Effects of Comprehensive Care for Joint Replacement Model on Racial/Ethnic Disparities:

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Study Population

For this study, we compared all black, white, and Latino/a patients receiving lower extremity joint replacement (LEJR) surgery at hospitals participating in Comprehensive Care for Joint Replacement Model (CJR) with patients receiving surgeries from hospitals in Metropolitan Statistical Areas (MSAs) that were eligible for CJR but were not randomly selected.

Data Source

Patient demographics was obtained from the Medicare Master Beneficiary Summary Files. Health care utilization and cost was calculated using the full 100% Medicare claims for inpatient, outpatient, skilled nursing facility, home health, and carrier (professional) claims.

Inclusions

- All lower extremity joint replacement surgery (LEJR) episodes eligible under CJR (DRG 469 or 470)
  - Episodes consist of the index hospitalization and subsequent 90 days

- For patients identified as either white, black, or Latino/Latina.
- Occurring in hospitals in CJR participating MSAs or eligible control MSAs
- Occurring in either the three years prior to start of the program (2012-2015) or the two years after (April 2016 - December 2017)

Exclusions

- LEJR at hospitals participating in BPCI model 1 or the risk bearing phase of BPCI models 2 or 4 for LEJR
- Patients without continuous Medicare enrollment
- Patients enrolled in Medicare Advantage
- Patients under the age of 66 at the time of the surgery
- LEJR where another qualifying LEJR occurred within 90 days

Sample Size

Our final sample included:

- 170 MSAs
- 1,683 hospitals
- 776,059 patients
- 844,991 surgeries

Methods

Effect of CJR

We used generalized linear models to assess the impact of CJR on safety-net and non-safety-net hospitals on our primary outcomes:

- Total episode spending
  - Standardized 2016 dollars
  - Tested using a negative binomial model
- Discharge to institutional post-acute care setting
  - Included discharges to skilled nursing facilities, long-term care hospitals, inpatient rehabilitation centers, and swing beds
  - Tested using logistic regression
- Relevant readmission rate
  - Readmissions Occurring in the 90 days following index discharge
  - Excludes readmissions deemed irrelevant to CJR by CMS
  - Tested using logistic regression
- 90-day emergency department utilization
  - Any emergency department utilization in the 90 days following index discharge
  - Tested using logistic regression
- 90-day mortality
  - Recorded death in the 90 days following index hospitalization
  - Includes patients that died during their index hospitalization
  - Modeled using logistic regression

Tests of balance prior to CJR found no difference between treatment and control MSAs, so we were able to leverage the random selection of CJR and only compare outcomes for LEJR in the treatment versus control MSAs in the post-period. We used the following model:

$$Y_{mhs} = f(\beta_0 + \beta_1 * Treatment_m + \beta_2 * Race_h + \beta_3 * Treatment_m * Race_h + \vec{\beta_x}\vec{X_s})$$

$m = MSA$
$h = Hospital$
$s = Surgery$

Models adjusted for:

- Type of surgery (Hip vs Knee)
- Fracture status
- Presence of major complications or comorbidities (MCC)
- Patient characteristics
  - Age
  - Gender
  - Elixhauser comorbidity indicators
- Hospital characteristics
  - Volume
  - Ownership

  - Teaching hospital status
- MSA level characteristics
  - Sampling strata
  - Post-acute care supply
  - Market competitiveness for LEJR
- Year and month fixed effects

Characteristics of patients in the pre-CJR period

	White patients	Black patients	Latino/a patients
Sample Size, N	490,799	23,192	15,084
Institutional PAC discharge, N(%)	238,238 (48.5)	13,763 (59.3)	8,005 (53.1)
90-day readmission, N(%)	89,513 (18.2)	5,479 (23.6)	3,027 (20.1)
90-day ED, N(%)	93,899 (19.1)	5,410 (23.3)	3,065 (20.3)
90-day mortality, N(%)	13,958 (2.8)	579 (2.5)	325 (2.2)
Total episode costs, mean(sd)	26,696 (14841)	29,994 (17220)	27,872 (15787)

Limitations

- Costs do not include durable medical equipment
- We did not assess changes in access to LEJR among racial/ethnic groups. For example, outcomes may change for a group because higher risk patients from that group are no longer receiving care.
  - Future research should investigate whether CJR is leading to these selection issues.