

COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION



TECHNICAL APPENDIX A
SPENDING LEVELS AND TRENDS

ADDENDUM TO COST TRENDS JULY 2014 SUPPLEMENT

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1 Trends in Commercial Insurance Spending, 2010-2012

1.1 Three-way deconstruction of the growth in claims-based medical expenditures

The Health Policy Commission (HPC) and the Lewin Group used the All-Payer Claims Database (APCD) to deconstruct the trend in claims-based medical expenditures into three component parts:

- Change in the burden of illness or risk level of the population
- Change in the quantity of services used, adjusted for risk
- Change in the price paid

Table A1.1 below explains how these concepts were defined and implemented using data from the APCD. The sample consisted of claims for the state’s three largest commercial payers -- Blue Cross Blue Shield of Massachusetts (BCBS), Harvard Pilgrim Health Care (HPHC), and Tufts Health Plan (THP) -- and Medicare Fee-For-Service.¹ See **Massachusetts Commercial Medical Care Spending¹** for more information on the methods used to generate the analytic file.

Table A1.1: Definition of Concepts in Deconstruction of the Growth in Spending 2010-2012

Term	Definition
Overall spending	Total per member per month claims-based medical expenditures.
Standardized spending	A standardized measure of spending that does not vary by payer, provider, or time period. In effect, a measure of the quantity of services. This measure is calculated by re-pricing all services using a standard fee schedule.
Price index	A composite price measure that complements standardized spending and reflects price variation due to differences among payers, providers, and time periods. This measure is calculated as: (Spending for all services at prices paid) / (Spending for all services priced using a standard fee schedule). As a result, Overall spending = standardized spending * relative price paid.
Patient risk score	A measure of a patient’s expected need for health care services due to demographic and clinical characteristics.

Table A1.2 contains our findings. Consistent with data from other sources, this analysis indicates that changes in price paid were the main driver of the growth in commercial spending between 2010 and 2012.

¹ For this analysis of the commercial insurance market, we use a sample that consists of claims submitted by the three largest commercial payers – Blue Cross Blue Shield of Massachusetts (BCBS), Harvard Pilgrim Health Care (HPHC), and Tufts Health Plan (THP). This sample represents 66 percent of commercially insured lives and 36 percent of Massachusetts residents. For members of that sample, we analyze claims-based medical spending but not pharmacy spending or payments made outside the claims system (such as shared savings, pay-for-performance, and capitation payments) and estimate that we include approximately 80 percent of their claims-based spending. The APCD contains claims for the majority, but not all, self-insured plans. Self-insured plans are encouraged, but not required, to submit this data, and certain employers instruct their plans to opt out.

Table A1.2: Three-Factor Decomposition of the Growth in Spending

Contribution to rate of change in claims-based expenditures (excluding pharmacy spending), 2009-2011

Measure		Commercial
Observed overall spending	ob	2.9%
Standardized spending	s	-2.1%
<i>Three factor decomposition of growth in observed spending</i>		
Risk	r	~0%
Standardized spending adjusted for risk (quantity adjusted for risk)	$[(1+s)/(1+r)] - 1$	-2.1%
Price index	$[(1+ob)/(1+s)] - 1$	5.2%

Notes: Overall spending = risk * standardized spending adjusted for risk * price index

$$(1+ob) = (1+r) * (1+s)/(1+r) * (1+ob)/(1+s)$$

With: ob=change in observed overall spending, s = change in standardized spending, r=change in risk score

All changes are measured in nominal terms. Readers may not be able to reproduce results due to rounding.

Source: All-Payer Claims Database; The Lewin Group; HPC analysis.

1.2 Growth in claims-based medical expenditure by category of service

For detailed definitions of categories of service, see CHIA and HPC publication, “Massachusetts Commercial Medical Care Spending.”¹

We aggregated spending for each of 2010 and 2012 by category of service to identify the compound annual growth rate within each category and to calculate the proportion of total growth over those two years contributed by each category.

1.3 Member cost-sharing trends

Cost-sharing was estimated as the difference between allowed amount (the total expenditures incurred by the payer and the member for a given claim) and paid amount (the expenditures incurred by the payer alone).

Our method includes all out-of-pocket spending observed by the commercial payers – including deductibles, co-payments, and co-insurance – but excludes spending paid directly by consumers on services not covered by commercial insurance.

