

Urologist Practice Styles in the Initial Evaluation of Elderly Men With Benign Prostatic Hyperplasia

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OBJECTIVES	To investigate the degree to which expenditures on symptom evaluations vary among urologists and the factors associated with such variation. As the medical and surgical specialists for men with lower urinary tract symptoms (LUTS), urologists provide testing to evaluate symptoms and determine therapy.
METHODS	We developed a cohort of men with an initial urologist visit for benign prostatic hyperplasia (BPH) from a 5% sample of Medicare patients (1999-2007) and established a physician level factor, practice style, as a function of average per patient expenditures. We then determined which AUA BPH guideline elements explained variation in quantity and expenditures for BPH testing, and also examined the impact of patient and physician factors on practice style.
RESULTS	A nearly 15-fold variation in urologists' average per-patient expenditures existed (\$35 to \$527 per month; Median \$92). Practice styles were associated with physician ($P < .01$ all examined variables) and patient ($P < .01$ for comorbidity, race/ethnicity, and socioeconomic status) factors. Guideline recommended care was provided at lower rates by the lowest expenditure urologists compared with middle- to highest-intensity urologists ($P < .01$). Practice style variations were attributable mainly to differences in tests characterized by the guidelines as optional and not-recommended ($P < .01$).
CONCLUSIONS	Expenditures for BPH evaluations vary substantially by geography, practice setting, and experience and are accounted for largely by differences in the use of optional and not-routinely recommended tests. Greater standardization could enhance patient care and reduce health care costs. UROLOGY 77: 535-540, 2011. © 2011 Elsevier Inc. All rights reserved.

For men with lower urinary tract symptoms (LUTS) consistent with benign prostatic hyperplasia (BPH), urologists provide care, including diagnostic testing that is usually not available from a primary care provider. Indeed, urologists provide more testing for BPH evaluation than primary care providers, including imaging, flow rate measurements, and urinary testing.¹ In part, this reflects the urologist's role as the medical and surgical specialist for men with BPH. Urologists often see patients whose symptoms were not adequately controlled by the first line of therapy started by the primary care physician.² Such patients may need more evaluative tests to help better guide their care.

Little is known about how urologists evaluate these men who are new to their practice. Previous work from the Urologic Diseases in America Project showed decreased use of imaging studies in the 1990s in accordance with guideline recommendations.³ Although the overall use of imaging declined, differences in practice styles among urologists were not assessed. Furthermore, contemporary practice patterns among urologists are not known. Such variation is an important topic for study, as the American Urological Association (AUA) has published guidelines encouraging standardization of initial BPH evaluations (Table 1).⁴ With tests for BPH ranging from low cost (eg, PSA) to high cost (eg, urodynamics), urologist practice styles will have significant consequences for the cost of urological care for men with BPH.

In the current study, we used Medicare claims data to investigate the degree to which urologists vary in their practice styles for evaluating men new to their practice with BPH. We examined patient and surgeon factors that could contribute to differences in BPH evaluations. We then assessed which aspects of evaluative care (defined by the AUA BPH guidelines as recommended, optional, and

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Table 1. American Urological Association (AUA) guidelines for benign prostatic hyperplasia (BPH) testing categories

	Name
Recommended care	Urinalysis PSA
Optional care	Urine cytology Uroflow Postvoid residual urine
Not-recommended care for routine BPH patients	Serum creatinine Upper tract imaging Filling CMG Pressure flow urodynamic studies Cystoscopy Prostatic and kidney ultrasound

not recommended for routine patients) drive variation among urologists.

MATERIAL AND METHODS

Study Population

From a 5% random sample of men insured by Medicare between 1999 and 2007, we selected men with International Classification of Disease Ninth Edition (ICD-9) diagnosis codes (Appendix 1) consistent with a BPH diagnosis on outpatient Medicare claims.⁵ More than 95% of Americans over age 65 years use the Medicare program as their primary insurance.⁵ The specialty of the physician billing for the service was determined from the Medicare records, and confirmed with data from the American Medical Association Master file. We then limited the cohort to men whose BPH diagnosis was recorded on an encounter with a urologist. Patients were excluded from the cohort if they lacked continuous enrollment in Medicare parts A and B or if they were enrolled in a Medicare HMO for 2 years before the initial visit with the urologist to 1 year after the visit. The 2-year period was used to confirm that there were no prior visits to a urologist for a non-BPH diagnosis. To make our study cohort most applicable to the average patient presenting to a urologist with LUTS, we also excluded patients with diagnoses suggesting prior surgical BPH therapy, prostate cancer, or neurologic disease that could contribute to LUTS (Appendix 2). Finally, we restricted the cohort to patients seen by urologists who cared for at least 10 new Medicare patients with BPH between 1999 and 2007. Because our database was a 5% Medicare sample this corresponds to at least 200 new Medicare patients per urologist over the 9-year period. These restrictions resulted in a study population of 10 248 patients treated by 748 urologists.

