

**COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION**



TECHNICAL APPENDIX B6

MAXIMIZING VALUE IN POST-ACUTE CARE

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1 Comparing PAC use in Massachusetts versus the U.S.

For Exhibits 10.1 and 10.4, we used the Healthcare Cost and Utilization Project's (HCUP) 2012 Massachusetts State Inpatient and National Inpatient Sample to create a dataset that included patients discharged to routine care or some form of post-acute care (PAC). HCUP uses the following discharge destinations: "home health care," "routine," "skilled nursing facilities (SNF)", "intermediate care facility (ICF)", and "short-term hospital." We grouped these into the following categories:

1. Routine: ("routine")
2. Home health care: ("home health care")
3. Institutional: ("skilled nursing facilities (SNF)", "intermediate care facility (ICF)", and "short-term hospital")

We evaluated the distribution of discharges by total discharges and also grouped results by payer: Medicaid, Medicare, and Commercial. We evaluated results for all Diagnosis Related Groups (DRGs) and also for DRG 470 (major joint replacement or reattachment of lower extremity without major comorbidity or complication). We presented "actual" results, rather than a risk-adjusted comparison.

2 Comparing PAC use in Massachusetts over time

For Exhibits 10.2, 10.6, and 10.8, we used the Massachusetts Health Data Consortium's (MHDC) 2010-2013 inpatient discharge databases and the Center for Health Information and Analysis' (CHIA) Inpatient Discharge Database 2014 to compare rates of PAC discharges. We limited our sample to Massachusetts residents who were at least 18 years of age with the following discharge destinations in MHDC: home/routine, long-term care hospital, rehabilitation facility or hospital, rehabilitation hospital, skilled nursing facility, home health agency, and home/IV therapy. Due to coding inconsistency, UMass Memorial Medical Center was removed from the dataset. We also limited the analysis to DRGs that had at least two dischargers per year from 2010 to 2014. Based on input from providers, we assumed that discharges to "skilled nursing facility" versus "inpatient rehabilitation facility" versus "long-term care hospital" were not coded accurately enough to ensure meaningful results by this level of provider type. Therefore, we grouped MHDC 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" and "rehabilitation hospital"/ "skilled nursing facility")

For Exhibit 10.6, PAC use in Massachusetts over time for DRG 470, we chose to present “actual” results rather than risk-adjusted comparisons.

For the adjusted PAC rate per year (Exhibit 10.2), we adjusted for change in case mix over time. To do so, we created a case mix weight by summing the volume of each individual DRG from 2010-2014 and then dividing it by the total number of all discharges per year. Each DRG’s weight was then held constant across all years [$PAC_t^{adj} = \sum_k (wt_k * rate_{kt})$, where k is a DRG and t is time].

Using the patient sample and discharge categories described above, as well as the case mix weight, we also evaluated the distribution of discharge destination by hospital type, shown in Exhibit 10.8. For our definition of academic medical centers (AMCs) vs Teaching vs Community hospitals please see the **Technical Appendix A: “Acute care hospitals in Massachusetts by type of hospital.”**

3 Risk-adjusted institutional PAC use following joint replacement surgery (DRG 470) within Massachusetts by hospital

For Exhibits 10.5 and 10.7 we used Massachusetts Health Data Consortium’s (MHDC) 2010-2013 inpatient discharge databases and CHIA’s Inpatient Discharge Database 2014 with the same patient sample and discharge categories described in the section above. We evaluated the probability of discharge to an institutional setting versus to home health or routine. Hospital effects were calculated using a logistic regression that included the following covariates: age, sex, payer group, income, admit source of the patient, and length of stay. New England Baptist Hospital was the only specialty hospital included in the analysis, given its unique specialization in orthopedic surgery.

