

ORTHOPAEDIC SURGEONS DO NOT INCREASE SURGICAL VOLUME AFTER INVESTING IN A SPECIALTY HOSPITAL

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Background: The number of surgical specialty hospitals with physician investors in the United States has increased in the last ten years. Opponents to these hospitals have argued that surgeon investors will perform more surgery in order to maintain the hospital's profitability. The purpose of the present study was to determine whether the surgical volume or the surgical rate increased for a group of ten orthopaedic surgeons after the opening of an orthopaedic surgery specialty hospital in which they held a financial interest.

Methods: We analyzed the practice data for ten orthopaedic surgeons during an interval spanning seven years before and eight years after the opening of an orthopaedic surgery specialty hospital in which they held a financial interest. The average rates of change in the number of surgical procedures per year for each period were computed and compared with use of regression analysis. The percentages of patients who underwent surgery before and after the opening of the specialty hospital were also compared.

Results: The ten orthopaedic surgeons did not increase their surgical volume or surgical rate after the specialty hospital opened. The ten surgeons performed an average of 4399 surgical procedures per year before the hospital opened and 4542 surgical procedures per year after the hospital opened. The rate of change in the number of surgical procedures per year (19.1 compared with 8.9 procedures per year) did not increase after the specialty hospital opened. The annual patient volume (16,019 compared with 15,982 patients) and the percentage of patients who underwent surgery (27.5% compared with 28.4%) did not significantly change after the specialty hospital opened.

Conclusions: The opening of an orthopaedic surgery specialty hospital did not increase the surgical volume or the surgical rate for ten orthopaedic surgeons who held a financial interest in the facility.

The number of specialty hospitals in the United States that focus on surgical services has increased substantially in the last ten years^{1,2}. About 70% of these specialty hospitals have surgeon investors who also practice in the facility². The American Hospital Association and several legislators have expressed concerns about this recent trend³⁻⁵. Specifically, they contend that physician investment in certain types of specialty hospitals creates an unfair competitive advantage over full-service hospitals³⁻⁵. In response to these concerns, an amendment to the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 placed a moratorium on the construction of particular types of specialty hospitals and directed various government agencies to study

specialty hospitals that have physician investors⁶.

Several government studies and privately commissioned reports have described various characteristics of full-service and specialty hospitals, such as geographic location, market share, extent of services provided, financial performance, case mix, and quality of care^{1,2,7}. None of those studies investigated whether physician investors changed their practice patterns after the opening of a specialty hospital.

The purpose of the present study was to compare the surgical practices of a group of ten orthopaedic surgeons before and after they invested in a specialty hospital. Our hypothesis was that the amount of surgery performed by these surgeons would have increased after the surgical specialty hospital opened. We also calculated the proportion of surgical procedures that were performed in the specialty hospital and outside of the specialty hospital in order to examine the extent to which the surgeon investors utilized the facility.