Assignment of Primary Urologist

The primary urologist responsible for the patient's care was determined by assessing the Unique Provider Identification Number (UPIN) for BPH-related care. For most patients, a single urologist provided all the BPH-related care. In cases with multiple urologists, the primary urologist was classified as the urologist who provided the plurality of patient care services.

Characterization of Urologist Practice Style

The practice style of the urologist was defined by the average Medicare expenditures per month for BPH tests and office visits

performed in the first year after an initial visit to a urologist. Using Healthcare Common Procedure Coding System (HCPCS) and ICD-9 codes, we determined the number of tests and office visits provided to each patient. We counted the total number of each type of care, and summed these at the level of the provider. We stopped assessment of care when patients had a billing code consistent with surgical therapy for BPH or 1 year after the initial BPH visit, whichever came first. Using the average national Medicare reimbursement (adjusted to \$2007) for each test, we calculated the total expenditures for each provider. The average monthly provider expenditure was determined by dividing the urologist's total adjusted Medicare expenditures by the total number of months of followup for the urologist's patients. This calculation provided the average Medicare expenditure per month for which the urologist was responsible. Based on monthly expenditures for BPH testing, urologists were split into 5 approximately equally sized groups of providers (quintiles).

Outcomes

Our primary outcome was rates of use BPH testing categorized as recommended, optional, and not-recommended for routine patients in the AUA BPH guidelines.⁶ We then quantified the adjusted expenditures per patient for recommended, optional and not-recommended care. Receipt of this care was based on appropriate Medicare procedure or laboratory codes.

We then explored how practice structure (solo, group, or hospital based), geographic location (census divisions), and experience measured as years in practice (categorized as <15, 15-30, and >30) influence a urologist's practice style. We also assessed the impact of patient factors on urologist practice style. These patient factors included age (67-70, 71-74, 75-78, and 79+), socioeconomic status (zip code level using the methodology of Diez Roux et al.⁶), race/ethnicity (white, black, and other), and comorbidity (Klabunde modification of the Charlson comorbidity index assessed in the 2 years before the urology visit for BPH).⁷

Statistical Analysis

We evaluated differences in physician and patient characteristics across the quintiles of urologist practice style using chi-square tests. Next, using linear regression, we determined the mean number of each type of BPH test by urologist practice style. We also determined the use of BPH tests by guideline category: recommended, optional, and not recommended. We then compared the rates of procedure use across the quintiles of practice style by linear regression. Differences between the physician practice styles were determined with the F-statistic from linear regression.

All analyses were carried out with SAS software (version 9.1 Cary, NC). All statistical tests were two-sided, and the probability of a type I error was set at 0.5. This study was granted letters of exemption by the institutional review boards at each of the author's institutions.

RESULTS

Average per patient expenditures attributable to BPH testing and visits to urologists ranged from \$35 to \$527 per month (Table 2: median \$92, 20th percentile \$72, 40th percentile \$85, 60th percentile \$100, 80th percentile \$123). At the patient level, patient age did not differ

