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Validation of a Visual Prostate Symptom Score in Men With Lower Urinary Tract Symptoms in a Health Safety Net Hospital

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OBJECTIVE To evaluate the correlation between the International Prostate Symptom Score (IPSS) and the Visual Prostate Symptom Score (VPSS), a visual assessment of urinary stream, frequency, nocturia, and quality of life using pictograms, in a health safety net population.

METHODS Men presenting to San Francisco General Hospital with lower urinary tract symptoms completed the IPSS and the VPSS without and then with assistance. Statistical analysis was performed using the chi-square test, the Wilcoxon signed rank test, and the Spearman rank correlation.

RESULTS One hundred twenty-one patients were enrolled between December 2013 and May 2014 with a mean age of 54 years. There were statistically significant correlations between total VPSS and total IPSS ($\rho = 0.71$; $P < .001$) and for frequency ($\rho = 0.47$; $P < .001$), nocturia ($\rho = 0.69$; $P < .001$), force of stream ($\rho = 0.65$; $P < .001$), and quality of life ($\rho = 0.69$; $P < .001$). In addition, there were statistically significant correlations between total VPSS and both VPSS quality of life ($\rho = 0.69$; $P < .001$) and Q_{max} ($\rho = -0.473$; $P = .006$). The mean absolute disagreement for participants who took the IPSS independently vs with assistance was greater than for those who took the VPSS independently vs assistance for all symptoms: frequency (0.64 vs 0.3, respectively; $P < .001$), weak stream (0.82 vs 0.14, respectively; $P < .001$), nocturia (0.38 vs 0.23, respectively; $P = .023$), and quality of life (0.63 vs 0.32, respectively; $P = .005$).

CONCLUSION Many men altered their IPSS responses when they received assistance. There was significantly less alteration in responses using the VPSS, suggesting that the VPSS is useful in determining lower urinary tract symptoms, particularly in patients with limited education and literacy. UROLOGY ■: ■–■, 2015. © 2015 Elsevier Inc.

Benign prostatic hyperplasia is the most common benign neoplasm in American men and affects almost 75% of men in their seventh decade of life, increasing to 83% of men during their eighth decade.[1,2] Benign prostatic obstruction can lead to lower urinary tract symptoms (LUTS), costing $1.1 billion in direct costs in 2000 and 8 million visits to physician offices for a primary or secondary diagnosis of benign prostatic hyperplasia.[1]

The International Prostate Symptom Score (IPSS) is a widely used validated questionnaire to assess LUTS in men with urinary complaints.[3,4] The IPSS was designed as a quick self-administered tool to be used in an outpatient clinical setting to help guide treatment decisions and monitor symptoms. It consists of 8 questions, 7 evaluating LUTS and 1 assessing quality of life (QOL; Supplementary Table 1).[5]

Patients with lower educational levels have greater difficulty accurately completing the IPSS. A study performed at Emory University found that for each symptom score question there was an inverse relationship between educational level and symptom misrepresentation.[6] In patients with fewer than 9 years of education, 58% misreported their total score by ≥4 points and 21% misreported it by >10 points.

In conjunction with Dr Groeneveld, van der Walt et al developed a Visual Prostate Symptom Score (VPSS;

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Stellenbosch University), which offers a visual assessment of urinary stream, frequency, nocturia, and QOL using pictograms, each with a corresponding numeric scale, which are totaled to determine symptom severity (Supplementary Fig. 1).[7] They found that the VPSS correlates significantly with the IPSS and can be completed autonomously by a greater proportion of men with limited education. The VPSS may, therefore, be more reliable than IPSS in assessing symptoms and making appropriate and timely treatment decisions in patients with lower education levels. We hypothesize that the VPSS may be more accurate than the IPSS in evaluating LUTS in men with low literacy in a health safety net population. The aim of this study is to assess the accuracy of the VPSS in men in a health safety net population by (1) correlating each IPSS question with the corresponding VPSS question and (2) evaluating the error in self-administered responses to each question.

METHODS

Study Population

This prospective study enrolled 121 consecutive English- and/or Spanish-speaking male patients aged >18 years with LUTS from the urology clinic at San Francisco General Hospital. San Francisco General Hospital is an urban tertiary-care county hospital serving a large health safety net population. Exclusion criteria included patients who did not understand either English or Spanish and patients with psychiatric or mental impairment who were unable to answer questions coherently.

