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Research Article

Harnessing the ICIQ-SF questionnaire for enhanced diagnosis and management of urinary incontinence in women: a cross-sectional study

Diagnóstico e tratamento da incontinência urinária em mulheres baseado no questionário ICIQ-SF: um estudo transversal

Uso del cuestionario ICIQ-SF para mejorar el diagnóstico y manejo de la incontinencia urinaria en mujeres: un estudio transversal

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Abstract

Introduction: The International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) assesses the impact of urinary incontinence on specific quality-of-life aspects in a straightforward manner. Conversely, the invasive urodynamic study serves as a diagnostic tool for identifying the etiology of urinary incontinence. **Objective:** The aim of this study was to compare the ICIQ-SF questionnaire results with those of the invasive urodynamic study to establish recommendations for clinical conduct. **Methods:** This cross-sectional, descriptive, and quantitative study employed a simple random sampling methodology. It included 189 women with a clinical diagnosis of urinary incontinence who underwent both the invasive urodynamic study and completed the ICIQ-SF questionnaire. The data from the ICIQ-SF and urodynamic studies were compared to develop a treatment recommendation for urinary incontinence in women. **Results:** The analysis revealed a higher proportion of detrusor overactivity in the invasive urodynamic study among participants who reported "It leaks before I get to the bathroom" (59.3%) and "It leaks when I am dressing" (43.2%) in response to Question 6. Furthermore, a significant association was found between stress urinary leakage and responses to Question 6, specifically "It leaks when I cough or sneeze" (79.8%) and "It leaks when I am doing physical activity" (67.2%). The ICIQ-SF responses guided the treatment indications for urinary incontinence, categorized into four groups: A) no leakage (respondents answering "never"), B) urgent leakage (Question 6 responses indicating urinary leakage before reaching the bathroom and while dressing), C) stress leakage (Question 6 responses of urinary leakage when coughing or sneezing, and during physical activity), and D) mixed and/or unclassified urinary leakage (more than two varied responses to Questions 3, 4, and 6, not conforming to the patterns of the previous groups). **Conclusions:** The ICIQ-SF is straightforward to administer and can guide the treatment of urinary incontinence. Meanwhile, the invasive urodynamic study, being invasive, should be reserved for special circumstances. According to the presented recommendations, patients in Group A should be managed by a general practitioner, those in Group B may undergo pharmacological and/or physiotherapy treatment, individuals in Group C may receive physiotherapy and/or surgical treatment, and those in Group D should be evaluated by a specialist and may require the invasive urodynamic study.

Keywords: Urinary incontinence; Questionnaires; Quality of life; Urodynamic.

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Resumo

Introdução: O *International Consultation on Incontinence Questionnaire* (ICIQ-SF) avalia, de forma simples e objetiva, o impacto da incontinência urinária (IU) em aspectos específicos da qualidade de vida. Por sua vez, a Avaliação Urodinâmica (AU) é um exame que possibilita o diagnóstico da etiologia da IU. **Objetivo:** Comparar os resultados do questionário ICIQ-SF com os da AU, a fim de estabelecer recomendações para a conduta clínica. **Métodos:** Trata-se de um estudo transversal, descritivo, quantitativo, com amostragem aleatória simples. Foram incluídas 189 mulheres com diagnóstico clínico de IU que realizaram a AU e responderam ao questionário ICIQ-SF. Os dados obtidos a partir do ICIQ-SF e dos estudos urodinâmicos foram comparados para subsidiar recomendações terapêuticas para a IU em mulheres. **Resultados:** A análise revelou uma maior proporção de atividade detrusora involuntária no estudo urodinâmico entre as participantes que responderam "Vaza antes de eu chegar ao banheiro" (59,3%) e "vaza enquanto estou me vestindo" (43,2%) à Pergunta 6. Além disso, observou-se associação significativa entre incontinência urinária de esforço e as respostas "Vaza quando tusso ou espirro" (79,8%) e "vaza quando estou fazendo atividade física" (67,2%). As respostas ao ICIQ-SF nortearam a indicação terapêutica para a IU, agrupando as participantes em 4 categorias. A) Sem perdas (resposta "nunca"); B) Incontinência Urinária de Urgência (respostas indicando perda urinária antes de chegar ao banheiro e ao se vestir); C) Incontinência Urinaria por Esforço (respostas indicando perda urinária ao tossir, espirrar ou durante atividade física); e D) Incontinência urinária mista e/ou não classificada (mais de duas respostas variadas nas Perguntas 3, 4 e 6, que não se enquadram nos padrões dos grupos anteriores). **Conclusões:** O ICIQ-SF é de fácil aplicação e pode nortear o tratamento da IU, enquanto a AU, por sua vez, deve ser reservada para situações específicas. Segundo as recomendações apresentadas, pacientes do Grupo A podem ser acompanhadas por clínicos gerais; o Grupo B pode receber tratamento farmacológico e/ou fisioterapia; o Grupo C pode ser encaminhado para fisioterapia e/ou tratamento cirúrgico; e o Grupo D deve ser avaliado por especialista, com possível indicação para AU.