Table 2. Urologists' practice styles

	Quintile 1 (lowest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (highest)	P Value
Average per patient expenditures per month	\$35–US\$71	\$72–US\$84	\$85–US\$99	\$100–US\$122	\$123–US\$527	
Patient level						
Age (y)	%	%	%	%	%	.63
67-70	21.3	19.1	21.9	18.1	19.7	
70-74	18.5	20.1	20.5	20.4	20.6	
75-78	21.0	17.8	20.2	20.5	20.6	
>78	19.5	20.1	19.6	21.4	19.4	
Comorbidity						<.01
0	21.3	19.3	20.6	19.9	19.0	
1	17.7	17.9	20.5	20.8	23.2	
2+	15.3	22.6	20.8	19.7	21.5	
Race/ethnicity						<.01
White	20.5	19.4	20.2	20.5	19.5	
Black	21.0	20.0	24.9	16.4	17.8	
Other	11.2	18.5	24.1	15.7	30.4	
SES						<.01
Lower SES	20.3	21.3	22.2	15.0	21.2	
Middle SES	25.2	20.5	18.9	16.7	18.8	
Upper middle SES	17.0	16.9	21.4	24.7	20.0	
High SES	5.2	22.5	17.3	33.0	22.0	
Urologist level						
Employment						<.01
Solo	18.2	14.0	20.9	23.3	23.6	
Group	21.5	22.2	21.8	18.3	16.2	
Hospital	13.5	13.3	18.7	31.4	23.1	
Census division						<.01
Northeast	10.5	16.6	17.3	36.4	19.2	
Midwest	28.9	21.3	22.9	14.4	12.5	
South	19.5	18.5	20.8	19.4	21.8	
West	17.2	18.5	19.2	19.6	25.5	
Years in practice						<.01
0-15	13.3	20.0	16.5	22.0	28.3	
15-30	20.7	18.3	21.3	21.1	18.6	
>30	22.9	19.7	22.9	17.4	17.1	

($P = .63$), whereas comorbidities, race/ethnicity, and area socioeconomic status varied significantly across the quintiles of urologist practice style ($P < .01$ for each). Patients with high comorbidity burdens were more likely to be treated by urologists with higher expenditure practice styles than were low comorbidity patients ($P < .01$). Black patients and patients with lower socioeconomic status were more likely to be seen by urologists with lower expenditure practice styles than were white patients or those of higher socioeconomic status ($P < .01$).

At the urologist level, practice structure, geographic location, and years in practice were different across the quintiles of practice style. Solo practice and hospital based practice were associated with higher expenditure practice styles. 23.6% of solo urologists were highest quintile and 23.1% of hospital based urologists were highest quintile. This compared with only 16.2% of group practice urologists being in the highest quintile of practice style (overall $P < .01$ for differences among groups). Urologists in the Midwest were more likely to be in the lowest quintile of practice style than urologists in the Northeast and West (28.9% Midwest; 17.2% West;

10.5% Northeast). Urologists in the Northeast were skewed towards the high and highest quintiles of practice style, with 55.6% of urologists falling into these categories ($P < .01$ for the overall differences among the groups). Duration of practice was also related to practice style. Urologists in practice for less than 15 years were more likely to be in the highest quintile of practice style than urologists in practice for longer amounts of time (28.3% compared with 18.6% and 17.1%; overall $P < .01$ for difference among the groups).

By definition, practice styles with higher expenditures were related to increased use of evaluative care tests. However, much variation exists within the categories of care (Figure 1). Although the lowest quintile urologists provided significantly less recommended care (226/100 patients) than highest quintile urologists a plateau of use develops, with middle to highest quintile urologists having similar practice styles (279, 301, and 306 procedures per 100 patients respectively). Among the optional care tests, a more exponential trend of increasing use across the practice styles is seen (47, 68, 81, 100, and 128 per 100 patients for lowest to highest). In contrast, not

