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# Urinary incontinence

## Assessment in women: stress, urge or both?

### Background

The aims of assessing urinary incontinence in women are to define the diagnosis, exclude other pathology and guide management. Treatment can be initiated when urinary incontinence is categorised as stress, urge or mixed incontinence. Once conservative measures have been exhausted, the management of stress incontinence is largely surgical, while that of urge urinary incontinence is largely medical.

### Objective

This article discusses the clinical assessment of urinary incontinence in women with emphasis on the primary care assessment and indications for specialist referral.

### Discussion

History taking is the cornerstone of urinary incontinence assessment and in combination with physical examination allows categorisation of patients into stress, urge or mixed urinary incontinence. Basic assessment includes investigations such as urine testing, bladder residual volume measurement, and a bladder diary. Urodynamic testing is not required in all patients or before initiating conservative treatment. Indications for specialist referral and urodynamic testing are discussed.

■ Urinary incontinence in women is very common, with the prevalence in community dwelling women ranging from 10–40%.<sup>1</sup> Stress incontinence appears to be the most common, and was the only symptom in 50% of women in a community survey. About a third of adults have mixed incontinence. With aging there is an increased prevalence of both urge and mixed incontinence.<sup>1,2</sup> With our aging population it is important to address urinary incontinence as it impacts greatly on quality of life.

Urinary incontinence in women can be categorised as:

- stress urinary incontinence (SUI)
- urge urinary incontinence (UII)
- mixed urinary incontinence (MUI)
- overflow urinary incontinence (OUI)
- fistula related, and
- functional incontinence.

Features of each category are outlined in *Table 1*. It is important to distinguish these categories as the type of incontinence guides management. In the majority of cases the cause of incontinence can be ascertained by a careful history and basic clinical assessment.

### History

History taking can be divided into four components:

- define the type of incontinence
- define the causes and precipitants
- exclude other pathology
- assess the severity and impact on the patient's life.

### Defining the type of incontinence

The features on history typical of the various types of urinary incontinence in women are outlined in *Table 1*. Ask about:

- triggers to urinary incontinence including physical exercise, coughing, sneezing, lifting (SUI); or hearing running water, hand washing, arriving home (UII)



- sudden severe need to void (UUI)
- urgency without loss of urine (overactive bladder – dry)
- constant versus intermittent leakage
- amount of urine loss.

## Defining the causes and precipitants of incontinence

It is important to take a full urinary tract history in order to exclude other conditions that can mimic incontinence such as urinary tract infections (UTIs), bladder cancers and calculi, and to assess for risk

