

## REVIEW

# Acceptability and perceived value of urodynamics from the patient perspective: A narrative review

Maurizio Serati MD<sup>1</sup>  | Andrea Braga MD<sup>2,3</sup>  | Peter F. W. M Rosier MD<sup>4</sup>  |  
Stefan de Wachter MD<sup>5</sup>  | Alan Uren PhD<sup>6</sup>  | Enrico Finazzi-Agrò MD<sup>7</sup> 

<sup>1</sup>Department of Obstetrics and Gynecology, University of Insubria, Varese, Italy

<sup>2</sup>Faculty of Biomedical Sciences, Università della Svizzera Italiana, Lugano, Switzerland

<sup>3</sup>Department of Obstetrics and Gynaecology, EOC - Beata Vergine Hospital, Mendrisio, Switzerland

<sup>4</sup>Department of Urology, University Medical Center Utrecht, Utrecht, The Netherlands

<sup>5</sup>Department of Urology, Faculty of Medicine and Health Sciences, University of Antwerp, Edegem, Belgium

<sup>6</sup>Bristol Urological Institute, Southmead Hospital, Bristol, UK

<sup>7</sup>Urology Unit, Department of Surgical Sciences, Tor Vergata University Hospital, University of Rome Tor Vergata, Rome, Italy

## Correspondence

Andrea Braga, Department of Obstetrics and Gynaecology, EOC - Beata Vergine Hospital, Via Turconi 23 CP 1652, 6850 Mendrisio, Switzerland.  
Email: [andybraga@libero.it](mailto:andybraga@libero.it) and [andrea.braga@eoc.ch](mailto:andrea.braga@eoc.ch)

## Abstract

**Background:** The value and application of urodynamic evaluation (UDS) have been a controversial topic in recent years. Gaining robust data on the patient viewpoint in this area is important since, even when UDS findings do not change the management plan, the objective diagnostic information gained from UDS may be valued by patients. Moreover, insights from UDS may empower treating physicians to counsel patients more effectively and manage their expectations regarding treatment outcomes.

**Objective:** This expert narrative review aims to analyze the findings of published studies in this area, looking at two topics in turn: (a) the tolerability and acceptability of the UDS procedure itself from the patient perspective and (b) patient perceptions of the clinical value of insights provided by UDS.

**Design, Setting, Participants, and Outcome Measurements:** An evidence assessment was conducted using selected articles from the literature reporting data on patients' perspectives on the tolerability, acceptability, utility, and value of the urodynamic investigation.

**Results and Limitations:** Although pain, discomfort, and infection risks are frequently used as a rationale to skip UDS when initial management fails, there is good evidence that, from the patients' perspective, the procedure is very well tolerated in most cases. There are only a few articles available that assess patient perceptions of the usefulness of UDS, but those that do exist appear to demonstrate that the insights gained from UDS are widely welcomed by patients in the interest of receiving a more tailored and personalized treatment approach.

**Conclusion:** From the patient perspective, UDS appears to be a well-accepted and well-tolerated diagnostic tool in patients with lower urinary tract symptoms, particularly when an appropriate explanation is provided before the examination. Our review also highlights that patients value the objective information provided by UDS and that this outweighs the temporary

invasiveness of the test. This information is particularly relevant in light of the relative lack of evidence in the literature about patient expectations of specialist care in functional urology, which may have hindered progress with quality of care.

**KEYWORDS**

acceptability, lower urinary tract dysfunction, LUTS, patient perception, patient perspective, tolerability, urodynamic

## 1 | INTRODUCTION

Urodynamic testing (UDS) is universally accepted as the gold standard diagnostic tool for patients with signs and symptoms of lower urinary tract dysfunction (LUTD),<sup>1-3</sup> even if it is not always needed before treatment initiation.<sup>4,5</sup> The necessity of UDS for a specific patient or for specific cohorts of patients is usually considered from the clinician's perspective. While the relevance of the patient's perspective on the quality and delivery of healthcare is not in dispute, very few studies in the academic literature have assessed the value of UDS from this viewpoint. No review articles on this topic, whether formal systematic reviews or expert commentaries, are available. All that exists is a collection of separate studies with different designs, patient populations, and objectives. While several of these studies have explored patient satisfaction with UDS, they focused only on the experience of the procedure itself (mainly tolerability), rather than the diagnostic and prognostic insight that UDS provides or the potential influence of these insights on the patient's subsequent engagement with their recommended management plan. Gaining robust data on the patient viewpoint in this area is important. Even when UDS findings do not change the intended management plan, they may help to confirm it, providing objective information that may be valued by patients. Moreover, these insights may enable the treating physician to counsel patients more effectively and manage their expectations about the likely outcome of proposed interventions.

