ORIGINAL ARTICLE

Reduced Access to Care Resulting From Centers of Excellence Initiatives in Bariatric Surgery

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Objective: To determine the effect on travel distance for Medicare patients before and after Centers for Medicare & Medicaid Services required that bariatric procedures be performed at Centers of Excellence (COEs).

Design: We calculated the distance traveled to our medical center for the 2 years prior (2004-2005) and 2 years after (2006-2007) COE status was required by Medicare. We also compared the proportion of bariatric cases done in large hospitals with those for esophageal and pancreatic resections, procedures whose effects regionalization would have on patient access have been modeled.

Setting: University of Texas Southwestern Medical Center, a high-volume tertiary referral center for bariatric surgery.

Patients: Patients undergoing bariatric procedures.

Main Outcome Measure: Travel distances.

Results: Depending on insurance status, before COEs were required, patients traveled a median of 16 to 25 miles to undergo bariatric operations at University of Texas Southwestern. After COEs were required, the median distance Medicare patients were required to travel increased 76% to 44 miles.

Conclusions: Center of Excellence requirements have increased the travel distance required for Medicare patients. Prior research has shown that outcomes at COEs are no different than those at non-COEs suggesting that the reduced access to care resulting from requiring COE status is not beneficial.

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IT IS THOUGHT THAT SURGICAL OUTcomes are related to the volume of procedures performed per year by a surgeon or at a hospital.[1,2] Low volumes are thought to be related to higher complication and death rates and higher annual volumes associated with better outcomes. Consequently, several policy-generating bodies have recommended limiting the conduct of several technically complex operations to high-volume centers.

See Invited Critique at end of article

This philosophy was adopted by the accrediting bodies for bariatric surgery. Currently, there are 2 organizations that designate bariatric surgery centers as "Centers of Excellence" (COEs). Both of these accrediting bodies require that at least 125 bariatric operations be performed annually to achieve this designation.[3,4] In a prior analysis of this phenomenon, it was predicted that establishment of this volume threshold would adversely affect access to care for patients seeking bariatric surgical operations.[5]

In 2006, Medicare required that hospitals providing bariatric surgery services for its beneficiaries have COE designation.[6] Until recently, no other insurer in our region had this requirement. We tested our prediction that COE designation would make access to care more difficult by analyzing the distance traveled to our facility by patients undergoing bariatric procedures in the 2-year periods before and after Medicare imposed the COE requirement.

METHODS

University of Texas Southwestern (UTSW) Medical Center is a high-volume tertiary referral center for bariatric surgery. We examined hospital billing information for patients undergoing bariatric operations from January 1, 2004, until December 31, 2007. The distance traveled to our medical center for bariatric operations was calculated using Web-based distance calculators (http://www.zip-codes.com/ and SAS zip code algorithms [Cheap Geocoding: SAS/GIS and Free TIGER Data Ed Odom, Darrell Massengill, SAS Institute Inc, Cary, North Carolina]) that determined the distance in miles between the location represented by a patient's home zip code and that of our medical center (75390).

Patients were grouped based on their primary insurance carrier. The median distance was calculated for distances between a patient's home and the medical center as categorized by year and insurance company. Median distance traveled was calculated for each

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Table. Numbers of Patients Undergoing Bariatric Surgery at UTSW for Each Year of the Study and Grouped by Insurer

Year	Blue Cross	Medicare	PPO	Private Pay	HMO	Annual Volume
2004	27	47	57	13	16	**160**
2005	30	60	63	4	15	**172**
2006	73	43	51	13	26	**206**
2007	79	145	63	21	28	**336**
Total/insurer	**209**	**295**	**234**	**51**	**85**	

Abbreviations: HMO, health maintenance organization; PPO, preferred provider organization; UTSW, University of Texas Southwestern.