Palavras-chave: Incontinência urinária; Questionários; Qualidade de vida; Urodinâmica.

Resumen

Introducción: El cuestionario Internacional de Consulta sobre Incontinencia – Forma Corta (*International Consultation on Incontinence Questionnaire – Short Form* – ICIQ-SF) evalúa de manera sencilla el impacto de la incontinência urinaria (IU) en aspectos específicos de la calidad de vida . A su vez, el estudio urodinámico invasivo (EUI) es uma prueba que permite diagnosticar la etiología de la IU. **Objetivo:** Comparar los resultados del cuestionario ICIQ-SF com los del EUIcon el fin de estabelecer recomendaciones de conducta clínica. **Métodos:** El presente estudio es transversal, descriptivo, cuantitativo, con muestreo aleatorio simples. Se incluyeron 189 mujeres con diagnóstico clínico de IU, que fueron sometidas tanto al EUI como a la aplicación del cuestionario ICIQ-SF. Los datos del ICIQ-SF y del studios urodinámico fueron comparados para desarrollar una propuesta de tratamiento para la IU en mujeres. **Resultados:** El análisis reveló una mayor porporción de actividad detrusora involuntaria en el EUI entre las participantes que indicaron: "Se escapa antes de llegar al baño" (59,3%) y "Se escapa cuando me estoy vestiendo" (43,2%) en la pregunta 6. Además, se encontró una asociación signicativa entre la pédida urinaria por esfuerzo y las respuestas a la misma pregunta, especificamente "Se escapa cuando toso o estornudo" (79,8%) y "Se escapa cuando realizo actividad física" (67,2%). Las respuestas del ICIQ-SF orientaron las indicaciones terapéuticas para la IU, categorizándose en cuatro grupos: A) Sin pérdidas (respuesta "nunca"); B) pérdida por urgencia (respuestas que indican pérdida al toser, estornudar o durante actividad física); C) pérdida por esfuerzo (respuestas que indican pérdida al toser, estornudar o durante actividad física); y D) pérdida urinaria mixta y/o no clasificada (más de 2 respuestas variadas el las preguntas 3,4 y 6, sin ajustarse a los patrones de los grupos anteriores). **Conclusiones:** El ICIQ-SF es de fácil aplicación y puede orientar el tratamento de la IU. El EUI, al ser más complejo, debe reservarse para casos especiales. Según las recomendaciones presentadas, las pacientes del grupo A pueden ser manejadas por atención primaria; las del grupo B pueden beneficiarse de tratamiento farmacológico y/o fisioterapia; las del grupo C, de fisioterapia y/otratamento quirúrgico; y las del grupo D deben ser evaluadas por un especialista y podrían requerir EUI.

Palabras claves: Incontinencia urinaria; Cuestionarios; Calidad de vida; Urodinâmica.

INTRODUCTION

As a result of pregnancies and vaginal deliveries, coupled with the effects of aging and hypoestrogenism, the mechanisms responsible for urinary continence are prone to failure.[1-3] This vulnerability is attributed to the loss of elasticity and atrophy observed in the urethral mucosa and bladder neck. Additionally, the compromised blood supply and collagen deterioration contribute to a diminished muscular response of the urethra to adrenergic stimulation.[4] Furthermore, the detrusor muscle's contraction force during urination may decrease due to cortical aging, further complicating urinary continence.[4]

In this context, urinary incontinence is characterized as any involuntary urine leakage that is clinically observable and constitutes a social or hygienic concern.[5] Its incidence, encompassing both

adults and children, is significant and escalating. Notably, the prevalence of urinary incontinence surges with age, yet it is often mistakenly regarded as a natural aspect of the aging process.[6] Despite this widespread issue, only about 20% of affected women experience symptoms severe enough to prompt them to seek treatment.[7,8]

Urinary incontinence significantly diminishes the quality of life by necessitating the use of absorbent products, increasing the financial burden through medication costs, leading to more frequent urination, causing the characteristic odor of urine on clothing, limiting physical activity, and resulting in urinary leakage during sexual activities.[9] These factors may cause embarrassment and social withdrawal, contributing to psychological, social, and sexual difficulties.[10,11] It is crucial to assess the severity of symptoms in relation to the patient's socioeconomic and cultural background to provide the most effective treatment.[12]

The employment of validated methodologies for comparing characteristics and outcomes among patients with urinary incontinence is of paramount importance. There is a particular need for methods that can accurately assess the severity of urinary incontinence in both epidemiological and clinical contexts.[8]

With this in mind, the International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) serves this purpose by evaluating the severity of urinary incontinence and its impact on daily activities.[13]

The diagnosis of stress urinary incontinence is primarily clinical, following the criteria established by the International Continence Society.[14] However, the differential diagnosis with urgency and mixed urinary incontinence requires a thorough evaluation.[10] This evaluation includes assessing the intensity and frequency of urinary leakage, the necessity for using intimate pads and/or diapers, obstetric history, the presence of genital prolapse, any previous anti-incontinence surgeries, and neurological history.[15] Tools such as the urinary diary[16] play a crucial role in enhancing self-awareness regarding daily leakage patterns, thereby serving as an effective means of evaluating urinary incontinence. Additionally, the absorbent test provides an objective measurement of the volume of urinary leakage.[17,18]

