COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION

TECHNICAL APPENDIX B3
HOSPITAL-LEVEL VARIATION IN SPENDING PER EPISODE OF CARE

ADDENDUM TO 2014 COST TRENDS REPORT

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1 Summary

This technical appendix lays out the Health Policy Commission's (HPC) approach for examining hospital level variation using three types of episodes, knee replacement, hip replacement, and percutaneous coronary intervention (PCI).

2 Sample

We used Massachusetts' All Payer Claims Database for the calendar year 2012 for our analysis. For a description of the HPC's APCD analytic file and methods, please see: http://www.mass.gov/anf/docs/hpc/apcd-almanac-technical-notes.pdf

2.1 Episodes of care

We used the Optum Symmetry Episode Treatment Grouper to group claims into unique episodes of care. Episode Treatment Groups (ETGs) are medically meaningful statistical units representing complete episodes of care. These episodes describe a recipient's observed mix of diseases and conditions, and any underlying co-morbidities and complications.

The following ETGs were used in our study:

List of ETGs used in Section 3.A

Percentage of total plans by network breadth, 2012

Episode	ETG	Description
Knee Replacements	712202	Joint degeneration, localized - knee & lower leg
Hip Replacements	712203	Joint degeneration, localized - thigh, hip & pelvis
Percutaneous Coronary Intervention	386500	Ischemic heart disease

Source: Optum, 2014

2.2 Patient population and risk adjustments

The study sample was defined according to the following criteria:

- Only inpatient stays at acute care facilities
- Only patients with a commercial payer
- Only complete episodes
- Only patients who are 18 and over
- Only patients who are classified as low severity (level 1 or 2) by the Optum ETG grouper
- Excludes outliers (all episodes in the top and bottom 5% of payments were cut out of the sample)

2.3 Attribution of patients to hospitals and hospital sample

To attribute an acute hospital to each episode, we created an anchor claim within an episode, which assigned all associated related claims to a certain facility.

For hip and knee replacement episodes, the anchor claim was the first claim where the patient had an overnight stay. For PCI, the anchor claim was the first claim with the following procedure codes: 00.66, 36.01-36.02, 36.05, 36.06, 36.07, and 36.09.

The assigned hospital was the national billing code on the anchor claim.

Only acute care facilities with greater than fifteen discharges were used in our analysis. We used a fifteen discharge threshold because we wanted to only include hospitals that had a sample size large enough to detect an average payment difference of 25% for the PCI reference hospitals,[i] the average payment for teaching hospitals. The PCI threshold was the most conservative across all three diagnoses, and was therefore used for entire analysis to maintain consistency.

Hospitals were categorized as AMCs, hospitals with a corporate affiliation to an AMC, and hospitals without a corporate affiliation according to the table below.

[i] We assumed a known standard deviation, $\beta = .8$, and $\alpha = .05$ for our power calculation.

Table B3.1: Hospitals with a corporate affiliation to an AMC

AMC corporately affiliated hospitals

Hospitals that are affiliated in a corporation with an AMC

Academic Medical Centers (6)	
Beth Israel Deaconess Medical Center	*Massachusetts General Hospital*
Boston Medical Center	*Tufts Medical Center*
Brigham and Women's Hospital	*UMass Memorial Medical Center*
Corporately affiliated hospitals (14)	
Beth Israel Deaconess Hospital - Milton	*Marlborough Hospital*
Beth Israel Deaconess Hospital - Needham	*Saints Medical Center*
Beth Israel Deaconess Hospital - Plymouth	*North Shore Medical Center*
Brigham and Women's Faulkner Hospital	*Newton-Wellesley Hospital*
Cooley Dickinson Hospital	*Martha's Vineyard Hospital*
HealthAlliance Hospital	*Nantucket Cottage Hospital*
Lowell General Hospital	*Clinton Hospital*
Hospitals without a corporate affiliation (41)	
Anna Jaques Hospital	*Morton Hospital*
Athol Hospital	*Mount Auburn Hospital*
Baystate Franklin Medical Center	*Nashoba Valley Medical Center*
Baystate Mary Lane Hospital	*Noble Hospital*
Baystate Medical Center	*North Adams Regional Hospital (closed 2014)*
Berkshire Medical Center	*Northeast Hospital*
Cambridge Health Alliance	*Quincy Medical Center (closed 2014)*
Cape Cod Hospital	*Signature Healthcare Brockton Hospital*
Emerson Hospital	*South Shore Hospital*
Fairview Hospital	*Southcoast Hospitals Group*
Falmouth Hospital	*St. Vincent Hospital*
Hallmark Health	*Steward Carney Hospital*
Harrington Memorial Hospital	*Steward Good Samaritan Medical Center*
Heywood Hospital	*Steward Holy Family Hospital*
Holyoke Medical Center	*Steward Norwood Hospital*
Lahey Clinic	*Steward Saint Anne's Hospital*
Lawrence General Hospital	*Steward St. Elizabeth's Medical Center*
Mercy Medical Center	*Sturdy Memorial Hospital*
Merrimack Valley Hospital	*Winchester Hospital*
MetroWest Medical Center	*Wing Memorial Hospital*
Milford Regional Medical Center	