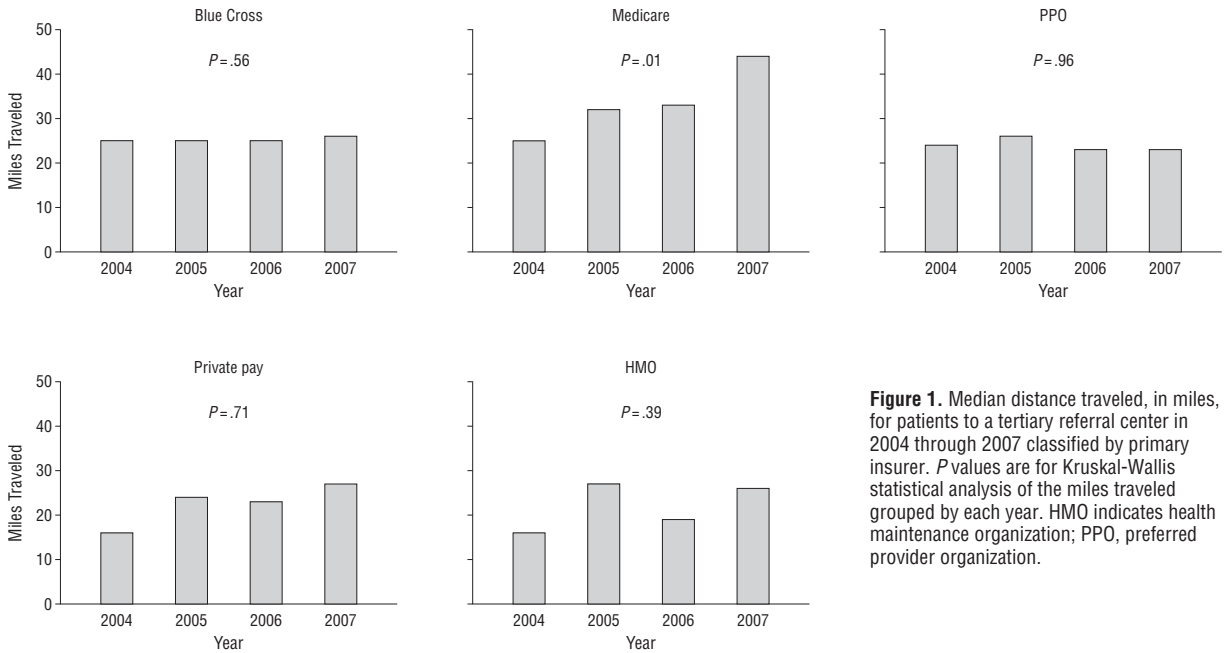

Figure 1. Median distance traveled, in miles, for patients to a tertiary referral center in 2004 through 2007 classified by primary insurer. *P* values are for Kruskal-Wallis statistical analysis of the miles traveled grouped by each year. HMO indicates health maintenance organization; PPO, preferred provider organization.

group and data were presented as bar graphs. Statistical significance of differences between median values for various insurance groups before and after COE status was required by Medicare was determined by the Kruskal-Wallis test.

Maps localizing where Medicare patients live were constructed by creating 2 cohorts for the Medicare group. One cohort was those patients undergoing surgery before COEs were required in 2004 and 2005. The other cohort was patients undergoing surgery at UTSW during 2006 and 2007, after COEs were required for Medicare patients undergoing bariatric surgery. A database was created with the home zip code for each patient undergoing surgery. Maps were drawn using the SAS procedures GPROJECT and GMAP (SAS 9.1; SAS Institute Inc).

Referral patterns for bariatric surgery in the Dallas, Texas, community were tracked via information collected by the Dallas–Fort Worth medical district. Bariatric surgery was identified by having discharge medical records of diagnosis related group = 288 (operating room procedures for obesity) and a primary procedure code of 44.31 (high gastric bypass) or 44.39 (gastrojejunostomy). The distance between their home address zip code and the medical center at which they underwent surgery was calculated. The dates in which each hospital received COE accreditation were obtained from the Centers for Medicare & Medicaid Services Web site (http://www.cms.gov/MedicareApprovedFacilitie/BSF/list.asp). Patients with all insurance types were aggregated into the analytic group because we did not have access to their Medicare status.

All statistical analysis was performed using SAS version 9.1 (SAS Institute Inc). Graphs were made using Sigmaplot version 10 (Systat Software Inc, Richmond, California).

RESULTS

The **Table** summarizes the annual volumes of bariatric operations performed at UTSW between 2004 and 2007. Annual volumes gradually increased until 2006 and then a substantial 1-year increase (63%) in volume occurred in 2007. This increase was attributable to a very large increase in the number of Medicare patients seeking care at our medical center. Between 2006 and 2007, the number of Medicare patients undergoing bariatric surgery at UTSW increased from 43 to 145.