Study Instrument

Dr van der Walt et al (Stellenbosch University and Tygerberg Hospital, Western Cape, South Africa) and Dr Groeneveld (Mbabane Hospital, Mbabane, Swaziland) developed the VPSS, which is a simplified assessment of daytime frequency, nocturia, force of stream, and QOL using pictograms with a corresponding numeric scale (Stellenbosch University; Supplementary Fig. 1).[7]

Study Design

The Institutional Review Board of the University of California, San Francisco, approved this study. Informed consent was obtained from all patients before assessment. Participants filled out a background questionnaire regarding their education level, ethnicity, literacy, income, housing status, and employment status. At a single visit, the participants were asked to self-administer first the IPSS and then the VPSS. The IPSS and VPSS were then readministered sequentially with the assistance of a health care professional who was trained to help explain questions in a standardized fashion. This interviewer-assisted score served as standard against which the original patient-administered score was measured.

Statistical Analysis

Frequency analysis and descriptive statistics were performed to examine the distribution of demographic characteristics. Statistical analysis was performed using chi-square for contingency table analysis; the Wilcoxon signed rank test was used to assess whether mean disagreements between self-reported and assisted IPSS and VPSS scores were statistically significantly different by education category as these data were found to be nonparametric, and the Spearman rank correlation was used for correlation analysis. A P value <.05 was deemed statistically significant. All statistical analysis was performed using STATA version 13.1 (StataCorp, College Station, TX).

RESULTS

A total of 121 men (mean age, 54 years; range, 20-82 years) were evaluated between December 2013 and May 2014. Stratified by education, 4 completed ≤grade 8, 30 completed grades 9-12, and 82 completed more than grade 12 (5 did not report education level). Seventy-five percent of the patients had an annual household income <25,000 US dollars yearly with 70% unemployed and 21% homeless. Of men enrolled, 43% self-identified as white, 23% as Hispanic, 16% as black, 13% as Asian, and 6% as multiple or other races. Men with education >grade 12 were more likely able to read (P <.001) and write (P <.001) in English. Income, unemployment, and homelessness were not statistically significantly different by education level (Table 1).

There were statistically significant positive correlations between total VPSS and IPSS scores ($\rho = 0.71$; 95% confidence interval [CI], 0.61-0.79; P <.001) as well as the individual VPSS and IPSS questions related to urinary frequency ($\rho = 0.47$; 95% CI, 0.32-0.60; P <.001), nocturia ($\rho = 0.69$; 95% CI, 0.59-0.78; P <.001), force of stream ($\rho = 0.65$; 95% CI, 0.53-0.74; P <.001), and QOL ($\rho = 0.73$; 95% CI, 0.63-0.80; P <.001). In addition, there was a statistically significant positive correlation between the total VPSS score and the VPSS QOL ($\rho = 0.69$; 95% CI, 0.58-0.77; P <.001; Table 2, Fig. 1).

There was a greater mean absolute disagreement between IPSS scores when participants took the survey independently vs with assistance compared to those taking the VPSS independently vs with assistance for all symptoms: frequency (0.64 vs 0.30, respectively; P <.001), stream (0.82 vs 0.14, respectively; P <.001), nocturia (0.38 vs 0.23, respectively; $P = .023$), and QOL (0.63 vs 0.32, respectively; $P = .005$). For total scores of comparable symptoms, the mean IPSS error was greater than the mean VPSS error: 1.66 vs 0.60, respectively; P <.001.