Table 1. Categories and clinical features of urinary incontinence in women

Category	Cause	Features on history
Stress urinary incontinence (SUI)	Due to weakness in the urinary sphincter and/or pelvic floor	<ul style="list-style-type: none"> <li>• Urine loss triggered by activities that cause a rise in intra-abdominal pressure (eg. coughing, sneezing, jumping, lifting, exercise)</li> <li>• The patient can usually predict which activities will cause leakage. In more severe cases, leakage can occur with minimal activity (eg. walking, standing from sitting) and may be associated with minimal patient awareness of urine loss</li> </ul>
Urge urinary incontinence (UUI)	Caused by detrusor overactivity, ie. a bladder muscle that contracts out of volitional control, usually at low bladder volumes and with little warning	<ul style="list-style-type: none"> <li>• Loss of urine is preceded by a sudden and severe desire to pass urine; the patient typically loses urine on the way to the toilet</li> <li>• Certain activities can trigger urine loss (eg. running water, hand washing, cold weather and arriving at the front door)</li> <li>• Volume of urine loss is variable ranging from a few drops to flooding (where the entire bladder volume is lost)</li> <li>• The symptom syndrome of urgency (with or without UUI) usually associated with frequency and nocturia is described as overactive bladder (OAB) syndrome<sup>17</sup> Approximately one-third of patients with OAB will experience incontinence (OAB wet) with the rest having OAB dry<sup>18</sup></li> <li>• It is important to exclude bladder or pelvic pathology as the cause of UUI before attributing this symptom to detrusor overactivity (previously known as 'unstable bladder')</li> </ul>
Mixed urinary incontinence (MUI)	<ul style="list-style-type: none"> <li>• A combination of SUI and UUI</li> <li>• It is important to define which symptom is predominant and most bothersome to the patient and treat this symptom first</li> </ul>	<ul style="list-style-type: none"> <li>• Features of both SUI and UUI</li> </ul>
Overflow urinary incontinence (OUI)	<ul style="list-style-type: none"> <li>• Occurs when the patient is in chronic urinary retention due to leakage from an overdistended bladder</li> <li>• Occurs in the setting of either bladder outlet obstruction and/or poor bladder muscle function</li> </ul>	<ul style="list-style-type: none"> <li>• Usually associated with a reduced sensation of bladder fullness and a feeling of incomplete bladder emptying</li> <li>• Does not tend to occur unless bladder emptying is very poor with postvoid residual volumes of &gt;300 mL<sup>19</sup></li> </ul>
Urinary fistula	<ul style="list-style-type: none"> <li>• Fistulae in the urinary tract cause continuous insensible loss of urine and are rare in the western world</li> <li>• Fistulous connections can occur between the bladder and vagina, ureter or urethra</li> <li>• In Australia, the most common is an iatrogenic vesicovaginal fistula caused by unidentified bladder injury, usually at the time of hysterectomy</li> <li>• Obstetric trauma is the commonest cause of vesicovaginal fistula worldwide</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous insensible urine loss from the vagina, usually of large volume. In severe cases the patient may not void normally as the majority of urine is lost via the fistula</li> <li>• Preceding history of pelvic surgery (especially gynaecological or incontinence) or obstetric trauma</li> </ul>
Functional incontinence	<ul style="list-style-type: none"> <li>• Involuntary loss of urine caused by physical (eg. poor mobility) or mental (eg. dementia) limitations that result in an inability to toilet normally</li> </ul>	<ul style="list-style-type: none"> <li>• Impaired mobility and/or impaired cognitive function</li> </ul>



factors predisposing to all of the listed conditions.<sup>2,3</sup>

A general urinary tract history includes an assessment of:

- urinary frequency – day versus night
- factors which worsen urge incontinence – diuretics and bladder irritants such as caffeine intake (including coffee, tea, cola and energy drinks) and alcohol
- reversible causes of urinary incontinence such as diuretics, lithium (which may cause excess fluid intake),  $\alpha$ -blockers (reduce urethral tone), and poorly controlled diabetes
- risk factors for SUI – including parity, history of large babies, forceps and breech deliveries, chronic cough, obesity
- previous urinary tract and gynaecological surgery – including incontinence and prolapse procedures, hysterectomy
- constipation – which can worsen voiding symptoms.

### Excluding other pathology

Patients who have typical SUI and UUI should not have any of the following features on history, examination or investigation:

- haematuria – either macroscopic or persistent microscopic; requires renal imaging to exclude tumours, calculi, and cystoscopy to exclude bladder pathology (eg. bladder cancer, calculi)
- pain – either suprapubic or dysuria suggests pelvic or other urinary tract pathology rather than SUI or UUI
- recent or acute onset of symptoms – the usual history is of a gradual onset
- obstructive symptoms (eg. straining to void, sensation of incomplete bladder emptying)
- recurrent UTIs

- neurological symptoms – which may point to a neuropathic bladder as the cause of UUI (eg. new onset paraesthesia, weakness, back pain, visual disturbances, altered bowel habit with constipation or faecal incontinence).

Patients who have atypical features, severe symptoms and those not responding to treatment should be considered for early specialist referral and are likely to warrant full assessment with cystoscopy and urodynamic study.<sup>2–4</sup>

### Assessing the impact of incontinence

Severity of incontinence and impact are not necessarily the same. It is important to obtain some idea of both incontinence severity and impact. Incontinence pad usage is often used as a guide to incontinence severity. However, this can be deceptive as some women will change pads frequently, even with minimal urine loss, for hygienic reasons. Standardised incontinence pad weight tests (used in specialist practice) are a more objective measure of urine loss.