The invasive urodynamic study enables the measurement of bladder and intra-abdominal pressures during both the filling and emptying phases of the bladder.[19,20] It serves as an auxiliary diagnostic tool, assessing physiological and pathological factors associated with the urination mechanism by analyzing the function of the bladder, urethral sphincter, and urethra.[21,22] Although the urodynamic evaluation can be slightly uncomfortable, it is generally well tolerated by patients who are adequately informed about the procedure. Nonetheless, it is considered invasive due to the necessity for urethral and rectal catheterization. A urinary assessment to rule out infection prior to undergoing urodynamics is essential.[19] The invasive urodynamic study comprises three phases: free uroflowmetry, cystometry, and pressure-flow studies.[23,24] More critical than merely noting urinary leakage during an invasive urodynamic study is the identification of underlying conditions, such as infravesical obstruction or detrusor overactivity.[25-27] Presently, the invasive urodynamic study is not deemed a compulsory examination for women presenting with stress urinary incontinence, provided they have a typical history and physical examination findings are consistent.[28]

Nager et al.[29] questioned the necessity of conducting an invasive urodynamic study in the preoperative period, citing observations of comparable postoperative outcomes 1 year after surgery in women regardless of whether they had undergone the examination. Nonetheless, there is substantial evidence suggesting that the invasive urodynamic study, along with clinical history, physical examination, and voiding diary, should be collectively considered when recommending surgical treatment, particularly for women exhibiting atypical urinary incontinence symptoms or those who have experienced unsuccessful surgical interventions.[4,16,25,26]

Given the ongoing debate regarding the significance of the invasive urodynamic study and its status as a specialized, not universally accessible test in healthcare settings, this study proposes developing recommendations for treating urinary incontinence utilizing the ICIQ-SF. This approach integrates clinical data with findings from the invasive urodynamic study, aiming to offer a comprehensive framework for managing urinary incontinence. Faced with this discussion, this study aims to compare the ICIQ-SF questionnaire results with those of the invasive urodynamic study to establish recommendations for clinical conduct.

METHODS

Casuistics

This cross-sectional study was conducted following approval from the *Escola Superior de Ciências da Santa Casa de Misericórdia de Vitória* Ethics and Research Committee, with participation contingent upon patients' consent, evidenced by signing a free and informed consent form. Inclusion criteria encompassed women who consented to participate and presented at the *Departamento de Urodinâmica do Centro Avançado de Urologia* (Urodynamics Department of the Advanced Urology Center) in Vitória, Espírito Santo. The study population consisted of individuals reporting urinary leakage and possessing a medical referral for urodynamic testing, captured during the period from August 1, 2014, to June 30, 2015.

From the initial selection of 230 patients, 41 opted not to participate in the study — 20 due to not being previously informed by their attending physicians and 21 due to personal reasons. Consequently, the study included a total of 189 women. The sample size was determined through a sampling process, commencing with a pilot sample of 85 cases to calculate the standard deviation, which was found to be 27.8. This calculation led to the requirement of a sample size of 186 patients to achieve statistical significance. The variable utilized was the Valsalva leak point pressure, with a confidence level set at 95% and a margin of error of 4 mmH_2O. The calculation of the sample size was based on the following formula:

$N=(Z/E)^2.(S)^2$
$N=(1.96/4)^2.(27.8)^2=186$
where N=sample number;
Z=1.96–standard normal distribution table for a 95% confidence;
E=4 (defined as a safe margin of error in the exam)=margin of error;
S=27.8–standard deviation.

The patients participated in the study by completing the ICIQ-SF, a questionnaire validated in Portuguese for assessing urinary incontinence and its impact on the quality of life. The initial questions of the questionnaire collected basic demographic information, with Question 1 asking for the date of birth and Question 2 for gender. Subsequent questions aimed to evaluate the frequency of urinary leakage (Question 3), with options ranging from "never" to "all the time"; the volume of urinary leakage (Question 4) from "none" to "a large amount"; the impact of urinary leakage on daily activities (Question 5) on a scale

from 0 (“not at all”) to 10 (“a great deal”); and the circumstances under which leakage occurs (Question 6), to distinguish between stress, urgency, or mixed types of incontinence, allowing for multiple responses to accurately characterize the condition.

Urodynamic examinations were conducted using the Dynapack MPX816 device from Dynamed Pro-Life Technology, adhering to the International Continence Society’s standardization[14]. This process yielded measurements for Valsalva leak point pressure, involuntary detrusor contractions, maximum cystometric capacity, and bladder compliance.[30] Additionally, demographic data were collected, including race, age, marital status, educational level, obstetric history, delivery types, and any history of pelvic or gynecological surgeries.