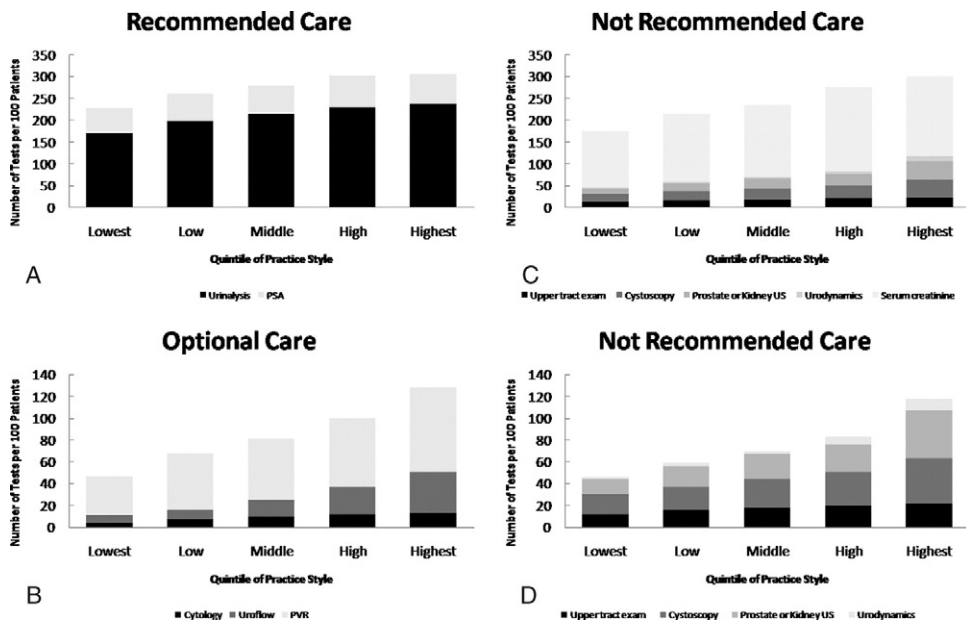


Figure 1. Evaluative care testing across AUA Guideline–recommended levels of care. **(A)** Differences in use of recommended care across quintiles of practice style were largely driven by urinalysis: 171/100 patients lowest, 214/100 patients middle, 237/100 patients highest. **(B)** Cytology use plateaus across urologist quintiles: 4/100 patients lowest, 10/100 patient middle, 13/100 patients highest. Uroflow grows exponentially across the quintiles: 7, 9, 15, 25, and 38 per 100 patients lowest to highest. **(C)** Serum creatinine measurements drive the use of not-recommended care: 129, 155, 164, 192, and 182 per 100 patients lowest to highest quintiles of practice style. **(D)** Use of procedures increases with increasing practice style quintile with the exception of upper tract imaging where a plateau develops (12, 16, 18, 20, 22 procedures per 100 patients lowest to highest quintile).

recommended care follows a roughly linear pattern of increasing use with increasing practice style quintile (175, 213, 233, 274, and 299 per 100 patients for lowest to highest practice style).

When the individual tests making up the categories of care are examined, the patterns of care are shown to be more variable (Figure 1A–D). For recommended care, little difference exists in use of serum PSA testing (56/100 lowest, 65/100 middle, 68/100 highest); the difference in use across quintiles is largely driven by urinalysis (Figure 1A: 171/100 lowest, 214/100 middle, 237/100 highest). For optional care, cytology use plateaus across practice styles (4/100 lowest, 10/100 middle, 13/100 highest), whereas uroflow grows exponentially across the categories (Figure 1B: 7, 9, 15, 25, and 38 per 100 patients lowest to highest). Serum creatinine measurements (Figure 1C) drive not recommended care use among all urologists, with patients seen by urologists in the higher quintiles receiving the most testing (129, 155, 164, 192, and 182 per 100 patients, lowest to highest). In the remainder of not-recommended care, use of testing increases across the quintiles of practice style (Figure 1D), with the exception of upper tract imaging where a plateau develops (12, 16, 18, 20, and 22 procedures per 100 patients lowest to highest practice style).

The impact of infrequently performed, high expense procedures on categorization of urologists into practice style quintiles is shown in Figure 2. Recommended care accounted for little variation among urologists with ad-

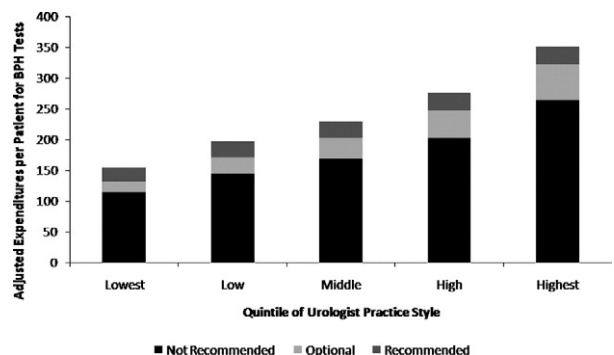


Figure 2. Expenditures per patient across quintiles of urologist practice style. Expenditures ranged from \$155 to \$351 per patient in the lowest and highest practice style urologists respectively. Recommended care expenditures were fairly stable across the quintiles (\$23 lowest to \$29 highest). Optional care expenditures were more than 3 times as high in the high expenditure practice style urologists compared with urologists with low expenditure practice styles (\$18 to \$58). Not-recommended care expenditures were more than 2 times higher in high expenditure practice style urologists compared with low expenditure urologists (\$114 to \$264).