There was substantial heterogeneity of the travel distances to UTSW. For example, distances traveled by Blue Cross patients ranged from 1.8 to 892 miles. The mean (SD) distance was 50.8 (87.1) miles. These numbers are indicative of heavily rightward-skewed data not following the normal distribution. For this reason, statistical comparisons between years of distances traveled were made with nonparametric Kruskal-Wallis tests and the groups were summarized with median rather than mean

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values. Median distances traveled are summarized in **Figure 1**.

The median distance traveled to UTSW for bariatric surgery ranged from 16 to 25 miles in 2004. These distances remained relatively stable through 2007 where they ranged from 23 to 27 miles for the non-Medicare insurance plans. In 2007, the median distance traveled for a Medicare patient to UTSW increased 76% to 44 miles.

Maps demonstrating the locations from where patients traveled from are shown in **Figure 2**. Part A demonstrates the home locations for Medicare patients undergoing bariatric surgery at UTSW in 2004 and 2005, before COEs were required. Most patients came from north Texas, with several coming from southern Oklahoma and 1 from Kansas. After Medicare required COE status for bariatric surgery, the geographic spread of patients coming to UTSW for bariatric surgery increased. Many still came from north Texas and southern Oklahoma but they also traveled from Arkansas, Louisiana, Alabama, and Georgia.

Figure 3 demonstrates the impact COE designation had on 5 Dallas hospitals in the years immediately prior to and after COE status was required for Medicare patients. University of Texas Southwestern is designated as such because it experienced a rise in patient volume and increased distance patients traveled for bariatric care, and it received its COE accreditation in May 2006. Hospital A was accredited as a COE in July 2006 and although their overall patient volume remained constant, there was a substantial increase in the distance that patients traveled for bariatric care. Hospital B was accredited in October 2007. The lack of accreditation was associated with a substantial decrease in patient volume paralleled by reduced distances patients traveled for bariatric surgery. Hospital C received early accreditation (February 2006) but had staffing problems culminating in a large decrease in patient volumes along with reductions in the distances patients traveled for bariatric surgical care. Hospital D was accredited in April 2007 and did not experience a change in volume or distance traveled.

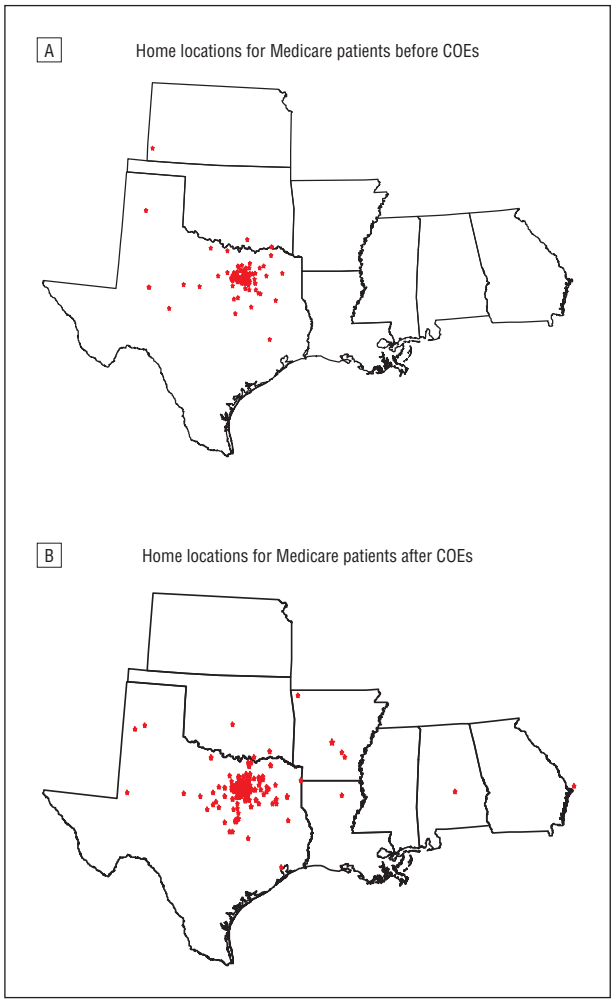

Figure 2. Regional map demonstrating the home location for Medicare patients undergoing bariatric surgery at University of Texas Southwestern before and after Centers of Excellence (COEs) were required. A, 2004 to 2005. B, 2006 to 2007.

COMMENT

We found a dramatic increase (76%) in distance traveled by Medicare patients that followed the Centers for Medicare & Medicaid Services decision to require that Medicare bariatric surgery patients undergo their procedures in COEs. Median travel increased from 25 miles before the COE requirement to 46 miles after. These increases were not observed for patients with other insurance, whose distances were consistent with those Medicare patients had traveled before the COE initiative.