The analysis integrated the scores from Questions 3, 4, 5, and 6 of the ICIQ-SF with clinical variables such as age, cystometric capacity, bladder compliance, Valsalva leak point pressure, and the presence of involuntary detrusor contractions. Following a thorough examination of these relationships, a scoring scale was devised. This scale, grounded in the ICIQ-SF responses, facilitates the formulation of management recommendations tailored to the individual scores, thereby guiding clinical conduct based on a comprehensive understanding of each patient’s condition.

Data analysis

Descriptive analysis was performed in which the categorical variables were expressed by their absolute and relative frequencies. The distribution of metric variables was assessed by determining their measures of central position and variability (median, mean, and standard deviation).

The comparison between categorical variables was performed using the chi-squared test, except when there were cells with expected results of less than five so that Fisher’s exact test or the likelihood ratio test was used.

Additionally, for the cross-checking of the metric data with categorical variables, the t-test for means was used when the data had a normal distribution. The non-parametric Mann-Whitney and Kruskal-Wallis tests were used when the normality of the data was rejected by the Kolmogorov-Smirnov test.

In addition, Spearman’s non-parametric correlation was used to analyze invasive urodynamic study data with age. Values of $p<0.05$ and the 95% confidence interval were considered significant.

RESULTS

Sample characterization

Caucasian individuals constituted the predominant racial group, accounting for 72.5% of the sample. Additionally, 64.6% of the participants were married, and 46.6% had completed high school education (Table 1). Further characterizing the sample, the analysis revealed that among the 189 patients assessed, 67.8% experienced urinary leakage due to stress, 23.4% exhibited detrusor overactivity leading to leakage, and 17.4% reported leakage both during physical exertion and as a result of detrusor overactivity. The mean age of the patients was 54.7±13.5 years. The bladder capacity varied between 60 and 500 mL. On average, the number of cesarean deliveries per woman was 0.99±0.94, while the average number of vaginal births was 1.71±1.63. Other characteristics can be consulted in Table 1.

Table 1. Sample characterization.

Variables	Parameters	
Age (A±SD)	54.7	13.5
Race/color (n, %)		
Caucasian	137	72.5
Black	38	20.1
Brown	14	7.4
Marital status (n, %)		
Married	122	64.6
Single	20	10.6
Widowed	29	15.3
Divorced	18	9.5
Literacy (n, %)		
Elementary	29	15.3
High school	88	46.6
College	72	38.1
Pelvic surgery (n, %)		
Perineoplasty	48	25.4
Hysterectomy	24	12.7
Without surgery	117	61.9
Number of births with cesarean sections (A±SD)	0.99	0.94
Number of vaginal deliveries (A±SD)	1.71	1.63
Bladder sensitivity* (n, %)		
Normal	156	82.5
Decreased	3	1.6
Increased	30	15.9
Bladder capacity (mL)* (A±SD)	310.5	108.3
Bladder compliance (mL/cmH_2O)* (A±SD)	33.2	10.9
Detrusor overactivity† (n, %)		
Present	81	42.9
Absent	108	57.1
Valsalva leak point pressure evaluation (cmH_2O) (n, %)		
No leakage	59	32.2
With leakage	130	67.8
Valsalva leak point pressure (cmH_2O)*,‡ (A±SD)	127.9	123.7
Detrusor overactivity presence (cmH_2O) (n, %)		
No detrusor overactivity	109	57.1
Detrusor overactivity however without leakage	37	19.5
Detrusor overactivity with leakage	43	23.4
Leakage with Valsalva leak point pressure and detrusor overactivity (cmH_2O) (n, %)		
No leakage	21	10.7
Leakage with both (Valsalva leak point pressure and detrusor overactivity)	33	17.4
The extent of urinary leakage interference in daily activities (quality of life) (A±SD)	8	2

n=189. A: average; SD: standard deviation.

*Invasive urodynamic study; †Detrusor overactivity/invasive urodynamic study; ‡130 patients had urinary leakage with Valsalva leak point pressure.

Comparisons between variables

Table 2 presents the responses to the ICIQ-SF questionnaire. Regarding Question 3, which inquires "How often do you lose urine?," the majority of patients (47.1%) reported experiencing leakage several times a day. For Question 4, "We would like to know how much urine you think you lose," the predominant response was "It leaks a small amount," selected by 47.1% of the participants. Concerning the final question, "When do you lose urine?"— where patients could select multiple responses — the most common answers were "It leaks when I cough or sneeze," reported by 63%, and "It leaks when I am exercising," by 52.4%.

Table 2. International Consultation on Incontinence Questionnaire-Short Form questions and answers obtained: absolute numbers and percentages.

Variables	n	%
How often do you lose urine? (Question 3)		
Never	6	3.2
Once a week or less often	18	9.5
Two or three times a week	30	15.9
About once a day	34	18.0
Several times a day	89	47.1
All the time	12	6.3
We would like to know how much urine you think you lose? (Question 4)		
None	6	3.2
A small amount	89	47.1
A moderate amount	63	33.3
A large amount	31	16.4
When do you lose urine? (Question 6)		
Never	5	2.6
It leaks before I get to the bathroom	71	37.6
It leaks when I cough or sneeze	119	63.0
It leaks when I am sleeping	10	5.3
It leaks when I am exercising	99	52.4
It leaks when I finish urinating and I am getting dressed	54	28.6
It leaks for no obvious reason	10	5.3
It leaks all the time	4	2.1

n=189.

