

Frequency volume charts provide an objective measure of bladder function, which is essential to support the correct diagnosis and treatment of urological problems

Use of frequency volume charts and voiding diaries

In this article...

- › The different types of charts used to record bladder function
- › How to interpret the results
- › Case studies of how charts help with diagnosis

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Nursing Times; 111: 5, 12-16, online version. Many people experience bladder and urinary problems and the reasons for them are manifold. Charting fluid intake and urinary output is an essential part of a continence and urology assessment, which will help practitioners diagnose problems and decide on treatment. This article describes the different charts in use; it also analyses and discusses examples of completed charts.

Urinary symptoms are common and may be due to conditions affecting the urinary tract or as a result of illness affecting other systems (for example, heart failure is associated with nocturia). Accurate diagnosis is essential to ensure prompt, effective treatment of the underlying cause.

Using charts to record the times urine is passed and the volumes voided over a period of time gives an objective measure of bladder performance. The charts are usually completed by patients after they have been taught how to do so by a health professional. They provide invaluable information and are used in the following circumstances:

- › As part of the initial assessment of lower urinary tract symptoms (National Institute for Health and Care Excellence, 2010);
- › To aid diagnosis as part of a continence assessment (NICE, 2013);
- › As a baseline in planning a bladder training regime;

- › To plan an individual toileting programme;
- › To measure progress during treatment, for example for overactive bladder.

The information that must be recorded on the chart will be determined by the assessor and based on the capabilities of the patient, who must be able to safely void into a container, and measure and record the volume of fluid.

What is measured and when

There are a variety of charts in use; this article follows the International Continence Society definitions (Abrams et al, 2002), which recognise three main types of recording:

- › Micturition time chart: records the times of micturition during the day and night;
- › Frequency volume chart (FVC): records the volumes voided as well as the time of each micturition, during the day and night;
- › Bladder diary: records the times of micturition and voided volumes, episodes of incontinence, pad use, other information such as the degree of urgency, degree of incontinence and fluid intake and type.

Charts or diaries should be completed for a minimum of three days (NICE, 2013) although a period of 3-7 days is usually used; this is recommended by the European Association of Urology (Lucas et al, 2014). The patient should be asked to include work and leisure days where applicable as this may indicate exacerbating factors. Charts should include a time column covering each 24-hour period; this can be blank for the patient to insert times, but is often labelled at hourly intervals.

A bladder diary is likely to be used as

5 key points

1 Charting bladder function and fluid intake is important for investigating symptoms and making a diagnosis

2 It is important to understand what is being recorded and why

3 Patients must be assessed to ensure they can record the information required

4 Patients need to understand the importance of recording information accurately

5 A completed chart forms the basis for further discussion with the continence/urology team



The measuring jug used to measure voids should be used only for this purpose

part of a continence assessment to aid diagnosis and inform a treatment plan. It is an invaluable tool, giving a baseline against which progress can be monitored, which helps to motivate patients.

Preparation and instructions

To ensure accurate, meaningful data is recorded, health professionals should help patients understand what is required and reinforce the importance of the chart in diagnosing and managing their condition.

Practitioners should:

- » Determine the information required based on assessment;
- » Assess patients’ capabilities when deciding what to record and ensure they are not at risk of falls when voiding into a container;
- » Confirm that the patient understands fluid measurements;
- » Provide a suitable chart for recording information.

They should tell patients:

- » To use a jug to measure the volume of urine and record this on the chart against the time;
- » If patients do not use a jug, to measure the contents of any cups/glasses they use and make a note of these. Recording the volume of drinks is easier if the container volume is already known. Practitioners can do this for patients unable to do so;
- » To wash and dry the jug after each use, keeping it for this purpose only;
- » To start recording with the first void on rising;
- » That if they are unable to measure urine volumes – for example, when using a public toilet, or because they are opening their bowels at the same time – to place a tick in the column next to the time;
- » Record the time prescribed diuretic therapy is taken, as this will increase urine output;
- » Record times of going to bed and getting up.

Collating the results

When a chart is returned, the assessor should collate the information for each day to identify:

- » Daytime frequency: the number of voids recorded during waking hours, including the last void before sleep and the first void after rising in the morning;
- » Nocturia: the number of voids recorded during a night’s sleep, where each void was preceded and followed by sleep;
- » 24-hour frequency – the total number of daytime voids and episodes of

TABLE 1. FVC: NORMAL BLADDER FUNCTION

	Day 1	Day 2	Day 3
6am		500ml Got up	
7am	450ml Got up		500ml Got up
8am			
9am			150ml
10am	300ml	300ml	
11am			200ml
12pm			
1pm	200ml		
2pm		250ml	150ml
3pm			
4pm			
5pm	350ml	250ml	
6pm			300ml
7pm			
8pm	250ml		
9pm			200ml
10pm		450ml Bedtime	
11pm	350ml Bedtime		450ml Bedtime
12am			
1am			
2am			
3am		250ml	
4am			
5am			
TOTAL	1,900ml	2,000ml	1,950ml
Summary			
Number of voids each day	5-7		
Number of voids each night	0-1		
Total voids in 24 hours	6-7		
Volume voided in 24 hours	1,900-2,000ml		
Maximum void	500ml		

nocturia during a specified 24-hour period (Abrams et al, 2002). An FVC or bladder diary must be used to determine the maximum voided volume (the largest volume of urine voided during a single micturition).