The error in self-reported IPSS score was greater than the error in VPSS score for symptoms by education category. For frequency, IPSS error was greater than VPSS error for those completing ≤grade 8 (1.25 vs 0.83; $P = .092$), completing grade 9-12 (0.83 vs 0.17; $P = .001$), and completing grade >12 (0.57 vs 0.24; $P = .005$). For weak stream, error for IPSS vs VPSS was equivalent for those completing ≤grade 8 (0.50), but IPSS error was greater than VPSS for grades 9-12 (0.57 vs 0.10; $P = .033$) and grade >12 (0.90 vs 0.12; P <.001). Similarly for nocturia, errors were equivalent for ≤grade 8 (0.75), but IPSS error was greater than VPSS error for grades 9-12 (0.43 vs 0.23; P =.192) and grade >12 (0.35 vs 0.16; $P = .027$). Errors in QOL for IPSS were greater than VPSS for all grade levels: ≤grade 8 (0.75 vs 0.50;

Table 1. Demographic characteristics of the study population

Patient Characteristics	Total Population (n = 121)	Education* Grade ≤8 (n = 4)	Grade 9-12 (n = 4)	Grade >12 (n = 82)	*P* Value
Age (y), mean (SD)	54.2 (13.1)	49.8 (24.0)	53.6 (14.0)	54.6 (12.3)	.738
Race, n (%)					.047
White	50 (43.1)	0	8 (26.7)	42 (51.2)	
Black	19 (16.4)	1 (25.0)	6 (20.0)	12 (14.6)	
Hispanic	27 (23.3)	3 ('75.0)	11 (36.7)	13 (15.9)	
Asian	13 (11.2)	0	4 (13.3)	9 (11.0)	
Other/unknown	7 (6.0)	0	1 (3.3)	6 (7.3)	
English,† n (%)					
As a primary language	76 (66.1)	1 (1.3)	16 (21.1)	59 (77.6)	.055
Self-reported able to read	107 (93.9)	1 (0.9)	26 (24.3)	80 (74.8)	<.001
Self-reported able to write	105 (5.5)	1 (1.0)	25 (23.8)	79 (75.2)	<.001
Annual household income,‡ (US $), n (%)					.688
<25,000	83 (75.5)	4 (100)	22 (81.5)	57 (72.2)	
25,000-39,999	18 (16.4)	0	4 (14.8)	14 (17.7)	
40,000-49,999	3 (2.7)	0	1 (3.7)	2 (2.5)	
>50,000	6 (5.5)	0	0	6 (7.6)	
Unemployed, n (%)	81 (69.8)	3 (3.7)	24 (29.6)	54 (66.7)	.546
Homeless, n (%)	24 (20.7)	2 (8.3)	4 (16.7)	18 (75.0)	.206

SD, standard deviation
* Five patients did not complete their education information and thus were not included in data analysis.
† One patient did not complete his primary language and 2 did not report ability to read and write English.
‡ Six patients did not disclose annual household income.

Table 2. Correlations between VPSS and IPSS parameters

Parameter	Spearman Correlation (95% CI)	*P* Value
Total scores		
Total VPSS vs Q_{max}*	−0.473 (−0.71 to −0.15)	.006
Total IPSS vs Q_{max}*	−0.452 (−0.69 to −0.12)	.009
Total VPSS vs Q_{ave}*	−0.323 (−0.60 to 0.03)	.071
Total IPSS vs Q_{ave}*	−0.473 (−0.71 to −0.15)	.006
Total VPSS vs Total IPSS†	0.708 (0.61 to 0.79)	<.001
Weak stream		
VPSS Q3 vs IPSS Q5†	0.646 (0.53 to 0.74)	<.001
Frequency		
VPSS Q1 vs IPSS Q2†	0.467 (0.32 to 0.60)	<.001
Nocturia		
VPSS Q2 vs IPSS Q7†	0.694 (0.59 to 0.78)	<.001
QOL		
Total VPSS vs VPSS QOL†	0.687 (0.58 to 0.77)	<.001
Total IPSS vs IPSS QOL†	0.665 (0.55 to 0.75)	<.001
VPSS QOL vs IPSS QOL†	0.728 (0.63 to 0.80)	<.001

CI, confidence interval; IPSS, International Prostate Symptom Score; QOL, quality of life; VPSS, Visual Prostate Symptom Score.
* n = 121.
† n = 32.

