

TRENDS IN AND DETERMINANTS OF TIME TO PRIMARY SURGICAL TREATMENT FOR FEMALES WITH EARLY STAGE BREAST CANCER

Irene Dankwa-Mullan, MD, MPH,¹ M. Christopher Roebuck, PhD, MBA,² Joseph Tkacz, MS,¹ Judy George, PhD,¹ Fredy Reyes, PhD,¹ Yull E. Arriaga, MD,¹ Gretchen P. Jackson, MD, PhD^{1,3}

¹ IBM Watson Health, Cambridge, MA, USA ² RxEconomics LLC, Hunt Valley, MD, USA ³ Vanderbilt University Medical Center, Nashville TN

BACKGROUND

Problem

While breast care quality recommendations suggest optimal time to adjuvant radiation and chemotherapy for accountability, there is not a standard time to surgery (TtS) for breast conserving surgery (BCS) or mastectomy (MAST).

Access to and time to surgical treatment has been proposed as a quality measure since it has an impact on initiation of chemotherapy or radiation.

Emerging evidence suggests geographic variation in time to and type of surgery performed for early invasive stage breast cancer (ESBCa).

METHODS

IBM® MarketScan® claims data were used to select women who had received primary BCS for non-metastatic invasive breast cancer between 01/01/2012 to 03/31/2018. (Figure 1)

Patients were excluded if they had received neoadjuvant therapy prior to surgical treatment.

Univariate and bivariate analysis were conducted along with a quantile regression model of the median TtS.

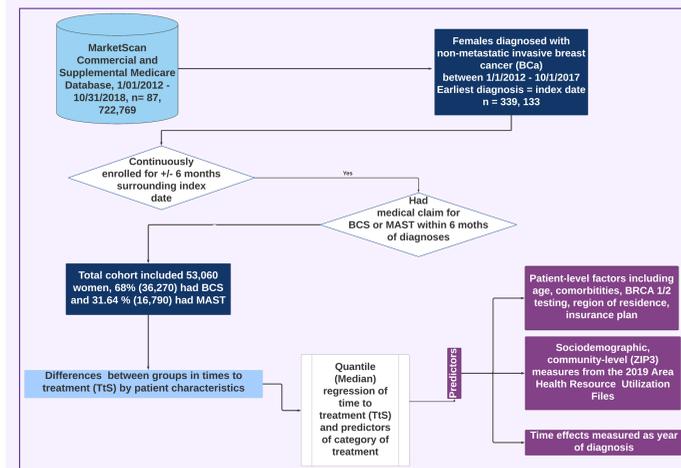


Figure 1. Cohort selection process

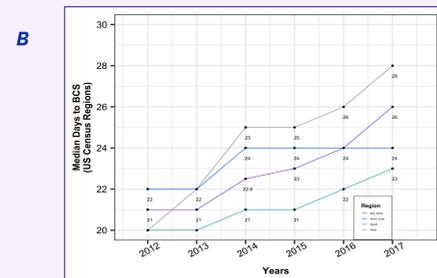
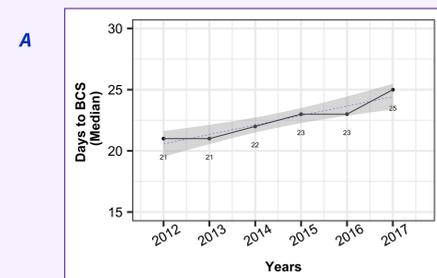
Study Cohort

A total of 53,060 women met study criteria, which, 68.3% (36,270) had BCS and 31.64% (16,790) had MAST. Figure 2 shows the national and regional trends in time to primary surgery (BCS or MAST) from 2012 to 2017

Geographic and Time Trends

- Time to surgery increased over the time period of the study
- Relative to the Northeast, residents in all other regions had lower TtS for MAST (-6.2 to 3.1, $p < .0001$ - $p = 0.01$, but only those in the South had significantly lower TtS for BCS (-2.9, $p < .0001$)

Breast Conserving Surgery



Mastectomy

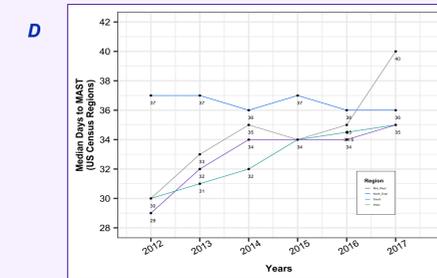
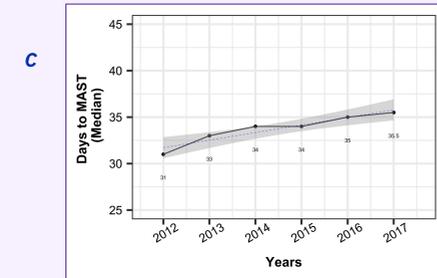


Figure 2. National and Regional Trends in time to BCS and MAST. Overall (National) median days to BCS (A). Overall (National) median days to MAST (C). Median days to BCS (B) and MAST (D) in each US census region.