The paucity of studies on the patient perspective of UDS and their heterogeneous methodological designs mean that a formal analytical approach that integrates and distills the available data is not feasible. We have, therefore, produced an expert narrative review on the insights derived from these studies, looking at two topics in turn: (a) the tolerability and acceptability of the UDS procedure from the patient perspective and (b) the perceived value to patients of the information and insight provided by UDS findings.

## 2 | PATIENTS AND METHODS

### 2.1 | Search strategy and study selection

We performed a literature search using Pubmed/Medline and Embase, up to December 31, 2021. The following keywords and medical subject heading (MeSH) terms were used separately and/or in combination for our search: "urodynamics," "patient perception," "tolerability," "acceptability," "embarrassment," "anxiety," "utility," "pain," and "discomfort." All relevant articles were carefully evaluated and their reference lists examined to identify other manuscripts that could be included in this article. Two independent reviewers (Andrea Braga and Maurizio Serati) assessed abstracts and subsequently full-text articles of all potentially eligible studies.

### 2.2 | Inclusion and exclusion criteria

Articles included in our analysis met all the following criteria: (1) Studies evaluating patient perceptions (men, women, and children) of the value of UDS and/or patients' perspectives on the tolerability and acceptability of the urodynamic procedure; (2) randomized clinical trials, prospective controlled studies, prospective cohort studies, or retrospective studies; and (3) articles published in English. Case reports, case series, letters to editors, and abstracts from national and international conferences were excluded from the review.

## 3 | RESULTS AND DISCUSSION

### 3.1 | Patient's perspectives on the tolerability and acceptability of the urodynamic procedure

As an invasive and intimate procedure, UDS may inevitably be associated with some physical and emotional discomfort and with the possibility of

complications. In terms of morbidity, the reported complication rate is variable and heterogeneous. A likely explanation is that this morbidity is largely operator or department-dependent.<sup>6,7</sup> Regarding discomfort, one qualitative study that explored patient satisfaction with UDS reported that patients commonly experience general anxiety in anticipation of the procedure. The authors postulated that fear of the unknown causes this anxiety (Table 1). In addition, the intimate nature of the procedure was associated with embarrassment.<sup>8</sup>

### 3.1.1 | Pain and discomfort

The topic of pain, bother, and physical discomfort during and after UDS has been evaluated in several studies. In 2006, a questionnaire-based study assessed emotional variables in patients undergoing UDS. The authors demonstrated that bother and pain was correlated with age (higher in patients >50 years) and income (lower in case of higher income). However, the study concluded that, overall, UDS was acceptable and well-tolerated, with 85.0% of patients stating that they would be willing to return for further UDS investigation.<sup>20</sup> A limitation of this study could be that it only investigated ambulatory UDS, which may affect generalizability. Patients may report discomfort and pain even a few hours after a UDS procedure although this usually resolves spontaneously. Post-UDS urinary tract infection is a very rare but serious adverse event that may give rise to pain and discomfort sometime after the procedure.<sup>21,22</sup>

The issue of pain during and after UDS has mostly been evaluated in adults. However, two studies focused on the pediatric population. A cross-sectional study of 139 children predominantly with neurogenic LUTD or organic alteration in the urinary tract<sup>9</sup> showed that 41% of these patients expressed discomfort or pain during UDS. However, median patient-perceived pain was a visual analogue scale (VAS) score of 2, corresponding to “hurts a little bit.” Less than a quarter of the children indicated that they had experienced “severe pain” or worse (VAS score  $\geq 6$ ). Another prospective observational study in 76 children who underwent UDS<sup>19</sup> found that UDS in this population was well tolerated overall. All children were able to complete the test with low pain levels throughout. Urethral catheter insertion and electromyography needle insertion, when performed, were the most painful steps.