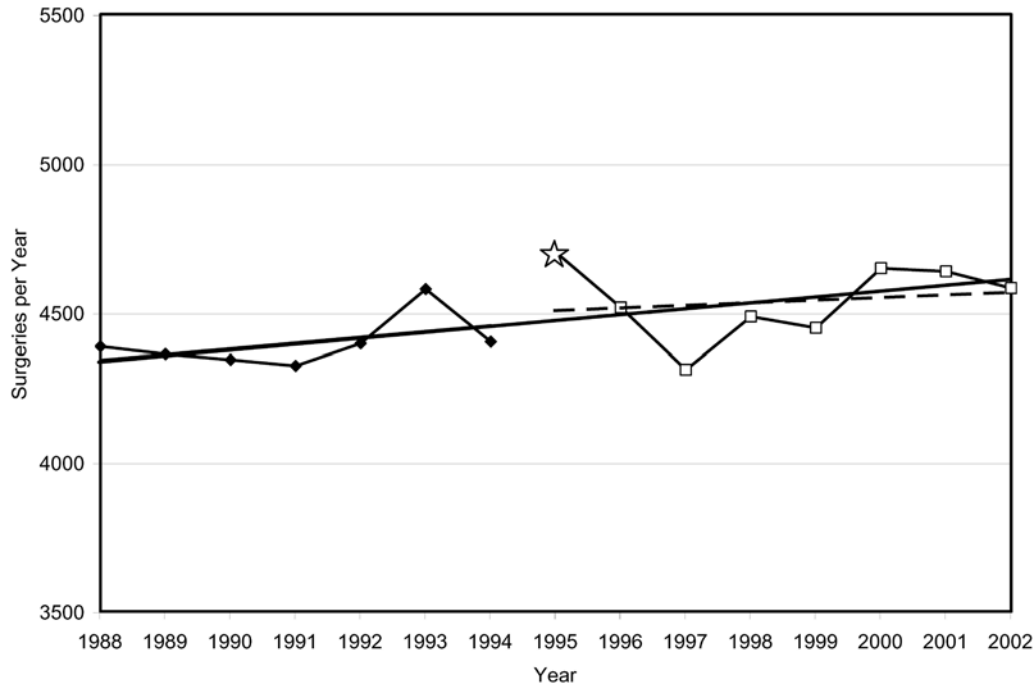


Fig. 1

Graph showing the number of surgical procedures, by year, for ten orthopaedic surgeons who held a financial interest in an orthopaedic surgery specialty hospital. The star represents the year that the specialty hospital opened. The solid line represents the annualized rate of change in the number of surgical procedures per year (growth in surgical volume) before the hospital opened, as extrapolated through the entire study period, and the dashed line represents the annualized rate of change after the hospital opened. These two rates were not significantly different ($p = 0.691$).

Materials and Methods

The practice data for ten orthopaedic surgeons in a single group practice were analyzed. The study period was seven years before and eight years after the opening of an orthopaedic surgery specialty hospital in which the surgeons held a financial interest.

At the beginning of the study period, the ten orthopaedic surgeons had been in practice for an average of 8.4 years (range, one to seventeen years) beyond residency and fellowship training. The ten orthopaedic surgeons held a financial interest in the specialty hospital and had participated in planning and designing the facility. The ten orthopaedic surgeons maintained their clinic in the same building as the specialty hospital, which is located near a large urban medical center in the southern United States.

For each calendar year of the study period, the number of patients who were encountered, the number of surgical procedures that were performed, and the locations at which the surgical procedures were performed were abstracted from archival practice data for each doctor. Surgical procedures were identified with use of Current Procedural Terminology codes ranging from 10000 to 69999. Procedures in this range of Current Procedural Terminology codes that had been per-

formed in the clinic (e.g., joint injections, closed fracture reductions, castings, etc.) were excluded. Only surgical procedures that had been performed in a hospital or surgical center were counted. The location of the surgical procedures after the specialty hospital opened was classified as either in the specialty hospital or outside of the specialty hospital.

Data Analysis

Means and standard deviations were computed for the number of surgical procedures per year. Regression analysis was used to determine the average rates of change in the number of surgical procedures per year. The regression slope coefficients represented the rates of change in the number of surgical procedures per year before and after the specialty hospital opened, or the respective annualized rates of surgical growth. A regression slope coefficient of 0 would be equivalent to no change in surgical volume, a negative slope would be equivalent to a decreasing rate of surgical procedures per year, and a positive slope would be equivalent to an increasing rate of surgical procedures per year. The proportion of all surgical procedures performed by the ten surgeons inside and outside of the specialty hospital after it opened also was computed.