1.4 Growth in claims-based medical expenditure by episode of care

The Lewin Group applied the Optum Episode Treatment Group (ETG) grouper to our claims sample to estimate expenditures for each episode of care. (Additional details on Lewin methodology are available in CHIA and HPC publication, “Massachusetts Commercial Medical Care Spending.”¹)

We aggregated episodes at the 4-digit ETG level and ranked episodes by total dollars of growth between 2010 and 2012 to calculate growth rates within each episode and contribution of each episode to total growth in per member per month spending.

2 MassHealth spending levels

Our analyses of MassHealth spending levels were based on data from the Medicaid Statistical Information System (MSIS), which is described in greater detail in our Data Sources appendix.

2.1 Difference in spending per beneficiary between Massachusetts and the United States

We calculated the difference in spending per beneficiary as the difference in Total Medicaid Paid Amount divided by the Unique Beneficiary Count for Massachusetts and the United States.

We categorized MSIS eligibility groups into five categories: aged, disabled, adults, children, and unidentified. Our definitions are as follows:

- *Aged*: Aged
- *Disabled*: Blind/Disabled
- *Adults*: Adults, Unemployed Adults, BCCA Women
- *Children*: Children, Children (Unemployed Parent), Foster Care Children
- *Unidentified*: Not eligible, Unknown

We compared spending per beneficiary in Massachusetts to the spending per beneficiary that would occur if the Massachusetts level of spending per beneficiary for each of these enrollment groups were applied to the U.S. average mix of enrollees across the groups. This difference (22 percent) was interpreted as the difference in spending per enrollee at comparable mix, and the remainder of the difference (31 percent – 22 percent = 9 percent) was interpreted as the difference attributable to enrollment mix.

2.2 Spending by beneficiary by eligibility group

For each eligibility group (as defined in 2.1 above), we calculated Total Medicaid Paid Amount divided by the Unique Beneficiary Count in MSIS for Massachusetts and the United States.

2.3 Analysis of spending per beneficiary by age segment

We used MSIS data to determine Unique Beneficiary Counts and Total Medicaid Paid Amount for each age segment within the Children and Aged eligibility groups (as defined in 2.1 above).

The proportion of beneficiaries in each age segment was calculated using Unique Beneficiary Counts, and the difference in spending per beneficiary within each segment between Massachusetts and the United States was calculated by comparing Total Medicaid Paid Amount divided by Unique Beneficiary Count within each segment.

2.4 Breakdown of difference between Massachusetts and U.S. spending per aged enrollee

We categorized MSIS categories of service into ten categories. Our definitions are as follows:

- *Capitated*: Capitated Care
- *Inpatient Hospital*: Inpatient Hospital Svcs
- *Institutional LTC*: ICF/MR Svcs, Nursing Facility Svcs
- *Home Health Services*: Home Health Svcs
- *Mental Health Services*: Mental Health Facility Svcs

- *Outpatient Hospital:* Outpatient Hospital Svcs
- *Other:* Other Care, Sterilizations, Unknown
- *Personal Support / Case Management Services:* Personal Support Svcs, Pccm Svcs
- *Pharmacy:* Prescribed Drugs
- *Professional Services:* Clinic Svcs, Dental Svcs, Lab And X-Ray Svcs, Other Practitioner Svcs, Physician Svcs

For each category of service, we calculated Total Medicaid Paid Amount for that category for the Aged eligibility group (as defined in **2.1** above) for Massachusetts and for the United States. Total Medicaid Paid Amount in each category of service was divided by the Aged Unique Beneficiary Count to determine spending per beneficiary in each category of service.

The difference in per beneficiary spending between Massachusetts and the United States for each category of service was divided by the total difference in per beneficiary spending to estimate the contribution of each category of service to the total difference.

3 Long-term care and home health

3.1 Drivers of higher spending on long-term care and home health

Drivers of higher expenditures for nursing homes

To estimate the contribution of demographic differences to higher spending on nursing homes, we used the Minimum Data Set (MDS) survey published for Quarter 4 of Fiscal Year 2011 and the 2011 American Community Survey 1-year Estimate. Our estimate of 13 percentage points of difference in spending contributed by age differences is based on the difference of expected nursing home utilization between Massachusetts and U.S. residents based on their age profiles. We determined the percentage difference in expected utilization by applying national rates of nursing home residency by age group (under 65, 65-74, 75-84, and 85 and over) to Massachusetts and U.S. population distributions.