The impact of the symptoms on the patient, or 'bothersomeness', can be gauged by the lifestyle changes that have been made to accommodate symptoms, and restriction in activities. Ask about: the need for incontinence pad use, reducing or stopping activities such as social engagements and playing sport, degree of disruption to day to day activities, and the emotional impact. Impact can also be assessed objectively by validated incontinence specific questionnaires such as the Urogenital Distress Inventory (UDI-6) and the Incontinence Impact Questionnaire (IIQ-7).<sup>5</sup> The patient's treatment goals and preferences must also be determined.

Table 2. Physical examination for urinary incontinence

Examination	Sign	Details
Abdominal	• Palpable bladder	• If palpable after voiding suggests chronic retention
Pelvic	• Atrophic vaginal mucosa	• Assess for oestrogen deficiency/atrophic change which may contribute to symptoms of urge incontinence and require treatment with topical vaginal oestrogen <sup>20,21</sup>
	• 'Stress test' or cough test	• Cough and strain to demonstrate leakage • Assessment of bladder neck mobility with strain
	• Pelvic organ prolapse	• Assessed with speculum according to: – location (ie. anterior, posterior or middle compartments) – severity (grading system)
	• Pelvic floor contraction	• Ability to perform and endurance • Grading out of 5 (Oxford system) <sup>22</sup>
	• Pelvic mass or tenderness	• Bimanual examination to exclude other pathology which can mimic incontinence
Rectal	Constipation and anal tone	• Impacts on voiding symptoms and should be corrected
Neurological screen	• Perineal sensation/anal tone • Lower limb neurological exam	• Screening for lower motor neuron problems • Assess if needed for other conditions (eg. multiple sclerosis, Parkinsonism)
Cardiac	• Volume status • Signs of heart failure	• Potential cause of prominent nocturia or nocturnal urinary incontinence



Table 3. Bladder diary definitions and normal values

Frequency/output	Definition	Values used in clinical practice
Number of day time voids	• Including last void before bed and first void on waking	Aim for 3–5 hourly
Number of night time voids	• Each void is preceded and followed by sleep	Aim for 0–1
Total urine output/24 hours		Aim for 1500–2000 mL or less
Nocturnal urine volume	• Total volume voided after patient goes to sleep • Excludes last void before bed • Includes first void on waking	Age dependent
Nocturnal polyuria	• Increased proportion of urine output produced at night	Young adults >20% urine production at night >65 years >33% urine output produced at night
Maximum voided volume	• Largest single volume voided	Aim for 300–600 mL
Mean voided volume		Aim for 250–300 mL

## Physical examination

Abdominal and pelvic examination is mandatory in the assessment of incontinence in women. Important physical examination features are listed in *Table 2*.<sup>3,6</sup>

## Basic investigations

All patients require urinalysis and urine culture if urinalysis is abnormal. It is advisable to have an assessment of bladder emptying with a postvoid residual volume (either with ultrasound or catheterisation) which will essentially exclude overflow incontinence.<sup>2,4,7</sup> In clinical practice, a postvoid residual volume of less than 50 mL is regarded as normal and in general, residual volumes greater than 150–200 mL are regarded as abnormal. In older women, residual volumes up to 100 mL may be regarded as normal, depending on the circumstances.<sup>2</sup>

## The bladder diary

The bladder diary (also known as a frequency volume chart) is an extremely useful, cheap and underutilised tool in the diagnosis and management of voiding dysfunction. Its use is recommended in all women with incontinence.<sup>4,7</sup> A bladder diary:

- provides an objective measure of the patient's symptoms
- allows comparison of symptoms over time and with treatment
- engages the patient in her treatment
- makes the patient aware of voiding habits and hence is a key tool in patient re-education/bladder retraining regimens
- is the only method by which polyuria (defined as 24 hour urine output >40 mL/kg) can be diagnosed<sup>8</sup> (*Figure 1*).