Interpreting the results

Comparing the results with what is considered normal bladder function may indicate areas of dysfunction and be used to confirm a diagnosis.

It is important to remember that it is difficult to define a “normal” or healthy bladder function (Lukacz et al, 2011) as normal parameters depend on age and gender, as well as many other internal

and external factors such as fluid intake and type.

The International Continence Society defines urinary frequency as a complaint by a patient that they void too often during the day (Abrams et al, 2002), which shows that patients’ perception of their symptoms must also be considered.

As a guide, “normal” parameters of voiding volumes and frequency in adults of average weight and height are outlined in Table 1.

Daytime frequency

Normal frequency is between five and eight voids in 24 hours. A high fluid intake may increase frequency.

TABLE 2. BLADDER DIARY: STRESS URINARY INCONTINENCE

	Drinks		Urine output		Pad changes
	Volume	Fluid type	Volume	Leakage	
7am Got up	200ml	Coffee	450ml		Panty liner
8am	200ml	Juice		✓	Panty liner
9am			150ml		
10am	150ml	Water			
11am	150ml	Coffee			
12pm	200ml	Water	300ml		
1pm	200ml	Tea		✓	Panty liner
3pm			200ml		
4pm	200ml	Tea			
6pm	200ml	Water	200ml	✓	
7pm				✓	Panty liner
8pm	330ml	Cola			
10pm			325ml	✓	
11pm Bedtime	150ml	Chocolate	100ml		Panty liner
3am	100ml	Water	200ml		
Total	2,080ml		1,925ml		

Summary

Fluid intake

Number of drinks in 24 hours	11
Volume in 24 hours	2,080ml
Caffeinated drinks	6

Urine output and incontinence

Number of voids each day	7
Number of voids each night	1
Volume voided in 24 hours	1,925ml
Maximum void	450ml
Incontinent episodes	5

Pad use

Product name	Panty liner
Number used in 24 hours	5

Nocturia

Rising during sleeping hours with the need to void once may be considered normal.

If nocturia is excessive, the practitioner should ensure the patient is awakening due to the desire to void and not for other primary reasons, such as pain, and simply voiding while awake.

The production of the antidiuretic hormone vasopressin decreases with age so older people may void more frequently at night. Nocturnal polyuria is present when an increased proportion of the 24-hour urine output occurs at night (normally during the hours while the patient is in bed). The precise definition is dependent

on age and is considered to be present when more than 20% (young adults) to 33% (over 65s) of urine is produced at night. Night-time urine output excludes the last void before sleep but includes the first void in the morning (van Kerrebroeck et al, 2002). Older people with nocturnal polyuria should be assessed to exclude underlying, undiagnosed heart conditions.

Maximum volume voided

Normal functional bladder capacity in adults is approximately 300-400ml (Lukacz et al, 2011), although volumes of 500-600ml are often recorded. The largest void is usually on rising; during the day, the bladder is emptied at lower volumes.

Total volume voided

The total volume voided depends on many factors but generally, in a healthy adult, should be 1,500-2,000ml. Patients who restrict fluid intake because they fear episodes of incontinence will have a low urine output, which can exacerbate symptoms as concentrated urine may both increase urgency and the patient's risk of developing a urinary tract infection.

Low urine output that is not linked to low fluid intake should be investigated.

Fluid intake and type

An average adult in good health will require a fluid intake of 30ml per kg of body weight in 24 hours (Kobriger, 2005). Using this calculation, an adult weighing 67kg should have a daily intake of approximately 2,010ml. The European Food Safety Authority (2010) recommends women have an overall intake of 2l and men 2.5l.

Caffeine is known to cause diuresis, urinary frequency and urgency at lower bladder volumes (Lohsiriwat et al, 2011). This is troublesome for some patients, who may benefit from advice about gradually reducing their intake of caffeinated drinks.

Case studies

The fictitious case studies below indicate differing bladder function/dysfunction.

Normal bladder function

Table 1 shows the FVC of Sarah Smith, a 38-year-old health professional with normal bladder function. Over three days, the chart shows:

- » Micturition frequency: 6-7 times in 24 hours;
- » Nocturia: up to once in 24 hours;
- » Total volume voided in 24 hours: 1,900-2,000ml;
- » Maximum void: 500ml.

