VALUE IN HEALTH 17 (2014) 823–829

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jval

Validation of the Patient Perception of Intensity of Urgency Scale in Patients with Lower Urinary Tract Symptoms Associated with Benign Prostatic Hyperplasia

Susan D. Mathias, MPH[1,], Ross D. Crosby, PhD[1,2,3], Jameel Nazir, MSc[4], Monique Klaver, PhD[5], Ted Drogendijk, MSc[5], Zalmai Hakimi, PharmD[5], Isaac A. Odeyemi, PhD[4]*

[1]*Health Outcomes Solutions, Winter Park, FL, USA;* [2]*Neuropsychiatric Research Institute, Fargo, ND, USA;* [3]*University of North Dakota School of Medicine and Health Sciences, Grand Forks, ND, USA;* [4]*Astellas Pharma Europe Ltd., Chertsey, UK;* [5]*Astellas Pharma Global Development, Leiden, The Netherlands*

ABSTRACT

Objective: To assess the reliability and validity of scores derived from the Patient Perception of Intensity of Urgency Scale (PPIUS) in patients with lower urinary tract symptoms (LUTS) associated with benign prostatic hyperplasia (BPH). **Methods:** A post hoc analysis of the phase II Solifenacin and Tamsulosin in Males with Lower Urinary Tract Symptoms Associated with Benign Prostatic Hyperplasia trial (NCT00510406), a 12-week clinical trial in men with LUTS associated with BPH, assessed the measurement properties of six PPIUS-derived scores: mean score; maximum urgency score; total urgency and frequency score (TUFS; average sum of urgency scores over 3 days); and numbers of urgency episodes, urgency episodes of grade 3 or 4, and urgency incontinence episodes. Test-retest reliability, presence of floor/ceiling effects, responsiveness to change, known-group validity, and concurrent validity were assessed for each score. **Results:** A total of 901 patients had at least one valid PPIUS assessment after baseline. TUFS demonstrated good test-retest reliability (intraclass correlation coefficient >0.8), discriminated between groups defined based on International Prostate Symptom Score storage score severity (known-groups validity), had high concurrent validity, and had high responsiveness to change (Guyatt's responsiveness statistic 0.88), with an absence of floor or ceiling effects. The psychometric properties of other PPIUS-derived scores were not as consistently robust and showed either low-to-moderate responsiveness, presence of a floor or ceiling effect, or low-to-moderate test-retest reliability. **Conclusions:** This study shows that the PPIUS is reliable and valid in patients with LUTS associated with BPH. TUFS provided the best combination of psychometric properties of the six scores derived from the PPIUS and appeared to be an appropriate measure of urgency and frequency.

Keywords: benign prostatic hyperplasia, lower urinary tract symptoms, Patient Perception of Intensity of Urgency Scale, validation.

Introduction

Lower urinary tract symptoms (LUTS) include storage symptoms, such as increased daytime urinary frequency, nocturia, urinary urgency, and urinary incontinence; voiding symptoms, including weak stream, hesitancy, and terminal dribble; and postmicturition symptoms, which include incomplete bladder emptying and postmicturition dribble [1]. In a large population-based study (Epidemiology of LUTS) conducted in Sweden, the United Kingdom, and the United States, the prevalence of *LUTS*, defined as a symptom frequency of at least "A few times per week," was more than 45% [1]. In men, LUTS are commonly associated with benign prostatic hyperplasia (BPH) [2,3].

Patients are typically in the best position to identify and describe their symptoms; therefore, the prevalence and impact of LUTS are often investigated using information collected directly from patients, through either surveys and questionnaires [4,5] or assessment tools including diaries or logs [6–8]. LUTS have been shown to negatively affect health-related quality of life (QOL) [9–11] because symptoms can cause significant interference with daily activities [12] and are associated with depression [11] and decreased enjoyment of sexual activity [13].

Reliable and valid tools for collecting information and assessing LUTS are essential. The Patient Perception of Intensity of Urgency Scale (PPIUS) is a single-item, patient-reported scale that can be used to assess the intensity of urgency associated with each micturition or incontinence episode (Table 1) [14]. The PPIUS uses information that patients provide regarding the frequency and urgency of micturition and incontinence episodes, and several scores can be derived from it. It was developed on the basis of guidance from the European Medicines Agency and then validated and used in clinical trials of therapies for overactive bladder (OAB), including those of solifenacin and mirabegron [8,14–22]. There are no reports, however, of its measurement properties in men with LUTS associated with BPH. The objective of this study was to assess the reliability and validity of different

* *Address correspondence to:* Susan D. Mathias, Health Outcomes Solutions, PO Box 2343, Winter Park, FL 32790, USA.
E-mail: smathias@healthoutcomessolutions.com.

1098-3015$36.00 – see front matter

http://dx.doi.org/10.1016/j.jval.2014.09.002

Table 1 – PPIUS and derived scores.