In its simplest form, the bladder diary consists of a patient chart of time, volume of urine voided (measured in mL) and some measure of incontinence episode frequency. No attempt is made at charting volume of urine loss but the patient can make a subjective assessment, eg. small, moderate, large loss of urine. The chart is completed by the patient over three complete 24 hour periods which are not necessarily consecutive.<sup>9</sup> Some clinicians also include a column for fluid intake in the bladder diary, but as information about

Figure 1. Example of bladder diary showing polyuria driving urinary frequency and leakage

**Bladder diary**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

This chart is designed to record urine output. Please measure and record the amount each time you pass urine over a 24 hour period. **Please complete three 24 hour periods which do not need to be consecutive.** You should purchase a 500 mL plastic jug for measuring urine output. You are not expected to measure leakage but please mark how often the leakage is occurring and whether the amount is large (L), moderate (M) or small (S). Please bring your completed chart to your appointment.

Day 1 – Date: \_\_\_\_\_

Time	Amount (mL)	Leakage	Time	Amount (mL)	Leakage
06.00	600	S			
08.00	350				
09.45	400				
12.00	500				
2.00	650	S			
3.30	400				
5.15	500				
7.30	350				
9.15	500				
11.00	400				
01.15	550	S			

Total volume for 24 hours \_\_\_\_\_ 5200 \_\_\_\_\_ mLs

fluid intake is gained indirectly by the patient's 24 hour urine output, it is debatable whether this is essential. Omitting measures of fluid intake simplifies the chart for the patient and improves the chance of compliance. 'Normal' population values for bladder diaries are difficult to establish and normative values do change according to age (eg. nocturia). Bladder diary information is summarised in *Table 3*.

## Interpreting a bladder diary

Several patterns of abnormality can be seen on a bladder diary:<sup>9,10</sup>

- frequent small volume voids – can occur in the overactive bladder syndrome, detrusor overactivity as well as painful bladder conditions
- frequent large volume voids – are usually associated with polyuria the most common cause of which is overdrinking, but other



conditions causing polyuria (eg. diabetes mellitus or insipidus, hypercalcaemia) need to be excluded

- frequent small volume voids with low urine output – usually due to deliberate patient restriction of fluid intake to try and control urinary symptoms
- nocturnal polyuria – may be associated with aging, obstructive sleep apnoea, cardiac failure, excess evening fluid intake.

## Limitations of clinical assessment

Unfortunately despite strenuous efforts by both the clinician and patient, it may not be possible to come to a clinical diagnosis of the type of incontinence. This may be due to a combination of factors including mixed symptoms, extremely severe incontinence, reduced patient awareness of bladder symptoms and vague history telling.

There is also significant overlap in the various symptoms and underlying conditions such that the same symptom can be produced by different mechanisms. It is for this reason that the bladder is known as ‘an unreliable witness’. For example: a patient may describe urine loss with activity (suggestive of SUI) but the cause of the leakage may actually be an uninhibited bladder contraction (detrusor overactivity); a patient may lose urine from detrusor overactivity with minimal sensation of urgency of urination. Urodynamic studies are useful in patients such as these to better define bladder dysfunction, but are not required in all patients with urinary incontinence.

## Urodynamic study

Urodynamic study is the gold standard test of bladder function. It gives information about bladder function in the same way that an echocardiogram gives information about cardiac function. Urodynamic study can vary from simple cystometry (where bladder pressures alone are measured) to complex cystometry (performed by urologists and urogynaecologists) where multiple pressures within the urinary tract are recorded with specialised electronic equipment, computer analysis and imaging. Patient complexity determines the degree of study complexity required.

## Indications for urodynamic study

Urodynamic studies are not required before starting conservative management in uncomplicated cases of stress or UUI. Indications for urodynamics include:<sup>11–16</sup>

- to define incontinence, particularly when the history is unclear
- when invasive or surgical treatments for incontinence are being considered

- to document severity/type of incontinence urodynamically (which can guide type of incontinence surgery offered)
- to document voiding function
- failed conservative management of urinary incontinence
- in complex patients who have:
  - an unclear diagnosis
  - mixed stress and urge symptoms
  - a history of previous urological or gynaecological surgery (for incontinence or prolapse)
  - failed surgery
  - neurological disorders.