Our estimate of the contribution of price differences to differences in spending represented an aggregate of published data points from various sources. We estimated private pay rates based on the median semi-private nursing home room per day private pay rate from the Genworth Financial 2011 Cost of Care Survey. For Medicare rates, we used the pay rate found in the Medicare & Medicaid Statistical Supplement. The Medicaid rate came from the American Health Care Association's "A Report on Shortfalls in Medicaid Funding for Nursing Home Care."² Using these payer-specific rates, we estimated an overall weighted average price at Massachusetts rates and at U.S. average rates across payer types, weighted by the mix of residents by payer type in Massachusetts. Our estimate of payer mix was obtained based on an analysis of OSCAR data in the American Association of Retired Persons' 2012 Across the States: Profiles in Long-Term Services and Supports report.³

3.2 Rates of discharge dispositions for Massachusetts and U.S. hospitals

We classified discharges in the Healthcare Cost and Utilization Project's (HCUP) National Inpatient Sample by discharge disposition (using the DISPUUniform field) and determined the proportion of discharges of each discharge disposition for Massachusetts hospitals (using the HOSPST field) and for all hospitals in the United States.

3.3 Regression-based analysis of discharges to post-acute care for Massachusetts and U.S. hospitals

We estimated the probability that a patient will be discharged to post-acute care within Massachusetts relative to the rest of the United States, adjusted for key patient and discharge characteristics. Within the sample discharged to post-acute care, we also estimated the probability that a patient would be discharged to a skilled nursing facility (SNF) as opposed to home health.

The Health Policy Commission conducted this analysis using the Nationwide Inpatient Sample from the Healthcare Cost and Utilization Project (HCUP), housed within the Agency for Healthcare Research and Quality.

Data and Sample

We used HCUP's Nationwide Inpatient Sample for calendar year 2011 for our analysis. This dataset includes a sample of 7 million discharges covering patients from all 50 states. Our sample included patients that were at least 18 years of age and had either a routine discharge, a discharge to a skilled nursing facility, or a discharge to home health. Patients with missing zip codes were dropped from the analysis.

Analytic Approach

The HPC used a logistic probability model (logit) to estimate the probability that a patient would be discharged to post-acute care based on the patient's state of residence, age, sex, primary payer, community income, and clinical profile.

We then used the same covariates in a second logit model that predicted the probability that a patient would be discharged to a skilled nursing facility as opposed to a home healthcare provider, conditional on being discharged to post-acute care.

Dependent Variable: The first logit model's dependent variable was a binary variable that indicated whether the observation was a routine dischargeⁱⁱ or a discharge to post-acute care, with post-acute care including both skilled nursing facilities and home healthcare providers.ⁱⁱⁱ

ⁱⁱ Defined by HCUP as a discharge to home or self-care, or a discharge to court/law enforcement.

The second logit model's dependent variable was an indicator that determined if the observation was discharged to a skilled nursing facility.

Variable of Interest: Our variable of interest was an indicator variable that determined if the discharging hospital was located in Massachusetts or some other state.

Demographic Variables: For age, our sample was grouped into 6 age categories, (1) between 18 and 44, (2) 45-54, (3) 55-64, (4) 65-74, (5) 75-84, (6), greater than 85 years of age. Payers were split into four categories, Medicaid/No Charge, Medicare, Private Insurance, and Self Pay/Other.

Because patient-level income was not available, patients were assigned to an income level based on the median incomes in their zip code in 2011, as reported by the US Census' American Community Survey.

For income, our sample was grouped into 4 income categories, less than \$38,999 per year, between \$39,000 and \$47,999, between \$48,000 and \$63,999, and greater than \$64,000.

Clinical Profile Variables: To characterize the patient's clinical profile, the independent variables included risk of mortality score, severity of illness subclass score, 29 comorbidity indicators^{iv}, DRG^v, and the length of stay within the hospital. For length of stay, our sample was grouped into 10 length of stay categories, 1 day, 2 day, 3 day, 4 day, 5 day, 6 day, 7 day, 8 day, 9-12 days, and greater than 13 days.