Subsequent analysis involved comparing responses to the ICIQ-SF questionnaire with urodynamic variables. Table 3 illustrates the comparison between the responses to Questions 3, 4, and 6 and the presence of detrusor overactivity and the Valsalva maneuver, as identified in invasive urodynamic studies. The comparisons between the responses to Questions 3 and 4 and the presence of detrusor overactivity or the Valsalva maneuver did not yield statistically significant results. However, Question 6 revealed distinct patterns: among patients with detrusor overactivity, a higher incidence of responses indicating "It leaks before I get to the bathroom" (59.3%) and "It leaks when I have finished urinating and I am getting dressed" (43.2%) was observed compared to those without detrusor overactivity. Conversely, in the study without detrusor overactivity, the most frequent responses to Question 6 were "It leaks when I cough or sneeze"

(75.9%) and "It leaks when I'm exercising" (63.9%). Moreover, in patients not experiencing urinary leakage with the Valsalva maneuver, a predominant percentage reported "It leaks before I reach the bathroom" (71.7%) and "It leaks when I have finished urinating and I'm getting dressed" (46.7%). In contrast, among those with leakage during the Valsalva maneuver, the responses "It leaks when I cough or sneeze" (79.8%) and "It leaks when I am exercising" (67.4%) were more common.

Table 3. Presence of involuntary detrusor contractions and urinary leakage with the Valsalva maneuver in the invasive urodynamic study according to the answers given to questions of the International Consultation on Incontinence Questionnaire-Short Form.

Variables	Detrusor overactivity (cmH_2O)				p-value	Urinary leakage with the Valsalva maneuver* (cmH_2O)				p-value
	Present		Absent			Present		Absent		
	n	%	n	%		n	%	n	%	
How often do you lose urine? (Question 3)										
Never/once a week or less often	8	9.9	16	14.8		13	10.1	11	18.3	
Two or three times a week	11	13.6	18	16.7		22	17.1	7	11.7	
About once a day	14	17.3	19	17.6	0.644†	24	18.6	9	15.0	0.509‡
Several times a day	40	49.4	49	45.4		61	47.3	28	46.7	
All the time	8	9.9	6	5.6		9	7.0	5	8.3	
We would like to know how much urine you think you lose? (Question 4)										
None/a small amount	34	42.0	61	56.5		65	50.4	30	50.0	
A moderate amount	31	38.3	32	29.6	0.139†	42	32.6	21	35.0	0.914†
A large amount	16	19.8	15	13.9		22	17.1	9	15.0	
When do you lose urine? (Question 6)										
It leaks before I get to the bathroom	2	2.5	3	2.8	0.999	1	0.8	4	6.7	0.036‡
It leaks when I cough or sneeze	48	59.3	23	21.3	<0.001	28	21.7	43	71.7	<0.001†
It leaks when I am sleeping	37	45.7	82	75.9	<0.001	103	79.8	16	26.7	<0.001†
It leaks when I am exercising	2	2.5	8	7.4	0.193†	8	6.2	2	3.3	0.508‡
It leaks when I finish urinating and I am getting dressed	30	37.0	69	63.9	<0.001	87	67.4	12	20.0	<0.001†
It leaks for no obvious reason	35	43.2	19	17.6	<0.001	26	20.2	28	46.7	<0.001†
It leaks all the time	2	2.5	8	7.4	0.193†	8	6.2	2	3.3	0.508‡
It leaks before I get to the bathroom	0	0.0	4	3.7	0.136†	4	3.1	0	0.0	0.309‡
Total	81	42.8	108	57.2	-	129	68.2	60	31.8	-

n=189.

*Valsalva leak point pressure; †χ^2 test; ‡Likelihood ratio test.

Tables 4 and 5 offer a detailed analysis comparing urodynamic variables, ICIQ-SF questionnaire responses, and age. Although Table 4 does not show significant associations among these variables, Table 5 reveals a correlation between bladder capacity and the impact on the quality of life. Specifically, an increased cystometric capacity is associated with lower scores on Question 5 of the ICIQ-SF, suggesting that a reduced bladder capacity contributes to a higher daily urinary frequency and adversely affects the patient's quality of life. This highlights the critical role of bladder capacity in evaluating urinary incontinence severity and its implications for daily activities.

Table 4. Questions of the International Consultation on Incontinence Questionnaire-Short Form and age by urodynamic variables.