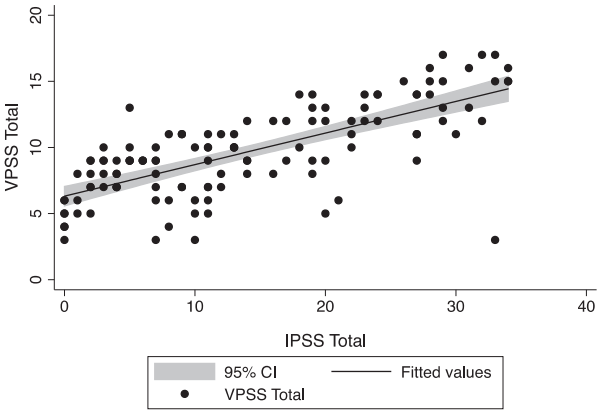

Figure 1. Correlation between total VPSS and total IPSS ($r = +0.708$; $P < .001$). CI, confidence interval; IPSS, International Prostate Symptom Score; VPSS, Visual Prostate Symptom Score.

$P = .564$), grade 9-12 (0.80 vs 0.37; $P < .001$), and grade >12 (0.46 vs 0.26; $P < .001$). Finally, error in total comparable symptom scores was greater for all grade levels: grade ≤8 (1.75 vs 1.50; $P = .564$), grades 9-12 (1.63 vs 0.42; $P < .001$), and grade >12 (1.66 vs 0.60; $P < .001$; Fig. 2).

COMMENT

Patient health literacy has become an area that is receiving increasing focus and concern, as lower levels have been associated with poorer health outcomes. Low literacy plagues at least 90 million Americans.[8-10] DeWalt et al performed a review evaluating the relationship between literacy and health outcomes and found patients with low literacy had poorer health outcomes in terms of multiple disease markers, measures of morbidity, general health status, and use of health resources.[11] They found that patients with low literacy were 1.5 to 3 times more

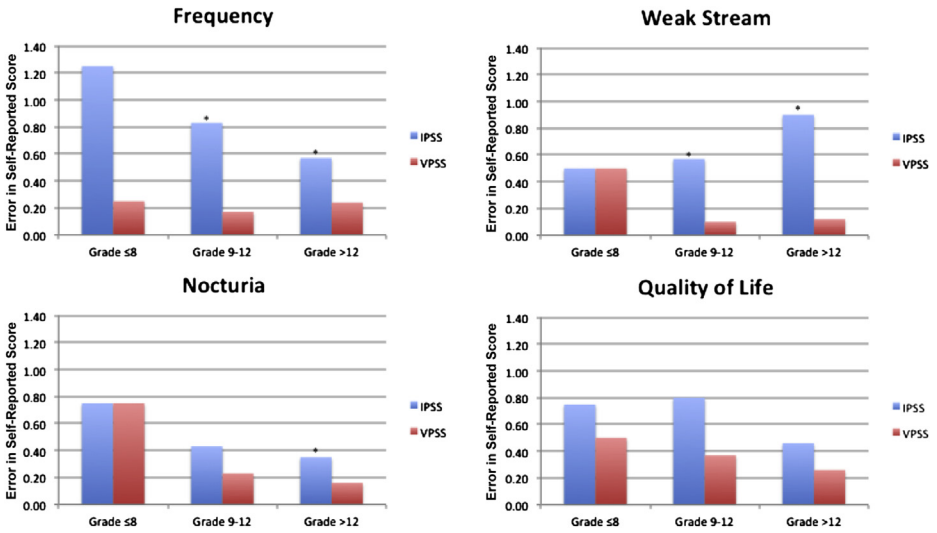

Figure 2. Mean absolute disagreement between self-administered and assisted scores for each symptom by education level. Statistical significance ($P < .05$) between errors in IPSS and VPSS by grade category indicated by *. IPSS, International Prostate Symptom Score; VPSS, Visual Prostate Symptom Score. (Color version available online.)

likely to experience a given poor outcome. Specific to urology, Wolf et al established that men with low literacy were twice as likely to have a PSA level >20 ng/mL at prostate cancer diagnosis.[12]

Regarding LUTS, previous studies have demonstrated that patients with lower literacy and education levels incorrectly self-administer the IPSS, which may negatively affect their quality of care.[2,6,10] Johnson et al[10] demonstrated that of the 7 IPSS index questions, only 38% of patients understood more than half of the questions, 18% understood fewer than half, and 28% understood none of the questions. Furthermore, the agreement between self-administered and interviewer-administered responses decreased with decreasing education level. In a follow-up of this study, Johnson et al[6] found a significantly different mean misrepresentation of the total IPSS score of 2.42 and 5.33 for patients with >12 and <9 years of education, respectively. Johnson et al[2] also found that education level significantly affected understanding of the IPSS in both the county hospital and the university hospital settings. More recently, Master et al[13] found that poor numerical literacy is more prevalent than document literacy and is associated with >3 times increased likelihood of misrepresenting IPSS scores.