Using the methods above, we also calculated the range of hospital-level variation in discharges to institutional PAC from 2010- 2014, looking at both the difference between the 10th and 90th percentile as well as the difference between the 25th and 75th percentile.

| Probability of discharge to institutional PAC, 2010-2014 | | | | | |
|--|------|-------|------|-------|-------|
| | 2010 | 2011 | 2012 | 2013 | 2014 |
| 10th percentile | 3.1% | 4.8% | 3.3% | 6.0% | 6.5% |
| 90th percentile | 8.3% | 11.0% | 7.4% | 11.7% | 13.6% |
| Difference | 5.2% | 6.2% | 4.0% | 5.8% | 7.1% |
| | | | | | |
| | 2010 | 2011 | 2012 | 2013 | 2014 |
| 25th percentile | 5.1% | 6.5% | 4.3% | 7.0% | 7.4% |
| 75th percentile | 7.3% | 9.8% | 6.2% | 10.2% | 10.9% |
| Difference | 2.3% | 3.3% | 1.9% | 3.2% | 3.5% |

For Exhibit 10.7 we ranked (highest to lowest) hospitals by their rate of institutional PAC use in 2010. Hospitals with fewer than 15 joint replacement discharges in 2010 were excluded from the analysis.

4 Spending data for Massachusetts

For Exhibits 10.3 and 10.9, we contracted with Mathematica Policy Research to work with the 2011 and 2013 All-Payer Claims Database. Estimates included PAC utilization through December 31 of each year, for services starting within 60 days of an acute hospital discharge on or after January 1 during that calendar year. Spending estimates did not include use of skilled nursing facility (SNF), inpatient rehabilitation facility (IRF), long-term care hospitals (LTCH) or home health services without a preceding hospital stay within 60 days of service initiation. Total PAC spending estimates in the chapter included spending per Medicare FFS beneficiaries and commercial spending on home health, SNFs, IRFs, and LTCHs in Massachusetts. Spending included insurer and beneficiary payments for services.

We presented results on total spending and mean spending per user. To calculate mean estimate spending per user, we averaged the spending per user within each PAC category. In other words, if a given beneficiary had 5 SNF stays in a year, the numerator would be spending for the 5 stays and the denominator would be one patient. Further, if in one year a given beneficiary had 3 SNF stays and 1 IRF stay, he/she would be counted as a separate user for each of those subcategories, but counted as one user for the institutional PAC category denominator. Likewise, for 2 SNF stays and 3 home health episodes, the denominator would again be one user for “All PAC”.

5 Changes to DRGs in Massachusetts

We conducted a time trend analysis of discharge to institutional care, from 2010 to 2014, for the most common DRGs. The most common DRGs were defined as the top 20 DRGs in terms of volume in 2010. The data below represents “actual” results and are not risk-adjusted. It shows the percentage of patients discharged to an institutional setting, as opposed to home health or routine care.