These observations, combined with results of studies in adults, also highlight the importance of providing appropriate preparation for UDS. It is noteworthy that pre-UDS counseling that is not carefully tailored to individual patients may inadvertently increase the

expected pain score, particularly in men who have previously experienced instrumentation of the urethra.<sup>17</sup>

Although pain, discomfort, and potential risks are frequently cited as a clinician's rationale to skip UDS, the patient perspective suggests these concerns are usually not justified. It would be interesting for future studies to assess whether the occurrence of pain can impact UDS results, potentially causing increased bladder sensation during filling or abnormal voiding, for example.

### 3.1.2 | Anxiety

The level of anxiety before and during UDS was evaluated in four studies. A pre-UDS telephone call did not decrease anxiety compared to standard care; however, the telephone call was associated with higher satisfaction with pre-UDS counseling.<sup>10</sup> The level of UDS-related anxiety has also been reduced through listening to music, preservation of privacy, improved ambience, and confidence in the technical ability of the test provider. Öztürk et al.<sup>11</sup> randomized 62 patients who were due to undergo UDS into two groups: no music (Group 1,  $n = 30$ ) or classical music (Group 2,  $n = 32$ ) during the procedure. VAS was used for self-assessment of discomfort and patient anxiety levels were quantified using the State-Trait Anxiety Inventory and Beck's Anxiety Inventory. The authors found statistically significant differences between the two groups in the mean anxiety score and the VAS rating of discomfort and concluded that listening to music during UDS can reduce both discomfort and anxiety.

Conversely, Solomon and Ridgeway<sup>18</sup> demonstrated in a randomized controlled trial that listening to music before and during the test, or watching an educational video before the test, did not decrease pain or anxiety associated with the test when compared with usual care. These data are supported by another prospective randomized trial,<sup>12</sup> that showed listening to music during UDS did not appear to lower pain and anxiety, nor increase overall satisfaction and willingness to repeat the procedure. The most important aspect in alleviating patients' pain and anxiety was the person actually performing the test, highlighting the importance of having trained and dedicated staff.

### 3.1.3 | Embarrassment

Embarrassment was reported to be a result of the intimate nature of the examination and lack of privacy. Patients found it difficult to pass urine or be examined in front of other people, particularly if they were of the

TABLE 1 Characteristics of the studies on the tolerability and acceptability of the urodynamic procedure

Author	Year	Objective	Patients	Type of study	Results
March-Villalba et al. <sup>9</sup>	2021	To measure the tolerance of UDS in the pediatric patients to analyze which clinical and urodynamic testing-related variables influence pain perception	139	Cross-sectional study	Although 40% of patients expressed discomfort or pain after UDS, it is a well-tolerated test.
Warda et al. <sup>10</sup>	2019	To determine if a telephone call before undergoing UDS would decrease test-related anxiety compared to standard care	52 Study groups and 50 control groups	RCT	The phone call before UDS did not decrease anxiety, but it was associated with higher satisfaction with pre-UDS counseling.
Öztürk et al. <sup>11</sup>	2019	To determine whether listening to music during UDS decreases patient anxiety and pain	32 Study groups and 30 control groups	RCT	Listening to music during UDS reduced patient pain and anxiety.
Khavari et al. <sup>12</sup>	2016	To determine whether listening to music during UDS reduced pain and anxiety	27 Study groups and 24 control groups	RCT	Music during UDS did not appear to lower pain and anxiety. The most important aspect in alleviating patients' pain and anxiety was the person actually performing the testing.
Yeung et al. <sup>13</sup>	2014	To describe symptoms and satisfaction in a cohort of women undergoing these procedures.	100	Prospective study	UDS is well tolerated in women. Younger age, anxiety or depression, and a diagnosis of OAB and PBS may lead to more negative experiences.
Rezvan et al. <sup>14</sup>	2018	To evaluate the hypothesis that an improved ambience can decrease UDS-related embarrassment and anxiety.	30 Study groups and 30 control groups	RCT	Simply dimming the lights and providing music during UDS resulted in a decrease in embarrassment.
Yiou et al. <sup>15</sup>	2015	To evaluate pain and embarrassment associated with invasive UDS and to determine underlying factors.	171	Observational study	UDS is a well-tolerated procedure. Younger patients with a high level of apprehension may experience a high level of pain and embarrassment.
Yokoyama et al. <sup>16</sup>	2005	To determine the tolerability and morbidity rate of multichannel UDS	154	Prospective study	For most patients, UDS were tolerable and acceptable
Greenstein et al. <sup>17</sup>	2005	To evaluate the effect of a routine explanation provided to men on their expectation of pain associated with UDS	63	Prospective study	The routine guidance provided to male patients undergoing UDS enhances their expectations of pain.
Solomon and Ridgeway <sup>18</sup>	2016	To determine if music or watching a preprocedure educational video decreases pain and anxiety in women undergoing UDS compared to usual care.	32 Study groups and 34 study groups, and 32 control groups	RCT	Music and an educational video do not decrease pain or anxiety in subjects undergoing UDS compared to usual care
Finkelstein et al. <sup>19</sup>	2020	To assess if UDS to determine anxiety, distress, and pain in children	76	Prospective study	EMG needle and urethral catheter placement, initial urodynamic testing, and not knowing what to expect were associated with greater pain and distress during pediatric UDS

