Development of a Risk-Adjusted Readmission Rate: Preliminary

May 2016 Update

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Overview of recent work

- **Develops regression-based adjustment model**
  - **Converts current approach to use regression-based approach**
    - APR-DRG SOI fixed effects model
  - **Assesses model fit and predictive properties**
  - **Tests whether simpler model yields similar results**
    - Reduces the number of variables needed in the model

- **Tests impacts of adding covariates to the model**
  - **Impacts on model fit**
  - **Impacts on hospital rates, and improvement from CY2013 to CY2015**
  - **Covariates tested:**
    - Age
    - Gender
    - Elixhauser co-morbidities
    - Primary payer
    - ADI

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May Updates

- **Test new model specifications**
  - **An "ADI only" model**
  - **Model that controls for hospital-level percentage of patients from high-ADI areas (85th percentile or higher)**

- **Re-run analyses of improvement rates**
  - **Eliminate bias due to comorbidities undetected after ICD-10 implementation in October, 2015**
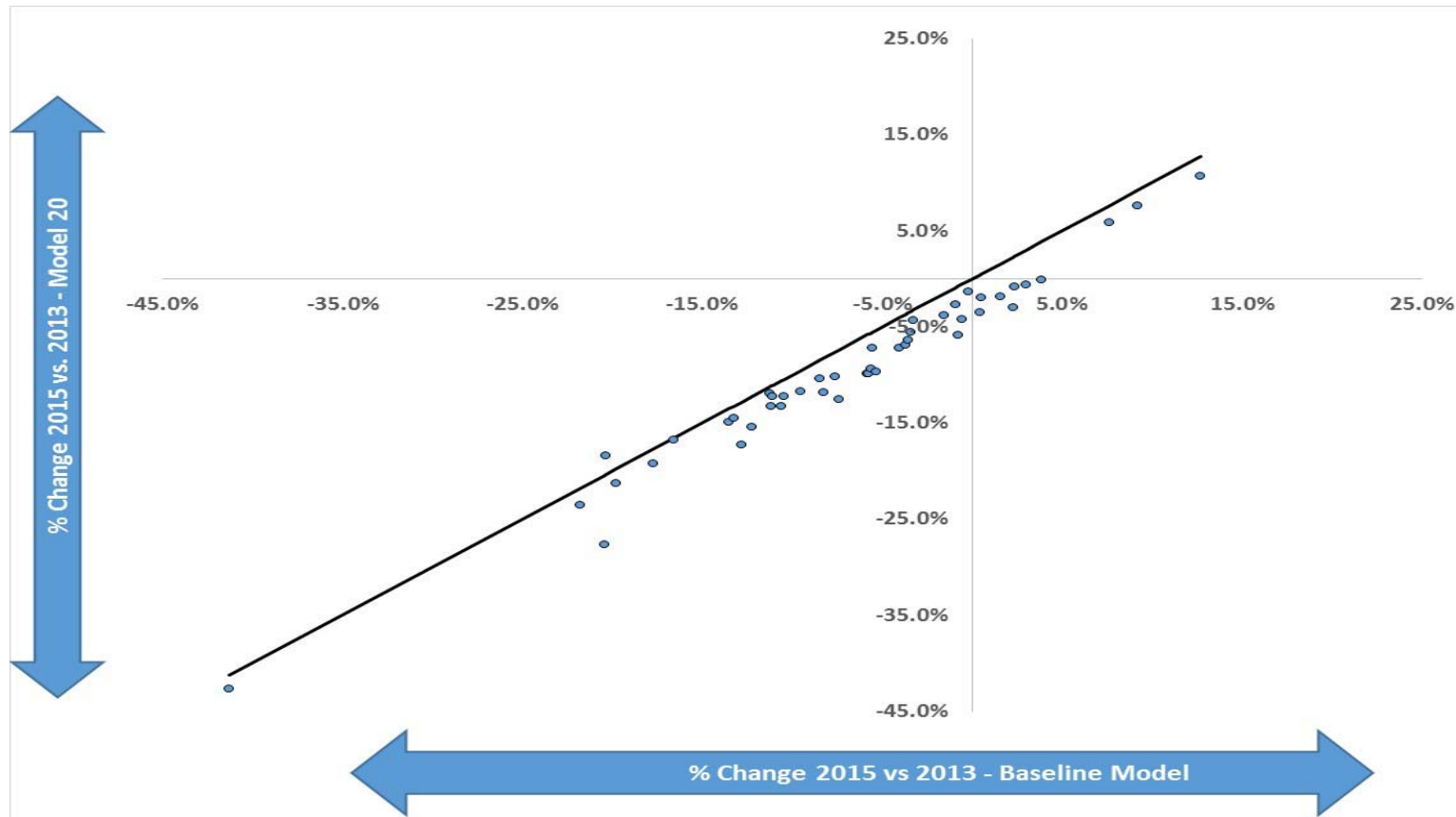   - Exclude Q4 of both 2013 and 2015

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Summary of Models

Model	APR-SOI Fixed Effects	CY 2013 Norms	Age and Gender	Elixhauser Comorbidities	Payer	ADI	High-ADI Hospital Control
Baseline	Yes	No	No	No	No	No	No
B2	No	No	No	No	No	Yes	No
15	No	Yes	No	No	No	No	No
18	No	Yes	Yes	Yes	No	No	No
19	No	Yes	Yes	Yes	Yes	No	No
20	No	Yes	Yes	Yes	Yes	Yes	No
21	No	Yes	Yes	Yes	Yes	Yes	Yes

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Model Fit Statistics

Model	Controls	Number of Observations	c-statistic	Max-rescaled R square
Baseline	APR-DRG SOI Fixed Effects	561,903	0.712	0.128
B2	ADI Only	561,903	0.547	0.006
15	CY 2013 Norms	561,903	0.712	0.127
18	Model 15 Plus: Age, Gender, Comorbidities	561,903	0.726	0.142
19	Model 18 Plus: Primary Payer	561,903	0.730	0.147
20	Model 19 Plus: ADI	561,903	0.731	0.148
21	Model 20 Plus: Hospital-level High-ADI control	561,903	0.732	0.149

Impact of Using Model 20

Source: Mathematica analysis of 2013 and 2015 Readmissions data provided by HSCRC.

Notes: (1) Quarter 4 of 2013 and 2015 have been excluded because of discharges containing ICD10 in Q42015.
(2) Baseline model controls for APR-DRG SOI fixed effects
(3) Model 20: controls for (logged) CY 2013 norms, age, gender, comorbidities, primary payer, and ADI

Impact of Using Model 21

Source: Mathematica analysis of 2013 and 2015 Readmissions data provided by HSCRC.

Notes: (1) Quarter 4 of 2013 and 2015 have been excluded because of discharges containing ICD10 in Q42015.

(2) Baseline model controls for APR-DRG SOI fixed effects

(3) Model 21: controls for (logged) CY 2013 norms, age, gender, comorbidities, primary payer, patient ADI, and hospital percentage of high ADI patients