Variables	Descriptive statistics				p-value
	n	Median	Mean	Standard deviation	
How often do you lose urine? (Question 3)					
Cystometric capacity (mL)					
Never/once a week or less often	24	325.00	315.46	95.23	
Two or three times a week	29	350.00	319.28	115.29	
About once a day	33	335.00	336.18	100.51	0.102
Several times a day	89	330.00	308.51	107.29	
All the time	14	240.00	236.43	119.65	
Bladder compliance (mL/cmH_2O)					
Never/once a week or less often	24	35.00	33.21	10.74	
Two or three times a week	29	38.00	34.66	9.88	
About once a day	33	35.00	34.33	8.52	0.913
Several times a day	89	35.00	32.67	11.86	
All the time	14	36.50	30.43	13.46	
Valsalva leak point pressure (cmH_2O)					
Never/once a week or less often	24	59.50	54.71	55.47	
Two or three times a week	29	98.00	82.52	53.40	
About once a day	33	80.00	71.64	49.00	0.299
Several times a day	89	72.00	64.79	50.80	
All the time	14	83.00	61.00	48.27	
We would like to know how much urine you think you lose? (Question 4)					
Cystometric capacity (mL)					
None/a small amount	95	328.00	325.92	98.44	
A moderate amount	63	330.00	289.13	120.97	0.312
A large amount	31	320.00	306.90	105.66	
Bladder compliance (mL/cmH_2O)					
None/a small amount	95	35.00	33.18	10.84	
A moderate amount	63	35.00	32.76	11.00	0.706
A large amount	31	38.00	33.97	11.68	
Valsalva leak point pressure (cmH_2O)					
None/a small amount	95	80.00	69.95	53.30	
A moderate amount	63	77.00	61.86	47.57	0.508
A large amount	31	80.00	69.29	53.89	
In general, how much does losing urine interfere with your daily life?* (Question 5)					
Detrusor overactivity (cmH_2O)					
Present	81	8	7.9	2.2	0.869
Absent	108	8	8.1	1.9	
Age (years)†					
Detrusor overactivity (cmH_2O)					
Present	81	55	55.7	14.6	0.370
Absent	108	52.5	54	12.5	

n=189. Kruskal-Wallis test.

*Mann-Whitney test; †t-test for means.

Table 5. Correlation between age, the extent of urinary leakage interference in daily activities (quality of life), and urodynamic variables.

Variables	r	p-value
Age (years)		
Bladder capacity (mL)	0.011	0.885
Bladder compliance (mL/cmH_2O)	0.013	0.861
Valsalva leak point pressure (cmH_2O)	-0.085	0.248
In general, how much does losing urine interfere with your daily life? (Question 5)		
Bladder capacity (mL)	-0.150	0.040
Bladder compliance (mL/cmH_2O)	-0.101	0.166
Valsalva leak point pressure (cmH_2O)	0.011	0.875

n=189. Correlation test.

Construction of the recommendations

Following the analysis, a scoring scale was developed to guide the clinical approach based on responses to the ICIQ-SF questionnaire. The analysis revealed a higher incidence of detrusor overactivity in the invasive urodynamic study among participants who selected “It leaks before I get to the bathroom” (59.3%) and “It leaks when I’m getting dressed” (43.2%) for Question 6. However, responses to Questions 3 and 4 did not significantly influence the formulation of this guidance.

Additionally, when examining the Valsalva leak point pressure, responses to Questions 3 and 4 were deemed insignificant for the recommendation framework. Yet, a significant correlation was identified between stress-induced urinary leakage and responses to Question 6: “It leaks when I cough or sneeze” (79.8%) and “It leaks when I’m exercising” (67.2%).

Based on these insights, responses to the ICIQ-SF questionnaire were categorized into distinct clinical diagnostic groups, as follows:

A: No leakage — For individuals who responded “never” to Questions 3, 4, and 6.

B: Urgency leakage — Based on answers to Question 6, specifically “It leaks before I get to the bathroom” and “It leaks when I’m getting dressed.”

C: Stress leakage — For responses to Question 6 that indicate “It leaks when I cough or sneeze” and “It leaks when I’m exercising.”

D: Mixed and/or unclassified leakage — For participants providing more than two varied responses across Questions 3, 4, and 6 that do not conform to the patterns of the previous groups.

This structuring of questionnaire responses into diagnostic categories is intended to streamline the clinical decision-making process by aligning patient-reported symptoms with identifiable patterns of urinary leakage.

Proposed recommendation

With these data, it was decided to develop recommendations to assist general practitioners in diagnosing urinary incontinence (Figure 1). In this way, early referral for conservative treatment can be facilitated, reserving urodynamic evaluation for those patients with more complex conditions, in which the clinical history, physical examination, and application of the questionnaire did not allow a definitive diagnosis and appropriate treatment.

