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Platinum Priority – Prostate Cancer

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Temporal Trends and the Impact of Race, Insurance, and Socioeconomic Status in the Management of Localized Prostate Cancer

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Abstract

Background: Numerous management options exist for patients with prostate cancer; however, recent trends and their influencing factors are not well described.

Objective: To describe modern patterns of care and factors associated with management choice using the National Cancer Database.

Design, setting, and participants: Patients with localized prostate cancer diagnosed between 2004 and 2012 were included and grouped according to National Comprehensive Cancer Network guidelines into low, intermediate, or high risk.

Outcome measurements and statistical analysis: Trend analyses and multivariate logistic regression was used to identify factors associated with management.

Results and limitations: There were 598 640 patients who met the study criteria; 36.3% were classified as low risk, 43.8% intermediate risk, and 20.0% high risk. Over the study period, among low-risk patients, observation increased from 9.2% to 21.3%, while radical prostatectomy (RP) increased from 29.5% to 51.1% ($p < 0.001$ for both). In contrast, external beam radiotherapy decreased from 24.3% to 14.5%, while brachytherapy decreased from 31.7% to 11.1%. A similar pattern was seen for patients with intermediate-risk or high-risk disease. Among high-risk patients, RP increased from 25.1% to 43.4% replacing external beam radiotherapy as the dominant therapy. On multivariate analysis, racial minorities, the uninsured, and low-income patients were less likely to receive RP. Low-risk patients in similar subgroups were significantly more likely to be observed. Limitations include potential miscoding or misclassification of variables.

Conclusions: Patterns of care in localized prostate cancer are changing rapidly. While use of observation is increasing in low-risk groups, the use of RP is increasing across all risk groups with a concomitant decline in use of radiotherapy. Socioeconomic factors appear to influence management choice.

Patient summary: In this report we identify a recent significant increase in the use of radical prostatectomy for prostate cancer patients. Socioeconomic factors such as race, insurance type, and income may affect treatments offered to and received by patients.

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1. Introduction

Prostate cancer is the most common cancer in men and the second leading cause of cancer-specific death [1]. The vast majority of men will present with localized disease amenable to surgery or radiation therapy. Many men, however, present with indolent cancers that will not become clinically relevant. While there is evidence to suggest such men can be safely observed, many still receive definitive local treatment in the USA [2,3]. At the same time, many men with more aggressive disease may in fact be undertreated [4,5]. Given the impact of prostate cancer treatment on quality of life and significant differences in the cost of these approaches, a careful understanding of their modern use is vital [6,7].

Previous reports have identified significant variability in patterns of care but are limited by use of databases derived from small subsets of community-based practices or inclusion only of particular patient subsets such as older men [8–10]. Using the National Cancer Database (NCDB), we sought to describe recent temporal trends in the management of localized prostate cancer in the USA and to identify clinical and sociodemographic variables associated with the receipt of particular treatment paradigms.

2. Materials and methods

2.1. Data source

The NCDB captures approximately 70% of all newly diagnosed cancer cases in the USA each year making it the largest and most broadly representative clinical registry currently available for research [11]. Detailed descriptions of data coding methods have been documented previously [12,13].

2.2. Inclusion/exclusion criteria and categorization

Male patients aged 18–90 yr with prostate adenocarcinoma diagnosed between 2004 and 2012 were included. Patients with documented nodal or distant metastatic disease were excluded. Patients with missing information on any available demographic variables were excluded. Patients were categorized into low-, intermediate-, or high-risk prostate cancer based on 2015 National Comprehensive Cancer Network guidelines. Patients missing any variables needed to accurately assign them to a risk group (prostate-specific antigen, T stage, or Gleason score) were excluded.

2.3. Variable definition

Primary treatment was defined as within 1 yr of diagnosis and was categorized as radical prostatectomy (RP), brachytherapy, external beam radiotherapy (EBRT), cryotherapy, primary androgen deprivation therapy (ADT), or observation. Use of ADT along with RP, EBRT, brachytherapy, or cryotherapy was also analyzed and defined as receipt of ADT up to 6 mo before definitive treatment until such treatment began. Patient insurance status was defined as private, uninsured, Medicaid (the US government program for the poor), younger (aged 18–64 yr) Medicare (the US government program for the elderly or disabled), older Medicare (aged 65+ yr), or government (such as the Indian Health Service and Veteran's Health Administration). Comorbidity was measured by modified Charlson-Deyo comorbidity score [14].

2.4. Statistical analysis

Patient demographics and clinical characteristics by risk group were summarized and compared with chi-square tests with a significance level of 0.05 (two-sided). Cochran–Armitage trend tests were conducted to analyze changes in patterns over time. Multivariate logistic regression models were used to identify factors associated with receipt of surgery versus radiotherapy and also receipt of observation versus definitive treatment. Statistical analyses were performed using SAS version 9.4 (SAS, Cary, NC, USA).

3. Results

3.1. Patient characteristics

There were 598 640 patients who met the study criteria with 36.3%, 43.8%, and 20.0% of patients classified as low, intermediate, and high risk, respectively (Table 1). Non-White race was associated with a significantly higher likelihood of presenting with high-risk disease (22.9% of Hispanics, 23.8% of Blacks, and 23.3% of those of other races compared with 19.0% of Whites, all $p < 0.001$). Insurance type was also associated with the likelihood of presenting with high-risk disease (28.3% of the uninsured or those insured by Medicaid compared with 15.6% of those with private insurance, $p < 0.001$).

3.2. Treatment modalities

RP was the dominant treatment modality received by all patients, increasing from 32.2% in 2004 to 52.2% in 2012 ($p_{\text{trend}} < 0.001$). During this time EBRT decreased from 33.3% to 25.0% ($p_{\text{trend}} < 0.001$). The most dramatic change in utilization was seen for brachytherapy which decreased from 20.3% in 2004 to only 7.4% in 2012 ($p_{\text{trend}} < 0.001$). Results are displayed in Figure 1A. When stratified by risk group, receipt of observation and RP increased for low-risk patients between 2004 and 2012, from 9.2% to 21.3% and from 29.5% to 51.1%, respectively (p_{trend} both < 0.001). During the same period, receipt of radiation therapy fell (24.3% to 14.5% for EBRT and 31.7% to 11.1% for brachytherapy, p_{trend} both < 0.001). Management trends stratified by risk group are shown in Figures 1B–D. Figure 2 shows the distribution of management strategies by age group for low-risk patients. Utilization of RP decreased monotonically with age while use of EBRT and brachytherapy increased until falling in those 75 yr or older. Observation also increased with age reaching a maximum of 26.8% in those aged 75 yr and older.

A similar pattern was seen for patients with intermediate-risk disease where receipt of RP increased from 38.5% to 57.3% ($p_{\text{trend}} < 0.001$), while receipt of radiation therapy fell (35.4% to 26.3% for EBRT and 14.5% to 6.5% for brachytherapy, p_{trend} both < 0.001). Rates of observation initially fell in this subgroup but were overall slightly increased (5.3% to 6.9%). For patients with high-risk disease, receipt of RP increased significantly, overtaking EBRT as the most common form of management (25.1% to 43.4%, $p_{\text{trend}} < 0.001$).

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