justed Medicare expenditures of \$23 per patient in the lowest quintile urologists compared with \$29 per patient among highest quintile urologists. In contrast, the absolute difference in adjusted optional care expenditures was \$40 (\$18 in lowest quintile vs \$58 in highest). PVR

contributed little to this difference (\$9 vs \$19 lowest to highest), whereas uroflow accounted for the majority of the expenditures (\$5 lowest vs \$26 highest). Not-recommended care had the highest absolute difference in expenditures, from \$114 in the lowest quintile to \$264 in the highest quintile. Of these adjusted expenditures, the commonly performed serum creatinine measurement contributed only \$15 dollars of expenditures per patient in the lowest quintile and \$22 per patient in the highest quintile. Cystoscopy provided the most impact on expenditures with \$44 per patient in the lowest quintile and \$100 per patient in the highest quintile.

COMMENT

The practice styles of urologists treating men in the fee for service Medicare system vary widely. Urologists in solo or hospital practice, in the Northeast and West, and in practice for shorter periods all appear to have practice styles associated with increased Medicare expenditures. These differing practice styles are explained in large part by increased use of BPH testing that the AUA guidelines describes as optional or not-recommended in routine initial evaluation. Within these categories, serum creatinine and PVR appear to be performed the most, but contribute little to the absolute differences in expenditures between urologists with low and high expenditure practice styles. In contrast, uroflow and cystoscopy are performed less frequently, but drive differences in expenditures among urologists.

Our findings reveal a striking lack of agreement among urologists in their approach to men new to their practice with diagnoses consistent with LUTS. These variations exist despite development of consensus panels,⁸ outcome assessments,^{9,10} and practice guidelines.^{4,11} Although the guidelines provide a framework for provision of care, they are the result of consensus more than high level clinical trial evidence.⁴ Although some practice style variation is expected given uncertainties in our evidentiary base, the large variation as we have observed in this study suggests a need for further guidance and/or clinical trials.

Furthermore, our findings suggest that the variations in practice style intensity are not random. In fact, high expenditure practice styles clustered in the Northeast and West, and among urologists with less experience. Additionally, hospital based and solo practitioners also had higher expenditure practice styles. Some of these factors may have been related to patient comorbidities, with higher comorbidity patients being seen by higher intensity practice style urologists. However, the findings suggest practice styles have potential for modification. For instance that younger urologists are using more testing compared with older urologists suggests changes have occurred in training programs. Increased emphasis on clinical guidelines could be incorporated into training, and in so doing the variations in practice style may be reduced.

As the health care system continues to change, value in care will be increasingly emphasized. Large variations

in practice style raise questions about the value of the care being provided by specialists.¹² Although some evaluative tests are necessary for proper patient selection for therapy,¹³ and the AUA guidelines recognize the role for testing in such situations,⁶ other tests are of lesser benefit. Our results suggest, as has been seen in other conditions,^{14,15} that there may be both underuse of recommended care and overuse of optional and not-recommended evaluations. Thus, both the high and low expenditure groups of urologists may be providing less than optimal care for their patients.

Certain characteristics of this study need to be considered while assessing its findings. The study used Medicare billing records to define the guideline recommended care. We were unable to assess use of a few guideline categories, including physical examinations or patient symptom scores from these data. Also, by using the 5% sample of Medicare patients, we were able to only randomly sample 1 in 20 patients seen by a urologist for BPH. This means our results best apply to higher volume urologists who were included in our sample. Furthermore, we do not know the duration of patients' symptoms, prior therapy, or symptom severity before their initial visit with a urologist. However, our study design attempted to limit the impact of these factors by examining care at the surgeon level instead of the patient level. For care to be determined by patient symptoms, and not urologist practice patterns, would require that each quintile of urologists saw a different type of BPH patient. Such a selective referral pattern on a national level is unlikely, although the regional differences we found may be related to referral patterns from primary care physicians to urologists in different regions of the country. We also restricted our cohort to patients who did not have neurologic or cancer diagnoses 2 years before through 1 year after their initial urologist visit, thus limiting possible bias caused by selective referral of complex patients to specialty providers.

CONCLUSIONS

Practice styles for BPH evaluations vary substantially by geography, practice setting, and experience and are accounted for largely by differences in the use of optional and not-routinely recommended tests. Increased emphasis on guidelines in residency training might decrease these variations. Greater standardization could enhance patient care and reduce health care costs.

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APPENDIX

SUPPLEMENTARY DATA

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.urology.2010.07.485](https://doi.org/10.1016/j.urology.2010.07.485).