# Contemporary Open and Robotic Radical Prostatectomy Practice Patterns Among Urologists in the United States

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**Purpose:** We describe current trends in robotic and open radical prostatectomy in the United States after examining case logs for American Board of Urology certification.

**Materials and Methods:** American urologists submit case logs for initial board certification and recertification. We analyzed logs from 2004 to 2010 for trends and used logistic regression to assess the impact of urologist age on robotic radical prostatectomy use.

**Results:** A total of 4,709 urologists submitted case logs for certification between 2004 and 2010. Of these logs 3,374 included 1 or more radical prostatectomy cases. Of the urologists 2,413 (72%) reported performing open radical prostatectomy only while 961 (28%) reported 1 or more robotic radical prostatectomies and 308 (9%) reported robotic radical prostatectomy only. During this 7-year period we observed a large increase in the number of urologists who performed robotic radical prostatectomy and a smaller corresponding decrease in those who performed open radical prostatectomy. Only 8% of patients were treated with robotic radical prostatectomy by urologists who were certified in 2004 while 67% underwent that procedure in 2010. Median age of urologists who exclusively performed open radical prostatectomy was 43 years (IQR 38–51) vs 41 (IQR 35–46) for those who performed only robotic radical prostatectomy.

**Conclusions:** While the rate was not as high as the greater than 85% industry estimate, 67% of radical prostatectomies were done robotically among urologists who underwent board certification or recertification in 2010. Total radical prostatectomy volume almost doubled during the study period. These data provide nonindustry based estimates of current radical prostatectomy practice patterns and further our understanding of the evolving surgical treatment of prostate cancer.

**Key Words:** prostate, prostatic neoplasms, prostatectomy, robotics, physician's practice patterns

**Abbreviations and Acronyms**

ABU = American Board of Urology

PC = prostate cancer

RP = radical prostatectomy

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Approximately a third of the more than 200,000 men diagnosed with PC in the United States annually undergo RP.[1,2] For years open RP was the standard surgical management of PC but in the last 5 years robotic RP has become the most common surgical approach to this disease. Data comparing RP techniques are limited but large population based studies show minimal differences in the outcome of robotic vs open RP.[3,4]

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The exact proportion of RPs done using the open or robotic technique is not known. The most commonly reported estimates stem from SEER (Surveillance, Epidemiology and End Results)-Medicare data and are not current.[3,4] In the SEER-Medicare cohort the minimally invasive RP rate increased from 9% in 2003 to 42% in 2006.[3] In 2009 *The New York Times*® reported that 86% of patients in the United States who underwent PC surgery were treated with a robotic procedure.[5] These numbers were based on industry estimates from the only manufacturer of the surgical robot and to our knowledge they were not independently verified. Furthermore, despite growing concerns about overtreatment of low risk PC the number of RPs appears to be increasing. Data from the Nationwide Inpatient Sample indicate that RP hospital discharges increased by 60% from 2005 through 2008.[6]

Little is known about how the diffusion of robotics has influenced urological individual practice patterns. We questioned whether the uptake of robotics has resulted in a larger or smaller proportion of urologists performing RP in the United States and whether surgeon age was associated with the likelihood that a urologist would perform robotic RP. Using ABU data we describe robotic and open RP current practice patterns, focusing on the annual number of RPs and the proportion of urologists performing RP in the United States. We also examined the impact of surgeon age on the likelihood of performing robotic RP. We hypothesized that due to robotic adoption the annual RP volume was increasing but the proportion of urologists performing RP was decreasing. We also hypothesized that older urologists would be less likely to report experience with robotic RP.

## MATERIALS AND METHODS

### Data

We used self-reported operative logs from the ABU, the agency responsible for urology board certification in the United States. The ABU evaluates candidates who are licensed to practice medicine and performs examinations for urological certification, recertification and ongoing maintenance of certification. Candidates for board certification or recertification must submit an operative case log for 6 consecutive months from the 17-month period before the case log due date. A notarized practice log verification statement must be submitted with the final case log. The first and second board recertifications occur 10 and 20 years, respectively, after the original certification and also rely on 6-month practice logs. Urologists who were certified before 1985 are not required to submit case logs for recertification. For this study the ABU provided de-identified case log data on RP that were used in accordance with ABU regulations.

### Cohort

We identified all urologists who applied for original ABU certification, or the first or second board recertification from 2004 through 2010. The procedures recorded in the individual 2004 to 2010 case logs were done from 2003 through 2009. Surgical procedures were identified by Healthcare Common Procedural Coding System codes in physician case logs (55866 for laparoscopic RP, and 55801, 55810, 55812, 55815, 55821, 55831, 55840, 55842 and 55845 for open RP). The robotic RP group includes traditional laparoscopic RP cases.

### Statistical Methods

We used summary statistics to describe current RP practice patterns after stratifying urologists into 3 groups by the types of RP they performed, including 1) open only, 2) robotic only or 3) open and robotic procedures. Since urologists submitting case logs for the initial certification were on average younger (mean age 36 years) than those seeking a first and second recertification (mean ages 44 and 53 years, respectively), we analyzed each certification type separately. Since urologists could have exclusively robotic, exclusively open or a combination of robotic and open experience, we used 2 outcomes, including 1) any robotic RP experience and 2) exclusively robotic RP experience. We created 2 logistic regression models for each outcome. To determine the association with age we plotted the predicted probability of each outcome as a function of age. All statistical analysis was done using STATA® 11.0.

## RESULTS

A total of 4,709 nonpediatric urologists submitted case logs to the ABU for certification or recertification between 2004 and 2010, of whom 3,374 (72%) included at least 1 RP case. Of surgeons performing RPs 961 (28%) reported doing at least 1 robotic RP, including 308 who performed exclusively robotic and 653 who performed open and robotic RP. In contrast, 2,413 surgeons performed exclusively open RP (table 1). Median age was 43 years (IQR 38–51) for surgeons who performed only open RP, which was 2 years greater than the age of surgeons who performed robotic only and open plus robotic RP (41 years, IQR 35–46 and 41, IQR 36–45, respectively). Robotic RP surgeons and those who performed a combination of open and robotic RP had substantially higher annual case volume than surgeons who performed only open RP (median 20, IQR 8–49 and 28, IQR 16–50, respectively, vs 8, IQR 4–16).

Table 2 shows that the number of certifying or recertifying urologists who performed RP increased with time from 427 in 2004 to 500 in 2010. However, this increase appeared to mirror the general increase in the total number of urologists certified since the proportion that performed RP remained relatively consistent across the years. We noted a large increase in the number and proportion of urologists who performed robotic RP and a smaller cor-