 CPT: 72148 72149 72156 72157 72158

Members with a MRI and diagnosis of some other serious underlying conditions such as cancer or immunosuppression. ICD-10: All codes in the range C00 and C96 D8 Z796

Members with a diagnosis requiring imaging within 90 days of MRI (e.g., osteoporosis, trauma or infection, drug abuse). ICD-10: M81 M82 M83 M84 M85 S3 F1

Members aged 70+ with a back X-ray/CT lumbar spine without MRI. CPT: 72100 72110 72114 72120 72131 72132 72133

Members with an X-ray/CT lumbar spine without MRI and long-term steroid use. ICD-10: Z795

Numerator: Members with back imaging within 6 weeks prior to the back pain diagnosis

Heel Pain Imaging Do LA, Koethe BC, Daly AT, Chambers JD, Ollendorf DA, Wong JB, et al. State-level variation in low-value care for commercially insured and Medicare Advantage populations. Health Aff (Millwood). 2022;41(9).

Starting population: All members 18+ years old with a heel pain diagnosis. ICD-10: M25571 M25572 M25579 M722 M7967

Exclusions:

Members with a diagnosis of heel pain within 180 days prior to imaging. CPT: 73620 73630 73650 73718 73719 73720 76880

Members with an inpatient admission within 6 weeks prior to imaging. ICD-10: non-missing admitting diagnosis

Members with a foot MRI with neurological deficits diagnosis. ICD-10: R298 R299 CPT: 73718 73719 73720

Members with a MRI and diagnosis of some other serious underlying conditions such as cancer or immunosuppression. ICD-10: All codes in the range C00 and C96 D8 Z796

Members with a diagnosis requiring imaging within 90 days of MRI (e.g., osteoporosis, trauma or infection, drug abuse). ICD-10: M81 M82 M83 M84 M85 S3 F1

Members aged 70+ with a foot X-ray/CT without MRI. CPT: 73620 73630 73650 76881

Members with an X-ray/CT without MRI and long-term steroid use. ICD-10: Z795

Numerator: Members with foot imaging within 6 weeks prior to the heel pain diagnosis

Abdomen Imaging Charlesworth, C. J., Meath, T. H., Schwartz, A. L., & McConnell, K. J. (2016). Comparison of low-value care in Medicaid vs commercially

Starting Population: Patients between the ages of 18 and 64 with abdomen imaging with contrast. CPT: 74150, 74160, 74170, 74176, 74177, 74178.

Exclusions:

insured populations. JAMA internal medicine, 176(7), 998-1004.

Members with “other” kidney or urinary disease. Diagnosis codes starting with “N25” through N29” and “N3”.

Members with hematuria. Diagnosis codes starting with “R31”.

Members with pancreatic disease. Diagnosis codes starting with “K85” or “K86”.

Members with adrenal mass. Diagnosis codes starting with “E279”.

Members with liver lesions. Diagnosis codes starting with “K7689”.

Members with abdominal injury. Diagnosis codes starting with “S3991”.

Members with kidney infection. Diagnosis codes starting with “N12”.

Members with jaundice. Diagnosis codes starting with “R17”.

Members with pancreatic or bladder cancer. Diagnosis codes starting with “C25” or “C67”.

Numerator: All remaining imaging.

Headache Imaging

Mafi JN, Reid RO, Baseman LH, et al. Trends in low-value health service use and spending in the US Medicare fee-for-service program, 2014-2018. JAMA Netw Open. 2021;4(2):e2037328. doi:10.1001/jamanetworkopen.2020.37328

Starting Population: Greater than 18. CPT for head imaging:
CT scan procedure codes: 70450 70460 70470.
MRI procedure codes: 70551 70552 70553 70554 70555 70557 70558 70559, 70544 70545 70546.
EEG procedure codes: 95812 95813 95816 95819 95822.
Headache ICD-10 diagnosis codes: R51 and G43.

Exclusions:

Members with an inpatient admission 30 days before. If they had any inpatient site of service claims or site of service codes at 21, 31, 51, 61.

Members with a head injury ICD-10 “S0” or cancer “C” up to one year beforehand.

Members with orbital complications (H05), intracranial complications (G93 I62), periorbital and orbital cellulitis and orbital abscess (L03213 H0501), subperiosteal abscess (H7001), and middle ear and mastoid disease (H65-H75) one year beforehand.