Abbreviations: EMG, electromyography; OAB, overactive bladder; PBS, painful bladder syndrome; RCT, randomized clinical trial; UDS, urodynamics.

opposite sex, were nonmedical, or if there were more people present than appeared necessary. However, several factors were identified which could improve the experience for patients. These included the interpersonal skills and technical skills of the healthcare professional (s), maintenance of privacy and communication, and provision of information.<sup>8</sup> Another randomized control trial<sup>14</sup> confirmed that simply dimming the lights and playing light instrumental music helped to alleviate embarrassment.

Some studies suggest that female patients tend to experience a significantly higher level of embarrassment while male patients experienced higher degrees of pain.<sup>15,16</sup> In addition, as demonstrated by Yeung et al.,<sup>13</sup> younger patients, those with anxiety or depression, and those diagnosed with OAB, may have a less favorable experience. Overall, however, UDS seems to be well tolerated and well accepted by both men and women with or without neurological dysfunction.

Embarrassment and anxiety are certainly relevant but also modifiable for most patients with adequate information, and empathetic professional management before and during the test.

### 3.2 | Patient perception of the value of urodynamic studies

The second aim of our review is to understand what value patients place on the findings of UDS (Table 2). In functional urology, the literature often unhelpfully equates symptoms or syndromes with underlying dysfunctions and/or conditions. Even international guidelines, such as those of the EAU, sometimes refer to symptoms like urgency as a “diagnosis,” even though several different underlying dysfunctions and patient habits can give rise to what clinicians collate in the term “urgency.” It is well known that LUTD symptoms are not sensitive nor specific to the underlying dysfunction and that relying on symptoms alone as the basis for diagnosis and treatment can be misleading.

Many studies have shown that UDS can highlight the existence of underlying conditions, providing insights that increase the confidence of physicians when recommending management and may also alter initially proposed management strategies.<sup>1</sup>

While the physician's perspective on the necessity of UDS in certain cohorts of patients may vary, there is also a small collection of studies demonstrating that patients place value on UDS. Majumdar et al.<sup>23</sup> published a patient preference study on this topic. They enrolled 309 patients with LUTS who were asked to complete a Kings Health Questionnaire (KHQ) and a 3-day bladder diary.

The patients were then invited to choose between conservative therapy based on symptoms alone, or treatment guided by UDS. If they had no preference, they were randomized to one of these two options. The authors compared the groups in terms of subjective and objective outcomes. Although they did not find statistically significant differences between the KHQ scores pre, and post UDS across the groups, they noted that follow-up attendance rates were significantly better in those who chose to undergo UDS when compared to those who chose conservative treatment based on symptoms alone (83.6% vs. 66.6%).