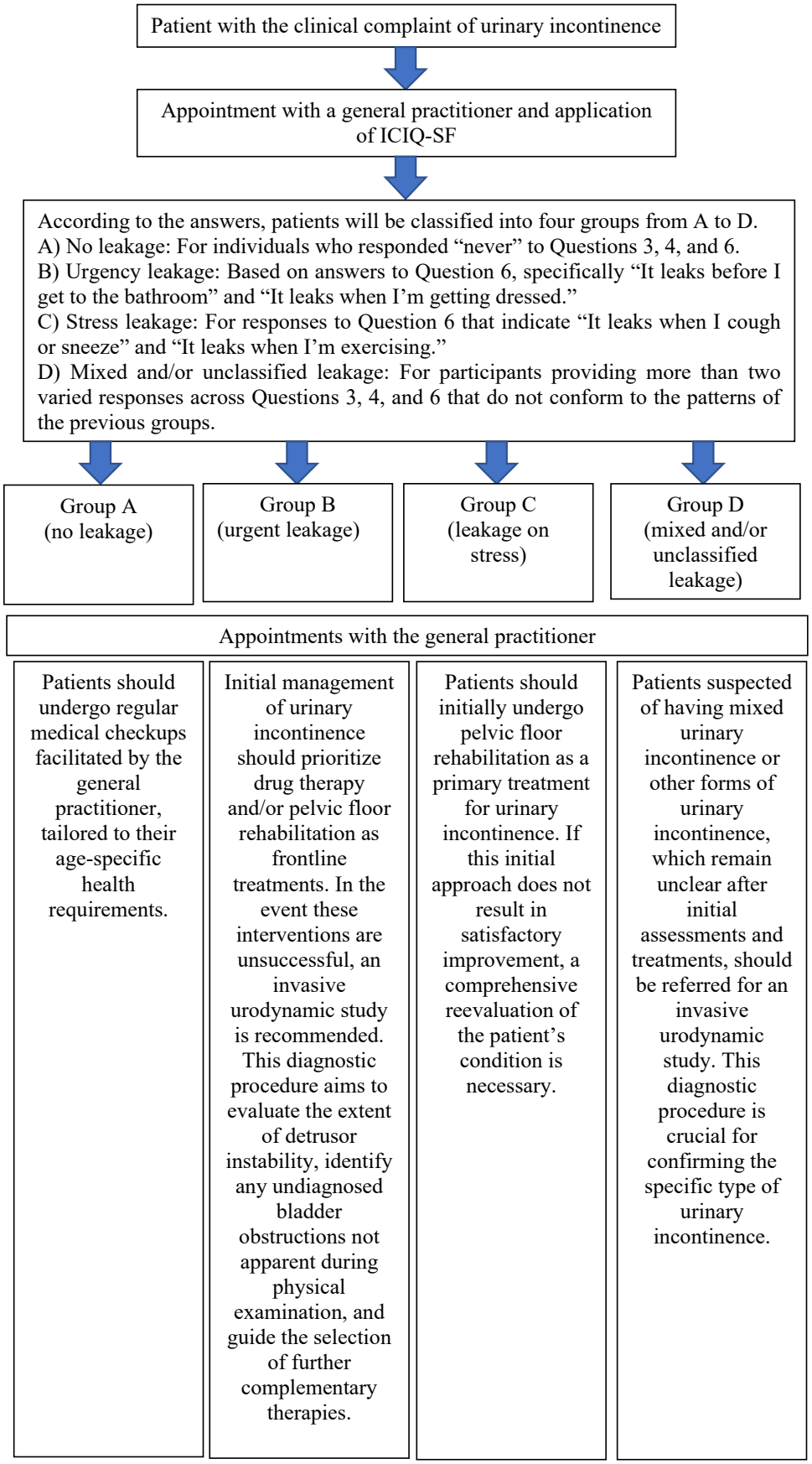

Figure 1. Referral flowchart.

In light of the insights gained from the analysis, recommendations have been developed to aid general practitioners in the diagnosis of urinary incontinence (Figure 1). These recommendations are designed to streamline the diagnostic process, enabling the early identification of patients who may benefit from conservative treatments before the use of invasive urodynamic evaluations.

DISCUSSION

Quality-of-life questionnaires are increasingly recognized for their capacity to elucidate the multifaceted impacts of specific conditions, serving as indispensable tools in symptom detection and in tracking both objective and subjective changes in women's daily lives.[27,31] The ICIQ-SF is a subjective tool designed to assess the severity of urinary incontinence and its impact on the quality of life. It is straightforward to administer, requiring approximately 5 min without the need for prior training.[32] Given its validation in Portuguese, the ICIQ-SF enables the classification of leakage severity into four categories: 1–5 (mild), 6–12 (moderate), 13–18 (severe), and 19–21 (very severe).[27] The focus of this study, however, was to categorize different types of urinary incontinence by analyzing responses to the ICIQ-SF questionnaire in conjunction with urodynamic data, rather than evaluating symptom severity.

As indicated in Tables 4 and 5, the analysis revealed no statistical differences in responses to Questions 3 and 4 that would facilitate the classification of urinary incontinence types. Question 5 uniquely quantifies the extent to which urinary leakage disrupts daily life, underscoring the significance of these findings in demonstrating the adverse effects on quality of life. This aspect is crucial in highlighting that the deterioration in the quality of life associated with urinary incontinence is not a normal or inevitable aspect of aging.[3,27]

The utility of urodynamic studies in diagnosing and treating overactive bladder syndrome and stress urinary incontinence has increasingly come under scrutiny.[33,34] However, in cases of mixed urinary incontinence, urodynamic findings play a crucial role in guiding the initial approach to treatment.[35] The authors argue that urodynamics tests are not cost-effective, as they necessitate specialized, expensive equipment, alongside specialized training and skills for accurate interpretation, thereby limiting access to specialized care.[3,27] Nonetheless, urodynamic evaluations can significantly enhance a surgeon's confidence in diagnosing urinary incontinence, thereby informing the choice of surgical intervention. They enable potential intraoperative adjustments or influence postoperative management strategies.[13,36] This dichotomy highlights the complex role of urodynamic studies in the comprehensive management of urinary incontinence, underscoring the need for a balanced approach that considers both their limitations and their potential to refine surgical outcomes.