For hospital cohort definitions—AMC vs. community vs. teaching—please refer to the hospital appendix in the report.

2.4 Resulting dataset

The final sample consisted of 1,068 hip replacements, 954 knee replacements, and 316 PCI.

3 Payment variation calculation

We calculated two different average payments. One was the average payment for the procedure, and the other was the average payment for the episode.

1. The procedural payments were defined as all payments that occurred between the admit date and the discharge date.
2. The episode payments were defined as all payments before and after the procedure. This could include any readmissions, any post-acute care, and any pre-surgical consultations.

Table B3.2 shows the average spending by procedure and episode, by hospital type.

Note that there are two mutually exclusive and collectively exhaustive ways to categorize the hospitals that are presented: either (AMC, NEB, Affiliated, Unaffiliated) or (AMC,NEB, Teaching, Community).

Table B3.2: Average spending by procedure and by episode, by hospital type

Price for Hip Replacements, Knee Replacements, and PCI

Average payment per procedure and episode by hospital type, 2012

Hospital Type	Knee Procedure	Knee Episode	Hip Procedure	Hip Episode	PCI Procedure	PCI Episode
AMC	$31,386	$36,111	$34,119	$37,735	$27,005	$31,160
Affiliated	$25,115	$29,818	$29,275	$32,776	$21,476	$25,625
Unaffiliated	$24,313	$28,625	$25,748	$29,540	$22,746	$27,425
Teaching	$25,778	$30,304	$26,900	$29,947	$23,797	$28,063
Community	$24,052	$28,456	$27,454	$31,304	$21,663	$26,617
NE Baptist	$27,117	$31,309	$27,726	$30,641	-	-
Overall	$26,787	$31,215	$28,718	$32,049	$24,411	$28,845

Note: Sample limited to commercially insured population (age 0-64)

Source: HPC analysis of All-Payer Claims Database 2012

4 Quality Measures

4.1 Total Joint Replacement

For hip and knee replacements we used Hospital Compare's data hip and knee major complication rates and readmission rates for the 2012 calendar year. We also looked at MA's Department of Public Health's most recent data (2011) on surgical site infections for hip and knee replacements, and our results were consistent with Hospital Compare—only New England Baptist had showed a statistically different result.

4.2 PCI

For PCI, we used MassDAC's PCI mortality rates for the 2012 calendar year and the Hospital Compare's PCI readmission rates for the 2010-2011 calendar years.

We also looked at all publically available data on cardiac care quality. These include timely and effective care measures, and heart failure and acute myocardial infarction (AMI) readmission and mortality rates. Because our analysis was of PCI, PCI readmission and mortality rates were chosen over general heart failure. Regarding timely and effective care measures, most did not show any meaningful variation. Measures that did show meaningful variation did not rank any hospital or hospital group as superior to another.

The complete list of quality measures analyzed was:

- Median Time to Transfer to Another Facility for Acute Coronary Intervention
- Statin at discharge
- Aspirin prescribed at discharge
- Heart attack patients given drugs to break up blood clots within 30 minutes of arrival
- Primary PCI Received Within 90 Minutes of Hospital Arrival
- Heart Failure patients given discharge instructions
- Evaluation of LVS Function
- Median Time to Fibrinolysis
- Fibrinolytic Therapy Received Within 30 Minutes of ED Arrival
- Median Time to Transfer to Another Facility for Acute Coronary Intervention
- Aspirin at Arrival
- Median Time to ECG
- Venous thromboembolism prophylaxis
- ICU venous thromboembolism prophylaxis
- Anticoagulation overlap therapy

- Unfractionated heparin with dosages/platelet count monitoring
- Warfarin therapy discharge instructions
- Incidence of potentially preventable VTE
- Heart Failure mortality and readmission rate
- AMI mortality and readmission rate