## Steps in a urodynamic study

A urodynamic study is performed without sedation or the need for fasting. The patient either stands, tilted upright on a tilt table or sits to help reproduce urinary symptoms. Specialised computerised urodynamic equipment is required. Steps in the urodynamic procedure include:

- free flow rate – patient passes urine into a commode which measures urine flow and volume
- urodynamic catheters inserted – into bladder and rectum to measure various pressures
- the bladder is filled at a fixed rate by the urethral catheter and bladder pressures are recorded simultaneously with patient reporting symptoms, eg. first sensation of filling (~150 mL), sensation of bladder fullness (~300 mL), urgent desire to urinate (~400–600 mL)<sup>2,11</sup>
- the patient coughs and strains during the procedure at fixed bladder volumes to check for SUI
- pressure – flow studies while the patient urinates assess voiding function

Figure 2. Fluoroscopic urodynamic study showing measurement of voiding pressures and flow with simultaneous imaging of voiding

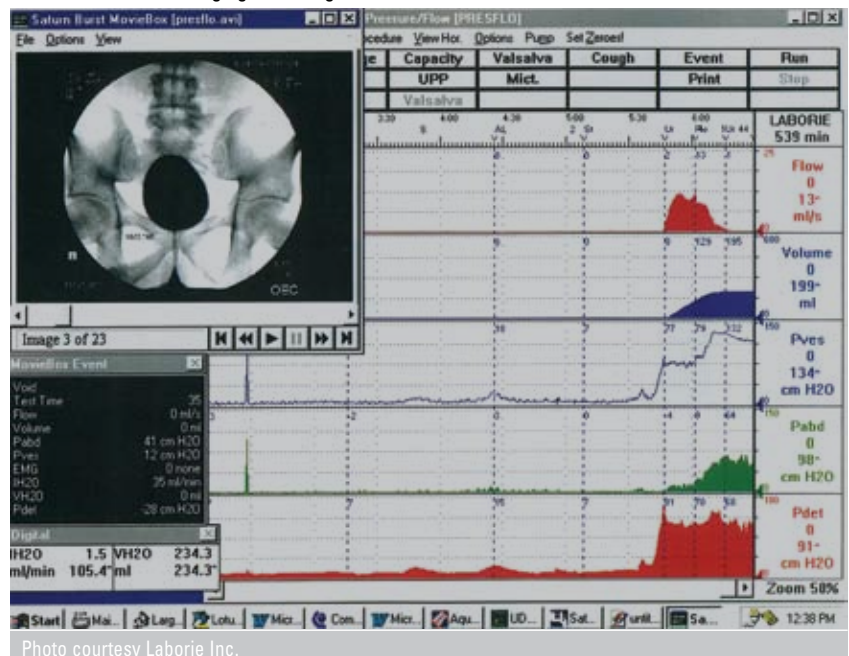






Figure 3. Patient undergoing fluoroscopic urodynamic study on a tilt table



- urethral function – assessed by various tests (eg. abdominal leak point pressures, urethral pressure profiles).

The urodynamic study can be combined with an imaging modality such as X-ray (fluoroscopic urodynamics) or ultrasound to provide anatomical as well as functional information (Figure 2, 3).

### Information gained from urodynamic studies

The aim of the urodynamic study is to reproduce the patient's urinary symptoms so that bladder function (or dysfunction) is reproduced during the study. Urodynamics provides information regarding:

- bladder overactivity – showing evidence of 'detrusor overactivity' or unstable bladder contractions
- bladder compliance – the elasticity of the bladder wall
- obstruction – by pressure and flow studies, and determining the site of obstruction by fluoroscopic imaging, and
- quality of the bladder muscle contraction.

Information is also gained regarding SUI presence, type and severity.<sup>11</sup>

### Conclusion

Clinical assessment is largely based on a combination of history, physical examination, bladder diary and basic testing of urine and bladder emptying. A clinical diagnosis of stress, urge or mixed urinary incontinence can then usually be made and conservative management instituted. Atypical features on history, examination or investigation as well as failure to respond to conservative measures or medical management should prompt specialist referral.

Conflict of interest: none declared.

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