These increased travel distances represent reduced access to care, a problem that is pressing for Medicare patients since they are less mobile and less able than other types of patients to travel to receive medical care.[7] This is very problematic for bariatric surgery patients whose long-term success is linked to the closeness of follow-up. This is especially true for patients undergoing laparoscopic banding operations who require frequent band fills. The operation is known to be very dependent on patients being seen every 4 to 6 weeks for at least 2 years after the operation, an activity unlikely to occur if patients must travel significant distances to their bariatric care center.[8,9] Prior analysis of the impact of the COE initiative also found a disproportionate share of high-risk Medicare patients at COEs. Although that report did not investigate the impact of travel distance, the problems of care coordination for complex patients and limited access to bariatric surgery for Medicare patients was highlighted.[10]

We found a general relationship between early accreditation resulting in increased distances traveled by patients for bariatric surgery in Dallas. The exception to this was 1 facility that was accredited early in the process but had staffing disruptions causing them to lose substantial volume. Two hospitals that waited until 2007 to become accredited experienced little change in distance traveled by their patients, suggesting that the increased travel distances seen in facilities receiving accreditation earlier were attributable to patients traveling long distances to get care. It is possible that the

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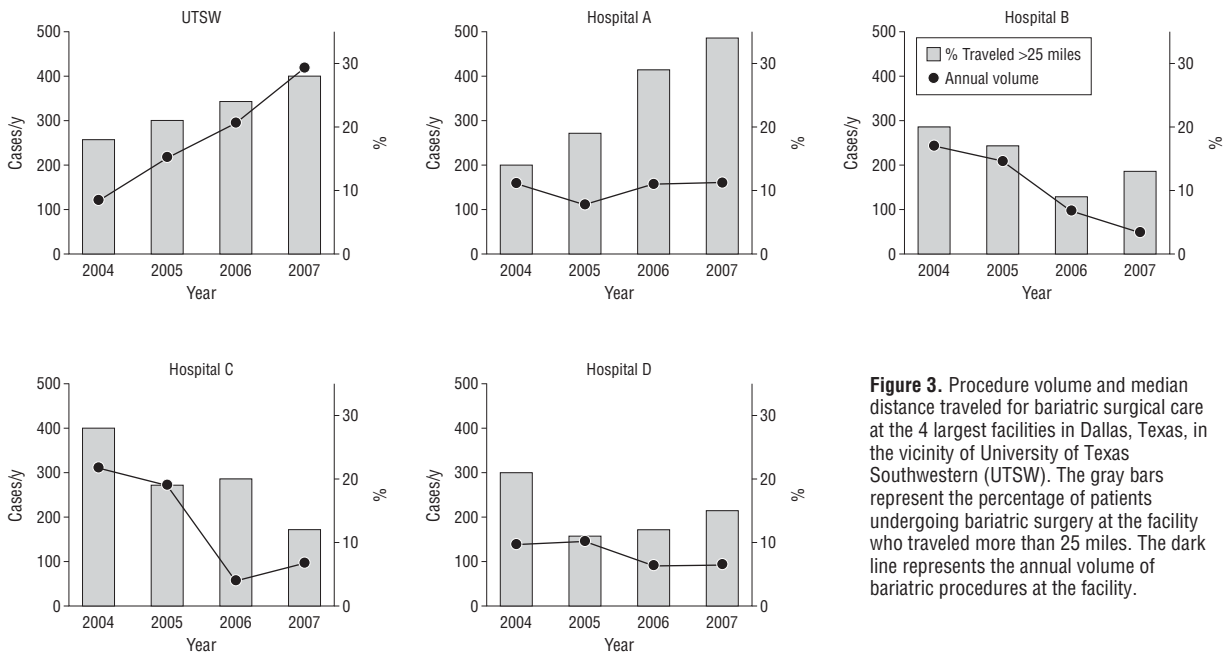

Figure 3. Procedure volume and median distance traveled for bariatric surgical care at the 4 largest facilities in Dallas, Texas, in the vicinity of University of Texas Southwestern (UTSW). The gray bars represent the percentage of patients undergoing bariatric surgery at the facility who traveled more than 25 miles. The dark line represents the annual volume of bariatric procedures at the facility.

changes in referral patterns we observed were due to increased public or referring physician awareness of COE status or in changes in insurance carrier policies that coincided with the Centers for Medicare & Medicaid Services COE requirement. Other potential factors that could explain our findings are the prospect that providers were progressively less willing to accept Medicare insurance or to take on the higher risk that is commonly associated with Medicare patients.