To test our primary research hypothesis, the numbers of

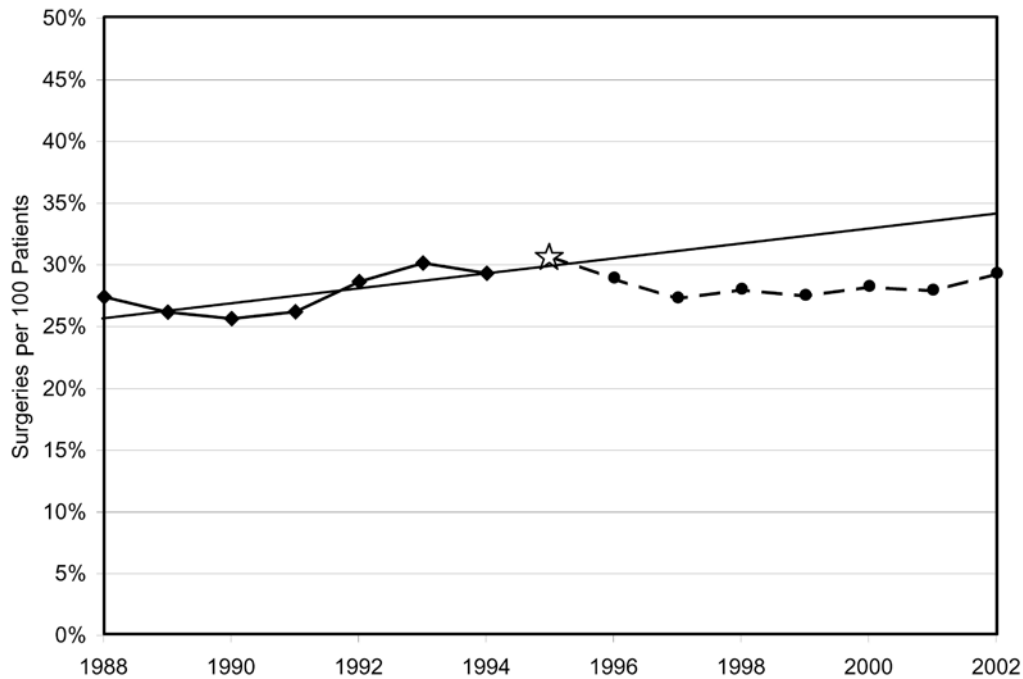


Fig. 2

Graph showing the percentage of patients undergoing surgery, by year, for ten orthopaedic surgeons who held a financial interest in an orthopaedic surgery specialty hospital. The star represents the year that the specialty hospital opened. The solid line represents the annualized rate of change in the percentage of patients undergoing surgery per year before the hospital opened, as extrapolated through the entire study period. The percentage of patients undergoing surgery per year did not change significantly after the specialty hospital opened ($p = 0.705$).

surgical procedures per year before and after the opening of the specialty hospital were compared with use of a paired *t* test. The regression slope coefficients were compared with use of a paired *t* test to determine whether the rate of change in the number of surgical procedures per year had changed after the opening of the specialty hospital. The annual patient volumes before and after the opening of the specialty hospital also were compared with use of a paired *t* test. Finally, the percentages of patients who underwent surgery before and after the opening of the specialty hospital were compared with use of the Friedman test (analysis of variance by ranks); this non-parametric test was used because percentage values cannot be assumed to be normally distributed.

Results

The number of surgical procedures per year ($p = 0.302$), the average rate of change in the number of surgical procedures per year ($p = 0.691$), total patient volume ($p = 0.933$), and the percentage of patients undergoing surgery ($p = 0.705$) did not significantly change after the opening of the specialty hospital.

Surgical Procedures per Year

The opening of the specialty hospital did not have a significant

effect on the average number of surgical procedures per year ($p = 0.302$) (Fig. 1). In the seven years before the specialty hospital opened, the ten orthopaedic surgeons performed an average (and standard deviation) of 4399 ± 84.5 surgical procedures per year. In the eight years after the specialty hospital opened, the surgeons performed an average of 4542 ± 127.6 surgical procedures per year. This difference of 143 surgical procedures per year indicated a 3.3% increase in surgical volume.

Rate of Change in Number of Surgical Procedures per Year

The opening of the specialty hospital did not have a significant effect on the rate of change in the number of surgical procedures per year ($p = 0.691$). Before the surgical hospital opened, the number of surgical procedures for the entire group had been increasing at an average rate of 19.1 surgical procedures per year, equivalent to an average of 1.9 surgical procedures per surgeon per year and indicating an average growth in surgical volume. After the specialty hospital opened, the number of surgical procedures for the entire group increased at an average rate of 8.9 surgical procedures per year, equivalent to an average of 0.9 surgical procedures per surgeon per year. Thus, surgical volume continued to

increase after the specialty hospital opened, but at a slightly lower rate.

