The Impact of Regionalization of Cystectomy on Racial Disparities in Bladder Cancer Care

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Abbreviations and Acronyms

HV = high volume

LV = low volume

NY = New York

SPARCS = Statewide Planning and Research Cooperative System

VHV = very HV

VLV = very LV

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Purpose: Regionalization of surgical care has improved the quality of care for patients with bladder cancer. We explored whether regionalization has benefited white and black patients equally.

Materials and Methods: We used a New York State inpatient database to identify all patients who underwent cystectomy for bladder cancer from 1997 to 2011. Hospital volume was classified in quintiles based on the number of cystectomies performed in the first 5 years of the study. Logistic regression was done to assess the association between race and low volume/very low volume hospitals. Racial disparities were further characterized using stratification by time and by the racial composition of the patient community.

Results: A total of 8,168 patients treated with cystectomy for bladder cancer were included in analysis. Compared with white race, black race was associated with a higher likelihood of low volume/very low volume hospital use (OR 1.59, 95% CI 1.26–2.02). The disparity was most prominent in 2002 to 2006 (OR 2.51, 95% CI 1.64–3.85) but it did not persist in 2007 to 2011 (OR 1.46, 95% CI 0.92–2.32). Black patients living in a black community had the highest likelihood of low volume/very low volume hospitalization during all periods of increased regionalization (2002 to 2006 OR 4.14, 95% CI 1.84–9.34 and 2007 to 2011 OR 2.40, 95% CI 1.07–5.39).

Conclusions: Regionalization of cystectomy transiently worsened the racial disparity in bladder cancer care, although the disparity did not persist with time. Specific efforts may be needed to address the consequences of regionalization in particularly vulnerable subpopulations, such as black patients who live in a black community where disparities have persisted.

Key Words: urinary bladder neoplasms; cystectomy; healthcare disparities; quality indicators, healthcare; regional health planning

SEVERAL studies have demonstrated an association between high surgical volume and better outcomes of various cancer surgeries, including cystectomy.[1–3] In response to these analyses AHRQ (Agency for Healthcare Research and Quality) developed recommendations encouraging the use of HV hospitals.[4–6] These guidelines focused on specific cancer surgeries, primarily pancreatic and esophageal cancer, with the strongest volume-outcome relationships.[7] Nonetheless, a volume-outcome benefit for

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cystectomy for bladder cancer was found for perioperative mortality[1–3] and long-term survival.[8] Consequently extensive regionalization of cystectomy even without delineated referral guidelines occurred in the last decade.[9,10]

While regionalization efforts have improved the quality of cancer care, there has been little research on potential unintended consequences of this process. Prior studies showed racial and socioeconomic disparities in the use of HV surgery centers for several cancers.[3,11–13] Poor geographic accessibility to HV centers may disproportionately affect vulnerable populations.[13–16]

We used data from the NY State Department of Health to assess minority access to HV centers for cystectomy in the context of increasing regionalization. We hypothesized that regionalization of surgical care for bladder cancer may further exacerbate racial disparities in care, particularly among individuals who are geographically removed from high volume centers.

MATERIALS AND METHODS

We obtained data from the NY State Department of Health SPARCS.[17] SPARCS includes information on all patients discharged from a hospital or emergency room in NY. Data on patient demographics, codes and provider identifiers were obtained. ZIP Code™ data from the 2000 or 2010 United States Census and the 2006 NCHS (National Center for Health Statistics) urban-rural classification scheme were linked to the data set. This study was deemed exempt by the Icahn School of Medicine institutional review board.

From SPARCS we identified all patients with a primary diagnosis of bladder cancer (ICD-9 diagnosis codes 188.X and 236.7) who underwent cystectomy (ICD-9 procedure codes 57.59-57.79 and 68.8) from 1997 to 2011. Patients with unidentifiable data on race, cystectomy provider and residential ZIP Code were excluded from study. We also excluded nonNY State residents since we could not account for the availability of cystectomy providers in local communities. However, data on nonNY residents were included when calculating hospital volume.

Currently there is no consensus on how to define hospital volume thresholds for cystectomy. Hospital volume is generally estimated by grouping patients into quintiles (VLV, LV, medium volume, HV and VHV) based on the number of operations performed at each hospital.[1,3] This methodology is problematic because volume depends on the period examined, a factor that is highly variable across studies due to regionalization.[7,10,18] To mitigate this limitation we measured facility volume in 5-year blocks (1997 to 2001, 2002 to 2006 and 2007 to 2011). Patients in the period with the least regionalization of care (1997 to 2001) were sorted into quintiles by 5-year hospital volume to create thresholds. These cutoffs were carried forward to the subsequent time blocks, thus, allowing us to reclassify hospital volume status in each 5-year period. A similar methodology was applied in prior studies of volume-outcome relationships.[3,15]

Race was assessed as a categorical variable with individuals classified as black or white. We limited analysis to these groups because we had an inadequate sample size of Asian, Indian and Hawaiian patients. We did not address ethnic disparities in this study due to the difficulty of isolating the relative effects of race and ethnicity. Temporal analysis of utilization patterns was done to assess the effects of regionalization on disparities. Other covariates obtained from the registry included patient age, gender, Charlson comorbidity score,[19] admission source (urgent, referral or unknown), payer (Medicare, Medicaid, other, private or uninsured), annual surgeon volume and surgery year. Surgeon volume was included because the surgeon experience level may influence the patient choice of provider independently of facility volume. Census data organized by ZIP Code was used to obtain information on the percent of the population with a college degree, the median household income and the urban/rural designation.

To determine whether geographic access contributed to racial disparities in LV/VLV utilization we calculated the minimum travel distance for each patient to the closest HV/VHV center using a geographic information system (MapPoint® and CDXZipStream™). Patients were sorted into terciles based on the minimum travel distance to a HV/VHV center. Unexpected findings on the relationship between distance and black-white disparities led to post hoc analysis of the racial composition of patient communities.

Although there is no convention to categorize neighborhoods by racial composition, we implemented a condensed stratification scheme reported in the literature.[20,21] ZIP Codes were classified according to the racial group that comprised greater than 50% of the population. ZIP Codes with no dominant racial group were identified as other. Thereafter study patients were classified into groups, including white patients living in white communities, black patients living in white communities, white patients living in other communities, black patients living in other communities, white patients living in black communities and black patients living in black communities. This stratification was done to separate the effects of individual race and neighborhood racial composition on disparities.

The chi-square test was used to assess unadjusted relationships between various exposures and hospital surgical volume. Adjusted analysis was performed with logistic regression to assess the association of race and neighborhood racial composition on LV/VLV hospital use. Variables were added in stepwise fashion, first including patient level descriptors (age, gender, comorbidity score, admission source, payer, annual surgeon volume and surgery year) and then including ecological variables (median income per household, urban/rural status and the percent of the population that was college educated). A random effects model was applied on racial neighborhood analysis to incorporate the data correlation structure. Finally we tested for interactions of race with minimum travel distance to a HV/VHV provider and payer.