Research Correspondence

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# Contemporary trends in the utilisation of radical prostatectomy

Dear Editor,

Standard treatment of localised prostate cancer includes active surveillance (AS), radical prostatectomy (RP), and radiation therapy with or without radiosensitising androgen-deprivation therapy. Although RP had been the most commonly performed treatment since the early 1980s, the landscape has changed significantly in the past 10–15 years. As evidence, 54% of Medicare patients with prostate cancer in 1991 underwent RP, with this fraction dropping to 24% two decades later [1].

Declining surgical utilisation could be attributable to various clinical, policy, and financial influences. First, more pervasive physician ownership of radiation therapy equipment has been shown to bias those practitioners towards more frequent use of highly reimbursing external beam radiation therapy over RP, potentially influenced by the ability to profit financially from self-referral [2]. Second, adoption of the 2012 United States Preventive Services Task Force (USPSTF) recommendation against PSA-based prostate cancer screening for all men has led to a decrease in PSA screening and prostate cancer incidence [3]. Finally, AS has emerged as the preferred treatment approach for low-risk localised prostate cancer, now adopted in as much as 40–50% of low-risk prostate cancer cases in the current decade (compared to historical averages closer to 10%) [4].

Despite these well-documented trends, the actual change in RP utilisation is unknown. As such, we sought to utilise a representative administrative database to determine RP utilisation patterns in recent years, including the period following the 2012 USPSTF recommendation. We hypothesised that a decline in surgical RP volume would be observed.

We queried the Premier Healthcare Database (Premier, Inc., Charlotte, NC, USA), which is a nationally representative database that encompasses ~20% of annual discharges in the USA. From 2009 to 2015, we identified all RP cases based on International Classification of Diseases, 9th Revision, Clinical Modification (ICD9) code 60.5. Robotic procedures were identified via ICD9 modifier 17.4×, CPT code S2900, and a review of hospital billing descriptions. Occurrences of overall RP and robot-assisted RP (RARP) were determined for each quarter of each year. Rates were normalised to population estimates from the 2010 United States Census, with intercensal population estimates used for all non-census years, and reported per 100 000. Hospital-specific weights are applied to project the sample to a national estimate of inpatient discharges. Temporal rate trends were analysed by estimated quarter percentage change (EQPC), which utilises generalised linear regression on the log scale. Stratified analyses were performed in populations aged ≥75 and <75 years; a difference-in-differences analysis was performed between the groups.

During the period of 2009–2015, there was an overall decrease in the overall utilisation of RP (EQPC −1.55%, 95% CI −2.32%, −0.78%; $P < 0.001$), although not for RARP (EQPC −0.66%, 95% CI −1.52%, 0.20%; $P = 0.13$; Fig. 1a). Focusing solely on the 2012–2015 period, we found that overall volume of RP decreased (EQPC −9.01%, 95% CI −10.71%, −7.28%; $P < 0.001$), which was also observed for RARP (EQPC −8.62%, 95% CI −10.46%, −6.75%; $P < 0.001$). In the 2 years preceding the washout period (2009–2010), there was not a significant change in the use of either RP ($P = 0.50$) or RARP ($P = 0.83$). After the 2012 USPSTF recommendation, RP utilisation decreased from 131 to 97 per 100 000 men aged 46–74 years, whilst remaining stable at 21 per 100 000 for men aged ≥75 years. Utilisation of RARP decreased from 97 to 85 per 100 000 men aged 46–74 years and increased from 16 to 18 per 100 000 for men aged ≥75 years (Fig. 1b). This corresponded to significant reductions in overall RP (difference-in-differences = 30; $P < 0.001$) and RARP utilisation (difference-in-differences = 9; $P < 0.001$).

Whilst purely descriptive, these findings may in part be explained by the prominent changes in prostate cancer screening and management that have taken place over the past 5 years. With estimations of over diagnosis ranging from 22% to 67% in the literature, the USPSTF advice against PSA screening in 2012 was largely an attempt to mitigate treatment morbidities for this often indolent malignancy [5]. It was also during this period that AS emerged as a viable initial management strategy for individuals deemed to be at low risk of disease progression, given that there appeared to be no disease-specific survival benefit for definitive therapy in these patients [6]. Additionally, incidence of localised prostate cancer has experienced a coincident decline and there has been a shift migration towards higher burden disease at diagnosis [3].


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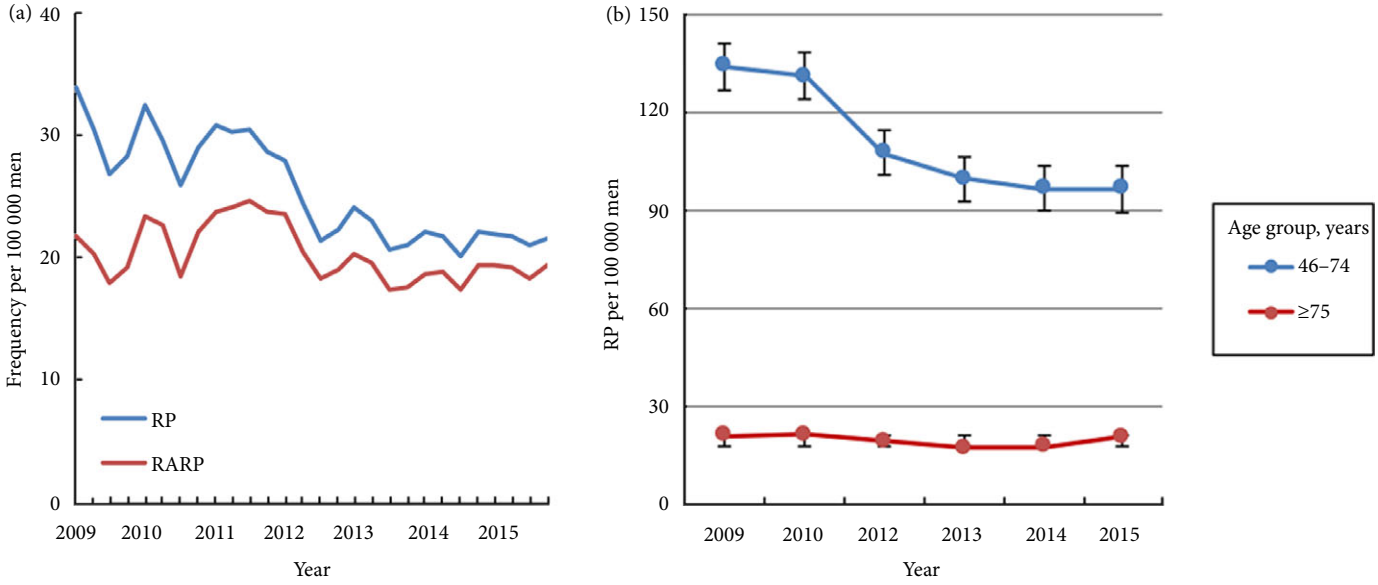
**Fig. 1** Trends in utilisation of RP, 2009–2015. (**a**) Frequency of RP or RARP by year. (**b**) Percentage of population undergoing RP by year, stratified by age group.