| Top 20 Most Common DRGs in 2010 | | | | | | | |
|---------------------------------|---|-------------------------------|-------|-------|-------|-------|------------------------------|
| DRG # | Description | % discharged to institutional | | | | | % point difference 2010-2014 |
| | | 2010 | 2011 | 2012 | 2013 | 2014 | |
| 470 | Major joint replacement of lower extremity w/o MCC | 55.01 | 52.61 | 49.63 | 46.78 | 44.26 | -10.75 |
| 871 | Septicemia or sever sepsis w MV 96 hrs + w/ MCC | 54.68 | 52.44 | 49.88 | 50.07 | 49.92 | -4.76 |
| 190 | Chronic obstructive pulomary disease w/ MCC | 24.2 | 23.67 | 22.62 | 23.72 | 22.81 | -1.39 |
| 641 | Nutritional & misc metabolic disorders w/o MCC | 23.42 | 22.25 | 20.92 | 20.9 | 22.27 | -1.15 |
| 690 | Kidney & urinary tract infections w/o MCC | 32.38 | 32.64 | 29.94 | 32.29 | 31.36 | -1.02 |
| 292 | Heart failure & shock w/ CC | 27.09 | 26.76 | 26.54 | 26.84 | 26.38 | -0.71 |
| 194 | Simple pneumonia & pleurisy w/ CC | 23.24 | 24.84 | 23.06 | 23.77 | 22.95 | -0.29 |
| 885 | Psychoses | 5.37 | 5.05 | 5.23 | 5.59 | 5.7 | 0.33 |
| 310 | Cardiac arrhythmia & conduction disorders w/o CC/MCC | 4.8 | 4.87 | 4.24 | 5.68 | 5.47 | 0.67 |
| 392 | Esophagitis, gastroent & misc digestive disorders w/o MCC | 6.29 | 6.97 | 6.34 | 6.62 | 7.07 | 0.78 |
| 766 | Cesarean section w/o CC/MCC | 0.01 | 0.01 | 0.03 | 0.71 | 0.83 | 0.82 |
| 775 | Vaginal delivery w/o complicated diagnosis | 0.01 | 0 | 0.01 | 0.61 | 0.84 | 0.83 |
| 765 | Cesarean section w/ CC/MCC | 0 | 0.05 | 0.04 | 0.39 | 0.83 | 0.83 |
| 774 | Vaginal delivery w/ complicated diagnoses | 0 | 0.03 | 0.01 | 0.39 | 0.88 | 0.88 |
| 603 | Cellulitis w/o MCC | 11.86 | 12.75 | 11.82 | 12.31 | 13.21 | 1.35 |
| 313 | Chest pain | 6.71 | 6.68 | 6.92 | 7.44 | 8.11 | 1.4 |
| 291 | Heart failure & shock w/ MCC | 37.05 | 40.38 | 37.14 | 40.15 | 41.22 | 4.17 |
| 312 | Syncope & collapse | 18.24 | 18.32 | 17.6 | 20.6 | 24.82 | 6.58 |
| 743 | Uterine & adeza proc for non-malignnancy w/o MCC/CC | 0.24 | 0.21 | 0.18 | 0.36 | 0.33 | 0.09 |
| 378 | GI hemorrhage w CC | 18.08 | 19.35 | 18.86 | 19.29 | 17.73 | -0.35 |

6 PAC use in Massachusetts versus the U.S., 2011

Using HCUP's 2011 Massachusetts State Inpatient and National Inpatient Sample databases we used the same methodology to the one described in Section 1 above.

| Massachusetts and U.S. discharge destination by payer | | | | | | | | | | | | | | | |
|---|---------------|---------------|------------|--|---------------|---------------|------------|--|-----------------|-----------------|------------|--|------------|------------|------------|
| <i>Percent of discharges, all DRGs, 2011</i> | | | | | | | | | | | | | | | |
| | Medicaid (MA) | Medicaid (US) | Difference | | Medicare (MA) | Medicare (US) | Difference | | Commercial (MA) | Commercial (US) | Difference | | Total (MA) | Total (US) | Difference |
| Routine | 77.4% | 88.1% | -10.7 | | 37.9% | 50.4% | -12.5 | | 76.6% | 85.4% | -84.6 | | 59.3% | 70.1% | -10.8 |
| Home Health Care (HHC) | 14.2% | 5.3% | 8.9 | | 25.7% | 18.2% | 7.5 | | 15.6% | 8% | -7.8 | | 19.9% | 11.8% | 8.1 |
| Institutional | 8.5% | 6.7% | 1.80 | | 36.5% | 31.4% | 5.1 | | 7.8% | 6.6% | -6.5 | | 20.8% | 17.4% | 3.4 |
| <i>Percent of discharges, for DRG 470 (joint replacement), 2011</i> | | | | | | | | | | | | | | | |
| | Medicaid (MA) | Medicaid (US) | Difference | | Medicare (MA) | Medicare (US) | Difference | | Commercial (MA) | Commercial (US) | Difference | | Total (MA) | Total (US) | Difference |
| Routine | 10.1% | 28.6% | -18.5 | | 2.4% | 16.9% | -14.5 | | 4.1% | 32.6% | -28.5 | | 3.4% | 23.3% | -19.9 |
| Home Health Care (HHC) | 50% | 38.5% | 11.5 | | 27.4% | 33.1% | -5.7 | | 65.8% | 50% | 15.8 | | 44.7% | 39.8% | 4.9 |
| Institutional | 39.8% | 32.9% | 6.9 | | 70.2% | 50% | 20.2 | | 30.1% | 17.5% | 12.6 | | 51.9% | 36.9% | 15 |