As the effect of poor health literacy on health care quality and outcomes is becoming better understood, the screening tools for patients for LUTS should be reflective. However, there is a paucity of literature evaluating new tools. Crawford et al[14] validated a shorter version of the IPSS called the UWIN (urgency, weak stream, incomplete emptying, and nocturia), but it does not address the problem of poor literacy. Ushijima et al[15] evaluated a novel visual analog scale questionnaire to the IPSS in Kyoto Prefectural University of Medicine (Kyoto, Japan). This questionnaire consists of a horizontal line anchored with labels on which the patient is instructed to mark the point along the line corresponding to his level of bother or satisfaction. The investigators found a greater match in the patient's chief complaint with the visual analog scale than with the IPSS (69% vs 58%; $P = .012$). Although promising as an alternative to IPSS that circumvents the issue of poor numeracy, this test still requires a literacy level to read and comprehend the question.

First to do so, van der Walt et al[7] evaluated the correlation between the IPSS and the new VPSS in a tertiary-level, public-sector teaching hospital serving a largely indigent population in South Africa. This group found the VPSS to correlate significantly with the IPSS in total score as well as individual parameters (frequency, nocturia, and weak stream). A significant correlation was found between VPSS, but not IPSS, and peak urinary flow. The study by van der Walt et al also found that the VPSS can be completed without assistance by a significantly greater proportion of men with limited education (82% vs 53%). The VPSS was also correlated with the IPSS by Park and Lee[16] in a Korean hospital, who also readministred the IPSS and VPSS a second time within a 6-month period. They found the change in the total VPSS significantly correlated with the change in total IPSS (correlation coefficient, 0.364) after treatment for LUTS.

Our study shows a significant correlation between VPSS and IPSS in total score as well as individual parameters of frequency, nocturia, urgency, and QOL. Furthermore, we found a lower mean absolute disagreement between responses in self- and assistant-administered questionnaire with VPSS compared to the IPSS for all levels of education suggesting it is appropriate to be used in patients with varied literacy levels. There are several limitations to our study. The IPSS and VPSS have slightly different scales for comparable symptoms. Although the IPSS 0-5 scale and the VPSS 1-6 scale for frequency and nocturia are mathematically equivalent, the IPSS reports weak stream on a 0-5 scale, whereas the

VPSS reports this symptom on a 1-5 scale. This may minimize the significance of the difference in errors between IPSS and VPSS for weak stream, although the trend toward more error in the IPSS vs VPSS is consistent for all compared symptoms.

Our study reflects the population of a single health safety net hospital with the majority of the patients earning <25,000 US dollars yearly and unemployed and is therefore not reflective of the demographics of the larger US population. In addition, the study was limited to men able to speak English and/or Spanish, as these patients compose a large portion of the patients receiving urologic care at San Francisco General Hospital and the IPSS has been validated in both languages. Further studies are required to address the validity of the VPSS in different patient populations. Finally, we used a health professional fluent in both English and Spanish to readminister the questionnaires. The IPSS was designed to be self-administered and the involvement of an interviewer-administrator may have introduced interpretation bias. We attempted to minimize this bias by using the same health professional trained in answering questions in a standardized fashion as the interviewer-administrator. Furthermore, similarly designed studies have found no evidence of interpretation bias with the involvement of an interviewer-administrator.[2,6,10,13]

CONCLUSION

Although the IPSS is a widely used and validated instrument to assess for LUTS, many men altered their responses when they received assistance with the questionnaire. This difference was significantly mitigated with the VPSS. Our findings suggest that VPSS may be more useful in assessing for the presence and severity of LUTS in all patients and particularly in patients with limited education and literacy. Patient comprehension should be kept in mind when developing and evaluating self-assessment tools. Further studies examining and validating patient questionnaires are integral in maximizing health care quality and outcomes in patients with lower education levels and poor literacy.

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APPENDIX

Supplementary Data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.urology.2015.05.012.