Not wasteful:

Members with other diagnoses up to 30 days before imaging service. Elevated ESR (R700), complicated headache (G445 G443), neurological deficit (R298 R299), epilepsy (G40), ataxia (R270), trigeminal headaches (G440), HIV (B20), cancer (C D0-D4), other immunocompromised conditions (D8), meningitis (G00-G03), encephalitis (G04 G05), cerebrovascular event (I6), involuntary head movements (R250).

Pregnancy diagnosis without previous headache diagnosis at least 30 days in advance (Z33)

Numerator: All remaining imaging.

Prescription

Antibiotics for Upper Respiratory Infection and Ear Infection (acute otitis externa)	Mafi JN, Reid RO, Baseman LH, et al. Trends in low-value health service use and spending in the US Medicare fee-for-service program, 2014-2018. JAMA Netw Open. 2021;4(2):e2037328. doi:10.1001/jamanetworkopen.2020.37328	<p>Starting Population: Patients with upper respiratory or ear infection. Diagnosis codes beginning with the following indicated the condition. Viral infections: Cold: "J00" Acute sinusitis: "J01" URI: "J06" Flu: "J09-J011" Viral pneumonia: "J12" RSV: "B974" Parainfluenza: "B348" Adenovirus: "B340" Coronavirus: "B342" Enterovirus: "B341", "B9719" Viral bronchitis: "J203-J207" Viral bronchiolitis: "J210-J211" Metapneumonia: "B9781" Acute otitis externa: "H60" Bacterial infections: Infectious and parasitic infections: "B95", "B96", "A", excluding stomach "A08", nervous system "A8", and fevers "A9" Mastoiditis: "H70" Strep: "J020", "J0300", "J0301", "J13" Abscess: "J36, J85, L02, J390, L03" Denominator Exclusions: HIV: "B20", immunocompromised conditions, and Malignant neoplasms: "C, D0-D4, D8" up to a year beforehand Tympanostomy up to two years beforehand: "69631, 69632, 69635, 69636, 69637, 69641, 69642, 69644, 69643, 69645, 69646" Bacterial infections 30 days before antibiotic prescriptions Middle ear infections: "H65, H66, H67" 14 days before antibiotics Numerator exclusions: Middle ear disease: "H65-H70" AND acute otitis "H605" externa within 30 days prior to the antibiotics prescription. Malignant otitis externa "H602" 30 days prior to antibiotics prescription Acute rhinosinusitis and sinusitis complications within 10 days prior: orbital complications "H05", intracranial complications "G93, I62", neurological deficit "R298, R299, H558", periorbital and orbital</p>
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		cellulitis and orbital abscess “L03213, H0501”, and subperiosteal abscess “H7001” Numerator: all antibiotics prescribed within a 7-day interval to the original URI or otitis media diagnosis
Concurrent Antipsychotics	Mafi JN, Reid RO, Baseman LH, et al. Trends in low-value health service use and spending in the US Medicare fee-for-service program, 2014-2018. <i>JAMA Netw Open.</i> 2021;4(2):e2037328. doi:10.1001/jamanetworkopen.2020.37328	Starting population: all patients with an antipsychotic prescription Exclusions: A lithium prescription within 60 days prior to an antipsychotic prescription. Concurrent antipsychotics with an overlap of 30 days or fewer between prescriptions. Numerator: All other concurrent, overlapping antipsychotics
Concurrent Anticholinergics	Garber, Judith. Lown Institute. How to identify low-value prescribing practices. February 28, 2022. https://lowninstitute.org/how-to-identify-low-value-prescribing-practices/	Starting population: all patients with an anticholinergic prescription Exclusions: Concurrent anticholinergic with an overlap of 30 days or fewer between prescriptions. Two concurrent anticholinergics that are also BOTH antipsychotics. Numerator: All other concurrent, overlapping anticholinergics.
Chronic Benzodiazepines	Luijendijk, Hendrika J., Henning Tiemeier, Albert Hofman, Jan Heeringa, and Bruno H. Ch Stricker. "Determinants of chronic benzodiazepine use in the elderly: a longitudinal study." <i>British journal of clinical pharmacology</i> 65, no. 4 (2008): 593-599.	Starting population: All patients with a benzodiazepine prescription. Exclusions: Those with less than a 180 days supply in a year Numerator: All other users with a greater than 180 day supply in a year period
Gabapentinoids for Non-Neuropathic Pain	Garber, Judith. Lown Institute. How to identify low-value prescribing practices. February 28, 2022. https://lowninstitute.org/how-to-identify-low-value-prescribing-practices/	Starting population: All patients with a gabapentinoid prescription. Exclusions: Those with epilepsy “G40” or neuropathic pain: “G539, G546, E084, E08610, E094, E09610, E104, E114, E134, M471, M472, M480, M500, M501, M502, M510, M511, M512, M541, M543, M544, M5481, S14, S24, S34, G50, G51, S045, B022, G60, G9009, M792, G905, G56, G57, M146, G58, G59, G62, G63, A5043, A5215, B2701, B2711, B2781, B2791, B2684, G54, G55, E71522, G130, G652, G651, G462, H463, H4701, M3483, G379, G990, G61, M055.” Numerator: All other prescriptions