The average number of surgical procedures per year as predicted by the surgical growth rate before the specialty hospital opened (4485 procedures) was slightly lower than the actual average number of surgical procedures performed per year after the hospital opened (4542 procedures). The difference of fifty-seven surgical procedures was within the standard error of prediction for the trend (183 surgical procedures), which indicates that there was no significant difference from the predicted value ($p = 0.582$).

Percentage of Patients Undergoing Surgery

The opening of the specialty hospital did not have a significant effect on the percentage of patients undergoing surgery ($p = 0.705$) (Fig. 2). The average number of patients seen per year by the ten orthopaedic surgeons also did not change significantly after the specialty hospital opened (16,019 compared with 15,982 patients per year; $p = 0.933$). In the seven years before the specialty hospital opened, 27.5% of patients underwent surgery. In the eight years after the specialty hospital opened, 28.4% of patients underwent surgery. This increase of 0.9% was equivalent to 1.2 additional patients undergoing surgery per doctor per month.

Proportion of Surgical Procedures Performed in the Specialty Hospital

In the last year of the study period, the ten surgeons performed 91.7% of their surgical procedures at the specialty hospital. Eight of the ten surgeons performed 99.2% (3447) of their 3474 surgical procedures at the specialty hospital that year. The remaining two surgeons accounted for 92.9% of the surgical procedures that were performed outside of the specialty hospital that year. One of these two surgeons performed 33.4% of his surgical procedures at a local full-service hospital in which he had practiced before the specialty hospital opened. This surgeon's practice consisted nearly entirely of joint replacement surgery. Consequently, many of his patients were elderly and had medical problems in addition to degenerative joint disease. These patients usually were receiving care for these medical problems from various physicians who were affiliated with the local full-service hospital. Many of these physicians had referred patients to this orthopaedic surgeon for treatment. This orthopaedic surgeon performed the surgical procedures for the referred patients at the local full-service hospital. The second orthopaedic surgeon performed 31.4% of his surgical procedures at two local full-service hospitals. This surgeon was an orthopaedic consultant for diabetes centers that were located at those full-service hospitals. Because of these relationships, he often provided surgical treatment for patients of the diabetes centers who had musculoskeletal problems related to diabetes. This surgeon performed those surgical procedures at the full-service hospital at which the patient had already been receiving treatment.

Discussion

There are numerous specialty hospitals that provide limited services in one particular branch of medicine. Many of these specialty hospitals are subsidiaries of larger full-service hospitals or belong to large hospital systems. In the last ten years, however, a substantial number of cardiac and orthopaedic surgery specialty hospitals have opened, and most have physician investors who practice at the facility^{1,2}. The American Hospital Association and various legislators have argued that physician investment in cardiac and orthopaedic specialty hospitals constitutes a conflict of interest and provides an unfair competitive advantage over full-service hospitals^{3,5}.

Representatives of the American Hospital Association have alleged that surgeon investors will increase surgical volume and admit only relatively healthy patients who have good health insurance to the specialty hospital, thus ensuring a profit for the hospital and themselves^{4,5,8-10}. According to this argument, the local full-service hospitals would then be caring for a greater number of less healthy and uninsured patients, which would decrease the profitability of those hospitals. This decrease in profitability would cause financial problems for the full-service hospitals since they use the profits from certain services, including orthopaedic surgery, to support other important but less profitable services, such as trauma centers, burn units, and emergency departments⁴.

The ten surgeons in the current study had a financial incentive to increase their surgical volume to support the specialty hospital, but this incentive had a negligible effect on their behavior. The surgical volume and surgical rate essentially did not change after the specialty hospital opened. The small fluctuations in surgical volume can be attributed to factors other than financial incentive, such as continued practice growth, increased operating room time, fewer deferred ("bumped") surgical procedures, and increased efficiency due to highly trained surgical staff and specialized equipment^{8,11-13}.