The authors therefore concluded, that, although UDS did not improve the outcomes of treatment of LUTS in this study, it may be beneficial for patient engagement with a recommended treatment plan and may enhance subsequent adherence. Another relevant finding was the previously unreported high uptake of UDS by women when given the choice of whether to undergo pretreatment UDS or have treatment based on symptoms alone. Indeed, in this study, out of 309 women, 153 (49.4%) preferred to opt for UDS and only 57 (18.4%) opted for symptom-based conservative treatment. Hence, there was a 3:1 patient preference in favor of gaining an objective diagnosis before embarking on treatment.

Selman et al.<sup>24</sup> focusing on male patients with LUTS, reported a similar finding. The authors performed qualitative interviews with patients from the UPSTREAM study and concluded that men with LUTS also prefer to obtain an objective diagnosis of the underlying cause of their symptoms before being treated.<sup>24</sup> In this study, UDS was shown to be acceptable and well tolerated, especially when there is good communication before and during the procedure, privacy is respected, the staff is well trained and results are discussed promptly and in sufficient detail.

Two years later, the UPSTREAM research group published an additional qualitative study of men recruited from 26 English urology departments.<sup>28</sup> Cohort sampling captured demographics, symptom burden, and decision to be treated surgically or nonsurgically in men who had undergone UDS and those who had not. After diagnostic assessments, the men were interviewed either pretreatment or after LUTD surgery. Thematic analysis was conducted and participants' descriptions of how LUTS treatment decisions were made were categorized as patient-led, doctor-led, or shared. No obvious association was detected between the treatment decision-making approach and patient satisfaction with the clinician's role in their decision. Most of the patients were satisfied with the decision, regardless of the type of decision-making approach. UDS evaluation influenced treatment decision-making to various extents. For most

TABLE 2 Characteristics of the studies on patient perception of the value of the urodynamic procedure

Author	Year	Objective	PTS	Type of study	Results
Majumdar et al. <sup>23</sup>	2010	To evaluate whether the treatment based on urodynamics (UDS) leads to better treatment response compared to where the treatment is based on symptoms alone	309	RCT	Follow-up attendance rates were significantly better in those who chose to undergo urodynamics when compared to those who chose conservative treatment (83.6% vs. 66.6%).
Selman et al. <sup>24</sup>	2019	To capture in-depth qualitative evidence regarding attitudes to and experiences of urodynamic testing among men with lower urinary tract symptoms (LUTS) at each end of the clinical pathway.	41	RCT	Male patients with LUTS preferred to obtain a diagnosis of the underlying cause of their symptoms. Therefore, they considered Urodynamics acceptable and generally well tolerated
Serati et al. <sup>25</sup>	2020	To evaluate the objective benefit and subjective patient satisfaction with tailored treatment based on the UDS diagnosis compared to the outcomes of the pharmacological treatment only based on the symptoms.	680	Prospective study	More than 70% of these patients chose to perform a complete UDS and only 19% declined this examination.
Verghese et al. <sup>26</sup>	2018	To establish if the management of women with overactive bladder and patient-reported outcomes differed based on the findings of UDS.	687	Prospective study	Women treated based on UDS diagnosis were associated to greater reductions in symptoms in comparison to women treated only on the basis of symptoms
Brandenburg et al. <sup>27</sup>	2020	To identify the expectations of men with LUTS referred to a urologist and to study the association between those expectations and satisfaction with the care provided	182	Prospective study	Most patients were positive about the urologist performing examinations (90%), providing an explanation about the cause of their symptoms (97%), finding the underlying cause of their symptoms (83%), and collaborating in the forming of a treatment plan (88%)

Abbreviation: RCT, randomized clinical trial.

patients, having insight from UDS was felt to be essential to both their clinician's and their own decision-making process. Even if they themselves had not personally found the insights from UDS to be meaningful, they were reassured that their consultant had been equipped with objective evidence to guide their recommendations.

Two other recently published studies have shown that, among women presenting with overactive bladder syndrome (OAB-s), the majority choose to undergo UDS to better understand the underlying cause of their symptoms before starting treatment. Serati et al.<sup>25</sup> enrolled 680 consecutive women with OAB-s and offered a choice between treatment based purely on symptoms and treatment based on UDS diagnosis. When fully informed about the nature and purpose of the UDS examination, more than 70% of participants chose to undergo a UDS assessment and only 19% declined this. This finding demonstrated that UDS is widely welcomed by patients in the interest of receiving a more informed, rational, and personalized treatment approach. It was also interesting to note that, following treatment, the group who had chosen to undergo UDS expressed a significantly higher satisfaction rate than the non-UDS group.