Despite overall lower surgical utilisation, there appears to be a lesser magnitude of change following the steep decline seen in 2012. It could be hypothesised that either disease progression or patient preference within the AS population could be somewhat buttressing RP volume, as definitive treatment is no longer as closely tied to initial diagnosis of disease and patients are undergoing surgery in a more delayed fashion. Furthermore, implementation of the Affordable Care Act has resulted in ~20 million Americans gaining insurance coverage and may result in increased access to prostate cancer care. Lastly, while proliferation of robotic consoles is slowing as markets reach a saturation point, it has been shown that ownership of a robotic system is associated with increased utilisation of RARP [7]. Therefore, the preceding decade of more pervasive robot ownership may be yielding a more centralised and stabilised volume of robotic surgery as hospitals are incentivised to amitorise their substantial capital costs ($1.4 million system purchase price and maintenance costs of $140 000/year) across as many patients as possible [8].

Certain limitations prevent fully exploring these possible explanations in the present or other similar databases. First, there is not enough data granularity or comprehensiveness to discern enrolment in AS or progression from AS to definitive management, nor can we stratify on the basis of low- or high-risk disease given that oncological data are not available in the present database. As such, the interplay of RP with AS cannot be more fully explored. Similarly, we do not have full data for the timing of prostate cancer diagnoses or prostate cancer incidence. Referral to competing definitive therapy, i.e. radiation, also cannot be reliably elucidated given that the Premier Healthcare Database does not include outpatient services. The database is also limited in that service utilisation by patients or providers who exit the network of Premier-affiliated institutions is not captured. Lastly, there were no mechanisms to account for new insurance coverage or hospital robot acquisition.

In conclusion, we have shown for the first time that in the aftermath of seemingly powerful influences on RP utilisation in the USA since 2012, volume has declined. Future research is needed to further explain these findings and understand their relationship to evolving approaches to screening and management of low-risk disease.

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## Conflict of Interest

Quoc-Dien Trinh reports consulting fees from Bayer and Astellas Pharma. Adam S. Kibel reports consulting fees from Profound, Janssen, and ConfirmMDx. All other authors have nothing to disclose.

**Tyler R. McClintock*, Ye Wang*†, Alexander P. Cole*, Benjamin I. Chung‡, Adam S. Kibel*, Steven L. Chang*†, and Quoc-Dien Trinh*†**

**Division of Urology, †Center for Surgery and Public Health, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, and ‡Department of Urology, Stanford University Medical Center, Stanford, CA, USA*

## References

1 **Warren JL, Yabroff KR, Meekins A, Topor M, Lamont EB, Brown ML.** Evaluation of trends in the cost of initial cancer treatment. *J Natl Cancer Inst* 2008; 100: 888–97

2 **Mitchell JM.** Urologists' use of intensity-modulated radiation therapy for prostate cancer. *N Engl J Med* 2013; 369: 1629–37

3 **Lee DJ, Mallin K, Graves AJ et al.** Recent changes in prostate cancer screening practices and prostate cancer epidemiology. *J Urol* 2017; 198: 1230–40

4 **Cooperberg MR.** Active surveillance for low-risk prostate cancer-an evolving international standard of care. *JAMA Oncol* 2017; 3: 1398–9

5 **Loeb S, Bjurlin MA, Nicholson J et al.** Overdiagnosis and overtreatment of prostate cancer. *Eur Urol* 2014; 65: 1046–55

6 **Wilt TJ, Brawer MK, Jones KM et al.** Radical prostatectomy versus observation for localized prostate cancer. *N Engl J Med* 2012; 367: 203–13

7 **Makarov DV, James BY, Desai RA, Penson DF, Gross CP.** The association between diffusion of the surgical robot and radical prostatectomy rates. *Med Care* 2011; 49: 333–9

8 **Anderson CB, Penson DF, Ni S, Makarov DV, Barocas DA.** Centralization of radical prostatectomy in the United States. *J Urol* 2013; 189: 500–6

Correspondence: Quoc-Dien Trinh, MD, Brigham and Women's Hospital, 45 Francis Street, Boston, MA 02115, USA.

e-mail: qtrinh@bwh.harvard.edu

Abbreviations: AS, active surveillance; EQPC, estimated quarter percentage change; RARP, robot-assisted radical prostatectomy; RP, radical prostatectomy; USPSTF, United States Preventive Services Task Force.

 