The surgeons also did not appear to be admitting only their relatively healthy patients who had good health insurance to the specialty hospital. On the contrary, the ten orthopaedic surgeons attempted to perform all of their surgical procedures at the specialty hospital. In the last year of the study period, eight of the ten surgeons performed >99% of their surgical procedures at the specialty hospital. The other two surgeons performed surgical procedures outside of the specialty hospital only when specifically consulted by local full-service hospitals.

The orthopaedic surgeons did not exclude patients who had difficult or challenging medical conditions from the specialty hospital. Their group practice had been in existence for more than twenty years before the specialty hospital opened. Many of their patients were referrals from other orthopaedic surgeons, and many of the referred patients had multiple orthopaedic and medical problems and had undergone multiple surgical procedures. Nearly all of these referred patients were managed at the specialty hospital after it opened.

Another criticism of specialty hospitals with physician investors is that they may only accept insured patients, thereby increasing the burden on local hospitals to care for financially or

medically indigent populations. In the county where the specialty hospital is located, 75% of indigent medical care is provided by two large full-service public hospitals. In addition, the county's nineteen nonprofit hospitals are required to provide charity care equal to at least 4% of their net revenues. The thirty for-profit hospitals in this county are not required to provide any charity care. Thus, by intent, the vast majority of the indigent and charity care in this county is provided by two public hospitals and the nonprofit facilities^{14,15}. The specialty hospital in the current study accepts a small number of charity and indigent cases, although it is not required to do so.

The physicians' group practice and the specialty hospital are Medicare and Medicaid providers. Medicare and Medicaid account for approximately 20% of the gross revenues of the specialty hospital¹⁵. Before the specialty hospital opened, the ten orthopaedic surgeons had been performing surgery in two nonprofit full-service hospitals. The opening of the specialty hospital did not affect the relative amount of Medicare and Medicaid revenues in those facilities. Medicare and Medicaid represented 50% of gross revenues at those two hospitals, both before and after the specialty hospital opened.

An orthopaedic surgery specialty hospital increases the local capacity to deliver orthopaedic care by increasing the available operating room time¹. Ideally, increased capacity matches an increased need for orthopaedic surgery. The need for orthopaedic surgery depends primarily on the size of the local population¹⁶⁻¹⁹.

The average need for orthopaedic surgery in the United States, based on thirty years of data collected by the American Academy of Orthopaedic Surgeons, depends on the ratio of orthopaedic surgeons to the total population, irrespective of geographic region¹⁹. During the fifteen-year period described in the present study, the ratio of orthopaedic surgeons to the total population averaged one surgeon per 16,675 people. This ratio stayed fairly consistent as the number of orthopaedic surgeons grew in proportion to the population. This ratio of surgeons to population equates to an annual rate of approximately 800 orthopaedic surgical procedures per 100,000 people¹⁹.

The population of the metropolitan area in the present study increased from 3.6 million people just before the specialty hospital opened to 4.4 million people in the last year of the study period²⁰. Population growth should have created a need for 6400 additional orthopaedic surgical procedures in the last year of the study period relative to the year before the specialty hospital opened. According to the American Academy of Orthopaedic Surgeons, the typical orthopaedic surgeon performs nine surgical procedures per week and practices forty-seven weeks per year^{21,22}, which amounts to 423 surgical procedures per year. At this rate, population growth alone would have required the equivalent of fifteen additional full-time orthopaedic surgeons to accommodate the need for orthopaedic surgery. The specialty hospital thus did not create excess capacity in the local health-care system, but it did help to meet the increasing need for orthopaedic surgery in a rapidly growing population.

The accuracy of these estimates may be questioned. According to the Texas Department of State Health Services, however, the total number of all surgical procedures per-

formed per year in our region during the study period was highly correlated with the growth of the population ($r = 0.96$); during that time, the total number of all surgical procedures performed in the metropolitan area increased by 22.6% whereas the population increased by 21.4%^{20,23}. Orthopaedic surgical procedures represent a relatively consistent percentage of all surgical procedures performed, averaging about 10% nationally²⁴. Thus, one might reasonably assume that the need for orthopaedic surgery increased proportionately with the population, just as the need for all types of surgery increased.