In the other study on the impact of UDS in women with OAB, Verghese et al.<sup>26</sup> showed that women who received treatment based on UDS diagnosis reported a greater reduction in symptoms than women who received symptom-based treatment alone. The authors speculated that UDS insights conceivably helped women to understand their condition better which, in turn, motivated them to adhere to recommended lifestyle measures and medications.

While these studies focused on patients already in secondary care, a recent prospective cohort study asked adult men with LUTS to complete a questionnaire before their first outpatient appointment with a medical specialist. The aim was to understand attitudes about the need for diagnostic insight and their expectations regarding the specialist's management approach. Most patients expressed an expectation that the urologist would perform diagnostic examinations (90%), provide an explanation of the cause of their symptoms (97%), find the underlying cause of their symptoms (83%), and collaborate with them to formulate a treatment plan (88%).<sup>27</sup> The expectations about undergoing diagnostic tests to clarify the cause of their symptoms were - at this initial stage - much higher than expectations related to management and outcome.

This last study highlights the expectations of patients who have failed first-line, conservative management, and are about to transfer to secondary care. In general, the expectations of patients in this setting are insufficiently

studied, partly because most communication about patients' desires and hopes take place in the primary care setting - where it is rarely properly documented - and partly because the boundary between primary and secondary care varies across healthcare systems.

To gain greater insight and understanding into patient perceptions of UDS - both, in terms of acceptability and tolerability of the procedure and in terms of the value of the information it generates - the International Consultation on Incontinence Questionnaire (ICIQ) group at the Bristol Urological Institute has developed a new patient questionnaire, ICIQ-satisfaction (ICIQ-S)-UDS. It is intended that this questionnaire can be used as a robust qualitative tool both for research purposes and for monitoring routine care within and across centers. Pilot studies with the ICIQ-S-UDS are expected to yield valuable new data, which we hope will shed further light on the themes explored in this article.

## 4 | CONCLUSION

In this article, we have summarized the available evidence on patient perceptions of urodynamic studies. While relatively few studies are available, the current evidence shows that, although anxiety, embarrassment, and discomfort can occur, there are simple ways to reduce these experiences, particularly through optimal staff training. Importantly, most patients with symptoms of LUTD, both female and male, positively welcome an examination that sheds light on the pathophysiology of their condition and informs a more personalized treatment strategy. We conclude also that the paucity of evidence in the literature about patient expectations of specialist care in functional urology may hinder progress in the quality of care and postulate that, in the minds of patients, the value of objective information about their dysfunction outweighs the invasiveness of the procedure.

In our opinion, clinicians should utilize UDS whenever it can improve understanding of the pathophysiology of urinary dysfunction and thereby guide management decision-making. Urodynamics also enables clinicians to provide informed explanations to patients about the underlying cause of their symptoms.<sup>29,30</sup> Unfortunately, over the last 2 years, the use of urodynamics - like other urological and urogynecological interventions - has been dramatically impacted by the COVID-19 pandemic.<sup>31</sup> We anticipate that the absence of urodynamic assessment will have heightened the chances of misdiagnosis and inappropriate management decisions, especially in "complicated patients," a daunting problem that we will have to face in the coming years.

## AUTHOR CONTRIBUTIONS

Protocol/project development, data collection, and manuscript writing: Maurizio Serati. Data collection and manuscript writing: Andrea Braga. Critical revision: Peter F. W. M Rosier. Critical revision: Stefan de Wachter. Critical revision: Alan Uren. Critical revision: Enrico Finazzi-Agrò.

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

Not required.

## ORCID

Maurizio Serati  <http://orcid.org/0000-0002-8534-646X>

Andrea Braga  <http://orcid.org/0000-0002-4877-0640>

Peter F. W. M Rosier  <http://orcid.org/0000-0003-0445-4563>

Stefan de Wachter  <http://orcid.org/0000-0002-6183-9251>

Alan Uren  <http://orcid.org/0000-0001-7486-2322>

Enrico Finazzi-Agrò  <http://orcid.org/0000-0002-0308-8824>

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