Response option	Response label
0	No urgency
1	Mild urgency
2	Moderate urgency
3	Severe urgency
4	Urge incontinence
Derived score	**Description**
Mean urgency score	Average of individual urgency scores over the 3-day micturition diary period
Maximum urgency score	Average of the maximum daily urgency score over the 3-day micturition diary period
Total urgency and frequency score (TUFS)*	Mean of daily totals for all recorded PPIUS urgency gradings (0–4) for each micturition diary day
Mean number of urgency episodes	Average number of instances with a PPIUS score of ≥1
Mean number of episodes of urgency grade 3 or 4	Average number of instances with a PPIUS score of ≥3
Mean number of urgency incontinence episodes	Average number of instances with a PPIUS score of 4

PPIUS, Patient Perception of Intensity of Urgency Scale.
* Previously known as the total urgency score (TUS).

scores derived from the PPIUS in a population of patients with LUTS associated with BPH.

Methods

Study Design

A post hoc analysis of PPIUS data from a phase II, double-blind, parallel-group, placebo-controlled, randomized study to assess the safety and efficacy of combinations of solifenacin and tamsulosin in men with LUTS associated with BPH (the phase II Solifenacin and Tamsulosin in Males with Lower Urinary Tract Symptoms Associated with Benign Prostatic Hyperplasia trial) was conducted. Full methodology, efficacy, and safety data from this trial have been reported previously [23]. Men aged at least 45 years diagnosed as having LUTS associated with BPH for at least 3 months, with a total International Prostate Symptom Score (IPSS) of at least 13 (a cutoff widely used to select patients for clinical trials of therapies for LUTS associated with BPH [23–26]), and a maximum urinary flow rate of 4 to 15 ml/s were eligible to enroll in the study. Patients with significant urinary, cardiovascular, cerebrovascular, renal, or hepatic disease were excluded.

Assessments

Assessments completed by patients enrolled in the study included the PPIUS; the IPSS [24], which, in addition to seven symptom items, contains a single-item assessment of QOL due to urinary symptoms (IPSS QOL); and the single-item Patient Perception of Bladder Condition tool. Each assessment was self-administered by the patient during clinic visits at screening, at the end of a 2-week run-in period (baseline), and at weeks 2, 4, 8, and 12 of treatment or at early termination.

Patients were asked to complete a 3-day micturition diary, in which they recorded all micturition and incontinence episodes, at home, before every visit. For every micturition and incontinence episode during the 3-day period, patients rated the degree of urgency according to the PPIUS, a five-point categorical scale, ranging from "No urgency" (a score of 0) to "Severe urgency" (a score of 3) and "Urgency incontinence" (4). Six scores derived from the PPIUS were evaluated (Table 1). The proportion of responses for each urgency rating was also recorded.

Patients completed the seven-item IPSS [27], developed to diagnose and assess the symptoms of BPH, at every visit. The IPSS was developed by the Measurement Committee of the American Urological Association and is recommended by the World Health Organization for use with patients with LUTS suggestive of BPH. It includes seven questions relating to the frequency of the following symptoms: incomplete bladder emptying, intermittency, weak stream, hesitancy, frequency, urgency, and nocturia. Each question is scored using a range from 0 to 5, where higher scores reflect increased symptom severity. The IPSS storage subscore and individual urgency item score were also calculated in this study. The IPSS also includes a single QOL question regarding how patients perceive their urinary condition, with responses ranging from "Delighted" (0) to "Terrible" (6).

Patients also completed the single-item Patient Perception of Bladder Condition, which asks patients to assess the amount of bother their urinary condition causes, using response options ranging from "Does not cause me any problems at all" (1) to "Causes me many severe problems" (6).

Descriptive Analysis

Patients with valid PPIUS assessments, that is, the PPIUS was completed correctly and PPIUS scores were calculated, at baseline were included in the analysis. Descriptive analysis was used to report demographic characteristics of the cohort including age, height, weight, and body mass index (BMI). Counts and percentages were calculated for race categories, history of smoking, and alcohol use.

Analysis of Measurement Properties

Measurement properties assessed included examination of response characteristics, test-retest reliability, responsiveness, known-groups validity, and concurrent validity. Internal consistency reliability could not be calculated because the PPIUS contains only a single item, and it was not possible to estimate the minimal clinically important difference because there were no anchors to which changes in PPIUS scores could be related. Measurement properties were evaluated for the full sample and for a subgroup of patients who reported substantial storage symptoms at baseline. *Substantial storage symptoms* were defined as having a micturition frequency of at least eight episodes daily and at least two episodes of urgency of grade 3 or 4 on average per day over the 3-day diary period.

To examine the PPIUS response characteristics, the variability in responses, including the number and percentage of patients with the minimum (0) and maximum (4) possible scores, was determined separately for the 3 days of diary ratings before baseline and the end of treatment for all six scores (mean and maximum urgency score, TUFS, and numbers of episodes of urgency [PPIUS grade ≥1], PPIUS grade 3 or 4, and urgency incontinence episodes). In addition, the proportion of responses for each urgency rating was determined separately by visit. Baseline and end-of-treatment visits were selected because these time points correspond to those for establishing efficacy.

Test-retest reliability refers to the extent to which a measure yields the same results in repeated applications in an unchanged population. Test-retest reliability was assessed by calculating intraclass correlation coefficients (ICCs) [28] between daily ratings on the PPIUS for 3 consecutive days before baseline. An ICC of at