In this study, a significant association was found between the manifestation of stress urinary incontinence during urodynamic testing and responses to Question 6 of the ICIQ-SF, particularly answers 3 (78.9%) and 5 (67.2%), with a 67.8% incidence of leakage at the Valsalva leak point pressure. Furthermore, the occurrence of detrusor overactivity in urodynamic assessments correlated with answers 2 (59.3%) and 6 (43.2%) of Question 6, observed in 42.9% of the patients exhibiting involuntary detrusor contractions. However, among the 89 patients analyzed for this aspect, only 23.4% experienced leakage. This finding underscores the complexity of diagnosing urinary incontinence subtypes and highlights the relevance of integrating questionnaire responses with urodynamic data to achieve a comprehensive understanding of each patient's condition.

The observation that 17.4% of the 189 patients exhibited leakage during both Valsalva leak point pressure and detrusor overactivity, qualifying them as cases of mixed urinary incontinence, aligns with established literature.[3] Studies have documented a proportional stratification of urinary incontinence types, identifying urge urinary incontinence at 15–25% and mixed urinary incontinence at 20–40%.[37,38] These findings are corroborated by research from Nager et al.,[36] which suggests that an increase in abdominal pressure during physical exertion of up to 25% can precipitate detrusor overactivity, leading to leakage at lower levels of exertion. This phenomenon is attributed to the combined effect of bladder instability and increased abdominal pressure exerting force on the urethra and bladder.[39] Consequently, the resultant volume of urinary leakage is notably higher than that resulting from exertion alone.[2,3] This evidence underscores the complexity of urinary incontinence mechanisms and highlights the significance of understanding the synergistic impact of bladder instability and abdominal pressure in the management of urinary incontinence.

The observed prevalence of stress urinary incontinence at 67.8% in this study, which surpasses the 30–45% range reported in the existing literature,[13,14] may be attributed to the selection bias inherent in referrals for surgical evaluation by attending physicians. This discrepancy underscores the potential influence of clinical practice patterns on study outcomes.

A notable strength of this study is its demonstration that general practitioners, utilizing a straightforward questionnaire, can efficiently provide tailored recommendations for patients with urinary incontinence. Conversely, a limitation identified is the lack of detailed physical examination data for the included patients.[2,3,10,13,15,20,37] This gap suggests an area for improvement in future research methodologies to ensure a more comprehensive assessment of urinary incontinence.

Building on the insights gained, the study proposes recommendations for the screening and initial management of uncomplicated urinary incontinence. It further recommends that cases of urinary incontinence with more complex diagnoses or those not responding to initial management should undergo further evaluation through urodynamic studies and consultation with specialists in the field.[3,9]

Limitations inherent to this study include its cross-sectional design, which may introduce reverse causality in some findings. Furthermore, the relatively modest sample size might not comprehensively represent the experiences of women with urinary incontinence across diverse healthcare settings. Despite these constraints, this research supports the implementation of the ICIQ-SF questionnaire, alongside specific recommendations, to facilitate effective patient triage. This approach ensures that individuals with more severe or treatment-resistant conditions are directed toward specialized care.

CONCLUSION

In this investigation, we methodically examined the associations between responses to the ICIQ-SF and urodynamic data to categorize types of urinary incontinence in women. Our analysis identified a significant association between the manifestation of stress urinary incontinence during urodynamic testing and specific answers within the ICIQ-SF, particularly regarding the frequency and circumstances of leakage. This finding certifies the utility of the ICIQ-SF in the preliminary identification of stress urinary incontinence, supporting our initial hypothesis.

Furthermore, we identified a patient subgroup displaying mixed urinary incontinence, characterized by simultaneous indicators of stress urinary incontinence and detrusor overactivity. This differentiation is essential for customizing treatment strategies, thereby emphasizing the

questionnaire's significance in informing clinical decision-making. The study, however, recognized certain limitations, such as the lack of comprehensive physical examination data, which could have further enhanced the diagnostic accuracy.

Despite these limitations, our results endorse the integration of the ICIQ-SF into the preliminary assessment of urinary incontinence. This approach presents a non-invasive, cost-effective method for the early detection and classification of symptoms.

The recommendations put forth aim to refine the diagnostic pathway, facilitating the early recognition of patients likely to benefit from conservative management strategies. Utilizing the detailed insights from the ICIQ-SF questionnaire enables practitioners to more accurately ascertain the nature of urinary incontinence, promoting a more focused and efficient referral mechanism for conservative treatment. Additionally, we advocate for the reserved application of invasive urodynamic assessments in complex cases, where the synthesis of clinical history, physical examination, and questionnaire responses fails to provide a definitive diagnosis.

CONFLICT OF INTERESTS

Nothing to declare.

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