Pediatric Low Value Care

Due to a smaller population compared to adults, pediatric low value care was limited to identifying the total number of low value services for eight imaging measures, rather than identifying variation by provider organization. Analyses were restricted to members younger than 18 years old.

Measure Source and Specification for Pediatric Low Value Care Measures

Measure	Source	Specification
Chest x-ray for bronchiolitis	House SA, Marin JR, Coon ER, et al. Trends in Low-Value Care Among Children’s Hospitals. Pediatrics. 2024;153(1):e2023062492	<p>Starting population: individuals aged ≥ 1 month and < 24 months old with bronchiolitis diagnosis “J21.”</p> <p>Exclusions: individuals with asthma, pneumonia, and croup “J05, J12, J13, J14, J15, J16, J17, J18, J45”</p> <p>Numerator: encounters with a chest x-ray “71045, 71046, 71047, 71048, 71101, 71111.”</p>
Chest x-ray for asthma	House SA, Marin JR, Coon ER, et al. Trends in Low-Value Care Among Children’s Hospitals. Pediatrics. 2024;153(1):e2023062492	<p>Starting population: individuals aged ≥ 24 months and less than 18 years old with asthma diagnosis “J45.”</p> <p>Exclusions: individuals with bronchiolitis, pneumonia, and croup “J05, J12, J13, J14, J15, J16, J17, J18, J21”</p> <p>Numerator: encounters with a chest x-ray “71045, 71046, 71047, 71048, 71101, 71111.”</p>
Head/brain CT scan for minor head injury	House SA, Marin JR, Coon ER, et al. Trends in Low-Value Care Among Children’s Hospitals. Pediatrics. 2024;153(1):e2023062492	<p>Starting population: individuals aged ≥ 2 years and less than 18 years old with a minor head injury “S00, S01, S02, S03, S04, S05, S06, S07, S08, S09.”</p> <p>Exclusions: individuals with skull fracture, concussion with loss of consciousness, traumatic avulsion/amputation, and crush injury “S02, S060X1, S060X2, S060X3, S060X4, S060X5, S060X6, S060X7, S060X8, S060X9, S07, S08.”</p> <p>Numerator: encounters with head/brain CT “70480, 70481,</p>

MRI or CT scan for acute atraumatic primary headache	House SA, Marin JR, Coon ER, et al. Trends in Low-Value Care Among Children’s Hospitals. Pediatrics. 2024;153(1):e2023062492	<p>70482, 70486, 70487, 70488, 70450, 70460, 70470.”</p> <p>Starting population: individuals \geq 4 years and less than 18 years old with diagnoses codes for headache, migraine, headache syndrome, or complicated headache syndromes “G43, G44, R51.”</p> <p>Exclusions: individuals with posttraumatic headache, thunderclap headache, concussion, and skull fracture “G443, G4453, S060, S020, S021, S028, S029.”</p> <p>Numerator: encounters with MRI or CT scan “70540, 70543, 70336, 70551, 70553, 70542, 70552, 70480, 70481, 70482, 70486, 70487, 70488, 70450, 70460, 70470.”</p>
CT, ultrasound, or x-ray imaging for abdominal pain	House SA, Marin JR, Coon ER, et al. Trends in Low-Value Care Among Children’s Hospitals. Pediatrics. 2024;153(1):e2023062492	<p>Starting population: individuals \geq 3 years and less than 18 years old with abdominal pain “R10, K590.”</p> <p>Exclusions: individuals with bowel obstruction, abdominal/spinal/pelvic trauma, and pregnancy “K5660, K562, K563, K564, K565, K566, K567, S30, S31, S32, S33, S34, S35, S36, S37, S38, S39, 000, 001, 002, 003, 004, 005, 006, 007, 008, 009A.”</p> <p>Numerator: encounters with abdominal CT, ultrasound, or x-ray imaging “74176, 74177, 74178, 74150, 74160, 74170, 76700, 76705, 76770, 76999, 74018, 74019, 74150.”</p>