Display of Effects: The estimate in the text, "Massachusetts hospitals are 2.1 times as likely as the national average to discharge patients to either nursing facilities or home health agencies," was based on the estimated probabilities of being discharged to post-acute care in Massachusetts versus other states conditional, on all other independent variables being held at their mean.

3.4 Average acuity for Massachusetts and U.S. residents of nursing homes

We compared the average RUG-IV nursing index values by payer by state based on data published in an analysis of MDS MARET data produced by Abt Associates for the Medicare Payment Advisory Commission.⁴

ⁱⁱⁱ Defined by HCUP as a discharge to home under care of Organized Home Health Service Organization, or Home IV provider, or a hospice-home provider.

^{iv} AIDS, alcohol abuse, deficiency anemias, rheumatoid arthritis/collagen vascular disease, chronic blood loss anemia, congestive heart failure, chronic pulmonary disease, coagulopathy, depression, diabetes—uncomplicated, diabetes with chronic complications, drug abuse, hypertension, hypothyroidism, liver disease, lymphoma, fluid and electrolyte disorders, metastatic cancer, other neurological disorders, obesity, paralysis, peripheral vascular disorders, psychoses, pulmonary circulation disorders, renal failure, solid tumor without metastasis, peptic ulcer disease excluding bleeding, valvular disease, weight loss.

^v DRG Version 24 was used for this analysis

4 Behavioral health

4.1 Estimate of total spending on behavioral health services in Massachusetts

In Section A.4, we estimate that \$6 billion to \$7 billion per year is spent each year on behavioral health services in Massachusetts. This approximation was developed as the sum of component estimates for Medicare, MassHealth, commercial payer, and direct state agency spending. The method used for each component is described below.

Medicare

We estimated Medicare non-pharmacy spending on behavioral health using the APCD and aggregate figures provided to the Commission by CMS, and pharmacy spending based on figures published from MedPAC.

Medicare fee-for-service spending on behavioral health services excluding pharmacy was estimated by identifying the sum of expenditures associated with episodes of care for behavioral health conditions in the APCD in 2011. We used Optum’s ETG grouper to associate claims with episodes and identified spending associated with 15 behavioral health-related episodes of care (see Table A4.1 below).

Table A4.1: List of behavioral health ETGs

ETG (4-digit)	Description	Type
2388	Mood disorder, depressed	Mental illness
2389	Mood disorder, bipolar	Mental illness
2393	Psych & schizo disorder	Mental illness
2394	Personality disorder	Mental illness
2397	Eating disorder	Mental illness
2398	Anxiety disorder/ phobia	Mental illness
2400	Psychosexual disorder	Mental illness
2401	Attention deficit disorder	Mental illness
2406	Other psych/behavior disorder	Mental illness
2499	Psychiatric disease S&S	Mental illness
2711	Cocaine or amph dep	Substance abuse
2712	Acute alcohol intoxication	Substance abuse
2714	Alcohol dependence	Substance abuse
2715	Opioid/barbiturate dependence	Substance abuse
2716	Other drug dependence	Substance abuse

Since Medicare claims contained in the APCD do not include cost-sharing, we increased the estimate of spending to reflect an assumed proportion of Medicare behavioral health expenditures represented by cost-sharing. We assumed this proportion to be the same as the proportion of total Massachusetts Medicare fee-for-service expenditures represented by beneficiary cost-sharing (13 percent, a 2012 figure provided to the Commission by CMS).

We assumed the same per member per month spending on behavioral health services for Medicare Advantage beneficiaries as for Medicare fee-for-service beneficiaries.

Finally, we estimated pharmacy spending using figures for national spending on major behavioral health drugs (as represented by antipsychotics and antidepressants) from the MedPAC 2012 data book.⁵ We calculated a national per member per month level of spending on behavioral health drugs in Medicare Part D and multiplied it by the number of Medicare Part D member months in Massachusetts in 2012.

Commercial

We estimated commercial payer spending on non-pharmacy behavioral health services using the APCD with methods similar to those used for Medicare spending. We calculated the total allowed expenditures associated with the 15 behavioral health-related episodes of care identified in Table A4.1. These allowed expenditures included payments made by commercial payers and by consumers in the form of cost-sharing.