Some opponents of specialty hospitals also contend that physician investment decreases patient volume and decreases revenues at the local full-service hospitals³⁻⁵. In the eight years since the specialty hospital opened, the two full-service hospitals at which the orthopaedic surgeons had been practicing increased their annual total surgical volume by 9173 surgical procedures²³. During that same period, the hospitals increased the amount of services that they delivered by 81% (as indicated by inflation-corrected gross revenues, the sum of charges for all services rendered)¹⁵. Thus, after the orthopaedic specialty hospital opened, the full-service hospitals dramatically increased the volume of health-care services that they were providing.

With respect to revenues, during the last year of the study period, the two full-service hospitals reported net revenues (realizable collections) of >1.2 billion dollars¹⁴, none of which was subject to taxes. The ratio of net revenue to gross revenue (that is, the ratio of the collectible amount to the total amount charged) for the two full-service hospitals was 41.3% that year. In contrast, the orthopaedic surgery specialty hospital reported net revenues of 56.5 million dollars¹⁴, which, after deduction of business expenses, was subject to taxation. The ratio of net revenue to gross revenue for the specialty hospital was 42.6%, nearly the same as that for the full-service hospitals. The specialty hospital's reported bad debt (1.2% of gross revenues) was essentially equal to the bad debt reported by the two larger, nonprofit, full-service hospitals (1.0% and 1.3% of gross revenues, respectively)¹⁴. If only 10% of the nonprofit full-service hospitals' net revenues had been subject to taxes, those facilities would have paid approximately 42 million dollars in taxes in 2002. Hence, the relative financial benefit of having tax-exempt nonprofit status far exceeded the net profits of the specialty hospital. Direct revenue comparisons between different types of medical facilities should be interpreted with caution. The specialty hospital, however, did not appear to be having any substantial long-term effect on either the delivery of care or revenues at the local full-service hospitals.

According to a study by the United States General Accounting Office, most of the surgical specialty hospitals built since 1990 have opened in densely populated areas that have population growth rates much higher than the national average². The General Accounting Office study also reported that the locations of specialty hospitals do not appear to be related to the number of physicians or hospital services that are otherwise available in the area². The specialty hospital in the current study is located in an area for which the projected ten-year population growth is 23% and in which there currently

are more than fifty hospitals, 11,000 staffed beds, forty-seven ambulatory surgery centers, and more than 250 board-certified orthopaedic surgeons. The General Accounting Office concluded that "specialty hospital location was associated with regulatory and demographic conditions that may facilitate or encourage hospital development."²² In other words, specialty hospitals tend to be built in communities that have a high need for the services that they provide.

Surgical specialty hospitals have several potential advantages. They may provide patients with more efficient services and a higher quality of care than do full-service hospitals^{8,11}. In a privately commissioned report in which several cardiac surgery specialty hospitals were compared with local full-service community hospitals with regard to the same services, the specialty hospitals were shown to be associated with better outcomes while treating patients who had a greater severity of illness⁷. The quality of care increases and the length of stay decreases as the volume of similar surgical procedures increases, thus supporting the concept of a specialty unit or specialty facility^{25,26}. Since opening, the inpatient and outpatient surgical services at the specialty hospital in the current study, on the average, have been rated at or above the ninety-fifth percentile for all indicators of patient satisfaction when compared with acute-care hospitals in the Gallup healthcare database. The latest available twelve-month risk-adjusted complication rate of 4.5% in the specialty hospital compares favorably with

the national average of 4.9% for acute-care hospitals over the same period. Increased efficiency and higher quality of care would, theoretically, lower the per-patient health-care cost.

In conclusion, the average number of surgical procedures per year performed by investing surgeons was not affected by the opening of the specialty hospital. Patient volume and the percentage of patients receiving surgery also were not affected. ■

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