8.5.8 Overall Index of Provider Organization Performance Measures

The HPC calculated a performance index based on a provider organization’s difference from the average across a set of performance measures: unadjusted PMPY spending, adjusted PMPY spending, ED visit rate, potentially avoidable ED visit rate, non-maternity inpatient admissions, MRI and CT utilization, share of select services at a HOPD, LVC screening and testing measures, LVC procedures, LVC imaging, and LVC prescriptions. Adjusted PMPY spending and the utilization measures have been adjusted for age, sex,

health status, insurer and product type, and community-level variables related to education and socioeconomic status across provider patient populations. Low value care (LVC) measures are not adjusted.

For each measure, the HPC calculated the mean and standard deviation across provider organizations. Then, the Z score for each provider organization was calculated to determine how many standard deviations away from the mean an organization performed in that measure. This process was repeated for each performance measure and the final exhibit uses the sum of Z scores by provider organization. While lower scores indicate better performance, the final exhibit uses Z score sums multiplied by -1 to indicate better performance as having a positive index.

8.6 Control Variables

Adjusted rates are reported for all exhibits in this chart pack except for those pertaining to LVC (section 8.5.7). Adjusted rates take into account the potential differences across provider organizations in patient health status, age, sex, patient insurance type, and insurer type.

Patient health status is based on risk scores generated from the U.S. Department of Health and Human Services Hierarchical Condition Categories (HHS-HCC) Risk Adjustment Model Software (“Do It Yourself (DIY)” Software Version 0723) with modifications. The HPC modified the model by applying a coding intensity adjustment that removed eight diagnosis groups from consideration in patient risk scores. These groups were selected based on peer-reviewed research that identified ten diagnosis groups that were most differentially coded in Medicare Advantage compared to traditional Medicare.² The HPC mapped the ten diagnosis groups identified in the literature that are attributable to the CMS-HCC model to eight diagnosis groups attributable to the HHS-HCC model (see table below). The eight diagnosis groups were mapped to ten hierarchical condition categories (HCCs) in the HHS-HCC model, all of which were removed from consideration for patient risk scores (i.e., removed from the model software).

Diagnosis Groups Mapped to CMS and HHS Hierarchical Condition Categories (HCCs)

Ten diagnosis groups identified in the literature	CMS-HCC	HHS-HCC (removed from HPC risk score creation)
Chronic obstructive pulmonary disease, intestinal lung disorders, and other chronic lung disorders	HCC280	HCC160
Acute or chronic heart failure, except end stage	HCC224, 225, 226	HCC130
Diabetes	HCC36, 37, 38	HCC19, 20, 21
Morbid obesity	HCC48	Does not map to any HHS-HCCs
Drugs use disorder, moderate/severe, or drug use with non-psychotic complications	HCC137	HCC82
Chronic kidney disease, moderate, stage 3, without psychosis	HCC328, 329	Does not map to any HHS-HCCs

² Kronick R, Chua FM, Krauss R, Johnson L, Waldo D. Are Fewer Diagnoses Better? Assessing A Proposal To Improve The Medicare Advantage Payment System: Article examines a proposal to improve the Medicare Advantage payment system. Health Affairs. 2025 Jan 1;44(1):66-74.

Major depression, moderate or severe, without psychosis	HCC155	HCC88
Rheumatoid arthritis and other	HCC93	HCC56
Hemiplegia/hemiparesis	HCC253	HCC150
Alcohol use disorder	HCC139	HCC84

In addition to these variables, the HPC linked community-level variables at the member zip code level, based on CHIA analysis of the 2020 American Community Survey. These variables include:

- Median family income
- Median home value
- Percent of employed persons ages 16 and over in white collar occupations
- Percent of households with dependents under age 18 headed by single parents
- Whether or not the population ages 25 and over with at least a high school education is over 80%
- Percent of population receiving 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.

References

- ⁱ Billings et al (1993). "Impact of Socioeconomic Status on Hospital Use in New York City, Health Affairs (Spring 1993).
- ⁱⁱ Johnston, K. J., Allen, L., Melanson, T. A., & Pitts, S. R. (2017). A "Patch" to the NYU emergency department visit algorithm. Health services research, 52(4), 1264-1276.
- ⁱⁱⁱ Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. Healthcare Cost and Utilization Project (HCUP). February 2023. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolssoftware/ccsr/dxcsr.jsp.