Center of Excellence status by both the American College of Surgeons and Surgical Review Corporation requires that a facility perform in excess of 125 bariatric cases per year.[3,4,11] In a recent analysis of bariatric surgery COEs, the major difference between COEs and non-COEs was the higher procedure volume in the COEs.[12] Despite the higher procedure volume requirements and the rigorous standards imposed on COEs, their outcomes were equivalent to non-COEs. By greatly lengthening travel distances, the COE initiative has reduced access to care for Medicare patients. Taken together, these studies show that access to care has been unnecessarily reduced without any measurable improvement in quality of care delivered.

One explanation for our results is that we service the greater north Texas region. Outside of Dallas, communities are mostly rural with limited access to specialty care. Prior studies of rural health care have shown that patients in rural areas receive less overall health care that is associated with higher mortality.[13] This can be explained in part by longer travel distances to specialized providers for these patients coupled with reluctance to spend large amounts of time seeking specialized health care.[14] In general, these patients rely more on local primary care providers than their urban counterparts.[15] Our observation that travel distances have increased for Medicare patients seeking bariatric surgery as a result of the COE initiative suggests that obese bariatric patients will receive less care than they did before because of barriers imposed by distance and the extra time required to seek care at a remote location. Our observations demonstrate reduced care for obese patients in rural areas at a time when obesity is on the rise. Common sense would dictate that alternate systems for ensuring quality health care can be delivered in rural areas, increasing care access for patients in remote locations.

An explanation for why outcomes were equivalent in COEs and non-COEs is that the relationship between procedure volume and outcomes has been overstated for bariatric surgery.[5] The apparent mortality increase in low-volume centers had shown in volume-outcome studies results from the Poisson and not the normal distribution of these types of data. The confidence intervals are so wide at low-volume centers that the statistical significance for higher mortality at low-volume centers is very difficult to prove. We also demonstrated that regression analytic techniques used to support the volume-outcome relationship are very sensitive to small differences in the different procedure-volume groups. In other words, a less than 0.01% increase in unexpected mortality results in highly significant odds ratios, despite the clinical insignificance of such a small increase in mortality that is attributable to facility procedure volume.

Regionalization has occurred for some procedures by market-based forces. A recent analysis of hepatic resection demonstrated a dramatic increase in the proportion of hepatic resections performed in high-volume hospitals. However, after 2000, there was increasing disparity between population socioeconomic composition between high- and low-volume hospitals,[16] findings that have been observed for treatment of colorectal cancer.[17] Low-volume hospitals have seen a disproportionate

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share of their patients undergoing hepatic resection be older, a minority, or poor or patients with substantial comorbidities. These findings suggest selective recruitment of healthier patients with significant financial resources to high-volume hospitals. Studies of lung resection have shown that minority status alone accounts for selective referral to low-volume hospitals[18] and review of mortality for black patients undergoing cardiac bypass procedures has shown that they are selectively operated on in low-volume hospitals.[19] For the case of market-driven selective referral, sicker, older, minority, or poor patients receive care in low-volume, local facilities. When policies are implemented forcing referral to high-volume facilities, patients must travel great distances, as we have seen with bariatric surgery, or not receive care at all.

Our results are among the first to show reduced access to care resulting from policies that limit surgical care to high-volume facilities. In previous work, we predicted that travel distances might increase if minimum procedure volume standards were set too high.[20] The current study has demonstrated that this prediction was correct and that policy-driven requirements related to minimum procedure volumes increase travel distances and reduce access for vulnerable patient populations.

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INVITED CRITIQUE

Center of Excellence Designation

Pros and Cons

Livingston and Burchell found a 3-fold increase in the number of Medicare patients seeking surgery, and a 14-mile increase in the median distance traveled, following the Medicare national coverage determination in 2006. They conclude that the Medicare COE requirement decreases access to bariatric surgery, without any resulting patient benefit.

Health care accessibility is determined by geographical, financial, cultural, and informational factors. While Livingston and Burchell demonstrate increased median distance traveled, they do not address the time, convenience, or cost of access to care. Financial barriers should not be underestimated, with many bariatric programs forced to limit access to Medicare patients to maintain

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