To estimate behavioral health spending including pharmacy spending, we scaled our non-pharmacy spending estimate to a total estimate using estimates for the proportion of behavioral health spending represented by pharmacy published in the literature.^{6,7}

MassHealth

We directly calculated MassHealth spending for the FFS and PCC populations. For the FFS population, non-pharmacy spending was calculated as the sum of payments to Inpatient Psych, Outpatient Psych, Psychologist, Mental Health Clinic, Psychiatric Day Treatment, and Substance Abuse provider types. For the PCC population, non-pharmacy spending was calculated as the total capitated payments to MBHP. Pharmacy spending on behavioral health drugs for the FFS and PCC population was provided to the Commission directly by MassHealth.

For the MCO population, we used figures provided to the Commission by MassHealth on behavioral health pharmacy spending for MCOs. We then estimated total behavioral health spending by assuming that the MCO population used the same relative proportions of pharmacy and non-pharmacy spending on behavioral health as the FFS and PCC populations. Finally, we estimated spending on behavioral health for all remaining MassHealth populations by assuming that behavioral health represented the same proportion of total spending for other MassHealth populations as for the MCO population. Note that these assumptions are likely too crude for developing specific MassHealth estimates of behavioral health spending, but were used as an approximation to estimate a statewide range of estimated spending on behavioral health.

Direct state agency spending

Direct state agency spending was estimated as total budgeted funds in FY12 for the Department of Mental Health and a similar figure on spending by the Bureau of Substance Abuse Services (BSAS) in the Department of Public Health provided to the Commission by BSAS.

4.2 Spending by category of service for people with and without behavioral health conditions

To determine each patient's clinical conditions, we used Optum's Symmetry Episode Risk Group (ERG) risk adjustment grouper. The ERG grouper evaluated diagnosis codes on 2010 medical claims to identify the chronic and acute conditions that were present for each enrollee and that typically have a material impact on health care costs. The data output included indicators for the presence of 34 clinical conditions.

Working together with clinical consultants, we refined Optum's ERG clinical conditions into 17 chronic conditions (arthritis, asthma, child psychology, blood, diabetes, epilepsy, glaucoma, cardiology, HIV/AIDS, hyperlipidemia, hypertension, mental health, multiple sclerosis (MS) and ALS (amyotrophic lateral sclerosis), psychiatric disorders, renal failure, mood disorders, and substance abuse). We categorized five of these conditions as behavioral health (child psychology, mental health, psychiatric disorders, mood disorders and substance abuse) and the remainder as chronic medical.

These condition indicators were used to identify patients with no behavioral health conditions and patients with one or more behavioral health conditions. Average levels of spending for these two subsets of patients were calculated by category of service, using 2011 Medicare and commercial claims. For detailed definitions of categories of service, see CHIA and HPC publication, "Massachusetts Commercial Medical Care Spending."¹

4.3 Impact of behavioral health conditions on expenditures for non-behavioral health conditions

Patients were segmented by payer type and age into commercial, Medicare under 65, and Medicare 65-and-over populations and were segmented by clinical conditions (see **4.2** above) into those without chronic medical conditions and those with at least one chronic medical condition. Within each payer segment and chronic medical condition segment, we further classified patients based on their ERG conditions (see **4.2** above) into three groups: (1) no behavioral health conditions, (2) at least one behavioral health condition, (3) at least one mental illness condition and at least one substance abuse condition.

For each payer segment, chronic medical condition segment, and behavioral health condition segment, we calculated total expenditures on episode treatment groups (ETGs) that were not related to behavioral health (all ETGs except for those identified in **Table A4.1** above).

4.4 Emergency department visits and boarding by diagnosis type

We used an estimate of the proportion of overall ED visits that carry a behavioral health diagnosis from DHCFP's 2012 cost trends report on ED utilization.⁸

The proportion of patients “boarding” in EDs in Massachusetts was estimated using data provided by the Department of Public Health. We calculated total ED boarding visits^{vi} and ED visits for which there was a behavioral health diagnosis^{vii} for calendar year 2012.

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^{vi} ED4: Total number of all patients remaining in the emergency department for 12 or more hours from ED arrival to ED departure including ED observation-stay, where “departure” is defined as admission, transfer, or discharge

^{vii} ED5: Total # of patients identified in ED4 with a behavioral health diagnosis (ICD-9 code 290.0-319)