SUMMARY OF KEY FINDINGS

For Breast Conserving Surgery

Trends and Factors associated with Time to BCS

- The mean TtS increased from 24.1 (median 21) in 2012 to 27.8 (median 26) in 2017
- TtS for BCS was at least 2.3 ($p < .0001$) days shorter for all women over 50 compared to the younger group
- Patients in communities with a greater percentage of college educated graduates (9.4, $p = .05$) or in urban areas (4.9, $p = .03$) had longer TtS for BCS
- Congestive heart failure (2.25, $p = .02$), cerebrovascular disease (2.0, $p < .01$), chronic obstructive pulmonary disease (1.1, $p < .01$) were related to longer TtS for BCS
- A pre-index in situ diagnosis was associated with 8.9 ($p < .01$) fewer days in TtS for BCS

For Mastectomy

Trends and Factors associated with Time to MAST:

- The mean TtS (days) increased from 36.9 (median 31) in 2012 to 38.85 (median 40) in 2017
- Among patients receiving MAST, TtS decreased with age, with individuals ages 70-79 waiting 7.9 ($p < .0001$) fewer days compared to those less than age 50
- A pre-index in situ diagnosis was associated with 6.5 ($p < .0001$) fewer days TtS for MAST
- Patients in urban areas (13.3, $p < .0001$) had a longer TtS
- Relative to the Northeast, residents in all other regions had lower TtS for MAST (-6.1 to -3.0, $p < .0001$ - $p = .01$)
- Patients residing in areas with a higher density of radiation oncologists had a shorter TtS for MAST (-10.7, $p = .01$)

Quantile (Median) regression days to BCS (n=36,270) and MAST (n=16,790)

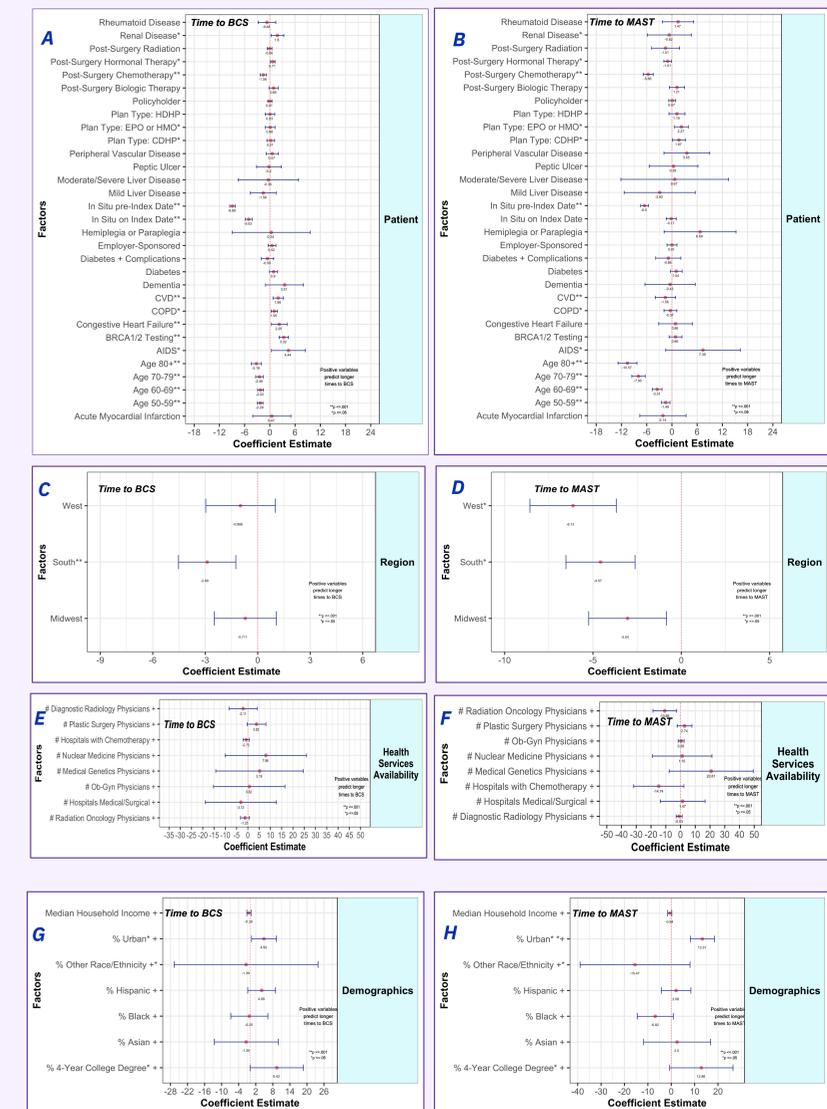


Figure 3. Coefficient estimates of quantile median regression of days to surgery with 95% confidence intervals. Patient, Health Service Availability, Region and Demographic factors for time to BCS (A,C,E,G) and time to MAST (B,D,F,H). Community (ZIP3)-level (#) data. # represents number per 10,000 residents. Significance levels are designated (* = $p < .05$; ** = $p < .001$). ZIP3-level p-values were based on clustered standard errors. Reference categories include: Year=2012; Age<50; Northeast Region; PPO/POS/Comprehensive Health Plan Type; Percent White.

LIMITATIONS

This cross-sectional study utilized privately-insured commercial claims data and results may not be generalizable. We inferred community-level characteristics based on county-level data. Clinical data sources (e.g., biomarker, hormone receptor status) may further explain observed variation in TtS for BCS and mastectomy.

CONCLUSIONS

This study shows TtS for both BCS and MAST is increasing over time. Increased TtS is observed in the Northeast. Women who were older and with in-situ diagnoses had significantly shorter TtS. Longer TtS persisted in urban areas and for patients with 4+ year college degrees. Factors affecting TtS should help inform policy and clinical practice efforts critical for optimizing quality care for patients with ESBCa.