Stress urinary incontinence

Table 2 shows the bladder diary of 29-year-old Sue Green, who enjoys exercise and jogging. She has two children, the youngest of whom is nine months old. She has urine leakage on exertion and has no frequency or urgency. Over a single day the chart shows:

- » Daytime frequency: seven times in 24 hours;
- » Nocturia: once in 24 hours;
- » Total volume voided in 24 hours: 1,925ml;
- » Maximum void: 450ml;
- » Leakage on exertion: five times in 24 hours;
- » Continence aids: buying own panty liners for leakage;
- » Fluid intake: 2,080ml in 24 hours.

Mrs Green's fluid intake and bladder function are within normal parameters, apart from episodes of leakage. Other investigations included urinalysis and physical examination. A diagnosis of stress urinary incontinence was then made and a treatment regimen of individualised pelvic floor muscle exercises commenced.

Overactive bladder

Table 3 illustrates the bladder diary of George Emerton, a 48-year-old science teacher. He complains of urinary urgency, and leaks urine if he is unable to reach the toilet quickly. On one occasion, he had to take a white coat from the classroom to cover his clothes as he could not control his urgency on the way to the toilet. Since he was unable to measure his voids, he was asked to put a tick in the column each time he passed urine.

One day of three-day charting shows:

- » Daytime frequency: 12 times in 24 hours;
- » Nocturia: twice in 24 hours;
- » Total volume voided in 24 hours: not recorded;
- » Maximum void: not recorded;
- » Leakage with urgency occurred once in 24 hours;
- » Continence aids: pads not used;
- » Fluid intake: 1,450ml, made up of six cups of strong black coffee and a pint of lager.

From Mr Emerton's charting, the obvious causes for concern are the low fluid intake and the volume of strong black coffee. In addition, lager can irritate the bladder in some people. After urinalysis to exclude urinary tract infection and a full continence assessment, Mr Emerton was advised initially to gradually reduce his caffeinated drinks, replace these with non-caffeinated drinks and ensure his fluid intake was about 2l in 24 hours. He will be reviewed in four weeks for progress and further treatment, investigation and referral if required.

Interstitial cystitis

Table 4 is the bladder diary of 55-year-old Jenny Carter. She complained of urinary frequency, urgency and leaks urine if unable to reach the toilet quickly. Lower abdominal pain occurs as her bladder fills. She is otherwise fit and active, but is very tired due to daytime frequency and nocturia occurring every hour.

One day of three-day charting shows:

- » Daytime frequency: 17 times in 24 hours;
- » Nocturia: seven times in 24 hours;
- » Total volume voided in 24 hours:

TABLE 3. BLADDER DIARY: OVERACTIVE BLADDER

	Drinks		Urine output		Pad changes
	Volume	Type of fluid	Volume*	Leakage	
6am Got up	150ml	Coffee	✓		
7am	150ml	Coffee			
9am			✓		
11am	150ml	Coffee	✓		
1pm	150ml	Coffee	✓		
2pm			✓	✓	
3pm	200ml	Coffee			
4pm			✓		
5pm			✓		
7pm	500ml	Lager	✓		
11pm			✓		
12am Bedtime	150ml	Coffee			
1am			✓		
TOTAL	1,450ml				
Summary					
Fluid intake					
Number of drinks in 24 hours			7		
Volume in 24 hours			1,450ml		
Caffeinated drinks			6		
Alcohol			1		
Urine output and incontinence					
Number of voids each day			12		
Number of voids each night			2		
Maximum void			Not known		
Incontinent episodes			1		
Pad use					
Product name			None		
Number used in 24 hours			0		

*Because of workplace arrangements, the patient was unable to record volume

- 1,665ml plus leakage;
- » Maximum void: 90ml;
- » Leakage with severe urgency: five times in 24 hours;
- » Continence aids: three rectangular pads used;
- » Fluid intake: 2,150ml.

The bladder diary confirmed the severity of Ms Carter's symptoms. Urinalysis and vaginal examination did not show any abnormality, and constipation was excluded. A post-void ultrasound scan showed her bladder was completely emptying. Referral to a urologist led to urodynamic studies; these showed a significant increase in bladder pressure during filling, resulting in severe urgency with high pressure and leakage at 90ml. A cystoscopy and

biopsy confirmed interstitial cystitis as the cause of the symptoms. This can be a difficult condition to manage and Ms Carter is discussing the options with the urologist.

Conclusion

Charting bladder function and fluid intake gives invaluable information to the assessor, but the importance of the chart and the need for accuracy must be explained to the patient completing it.

Although these charts are only a part of an assessment of bladder symptoms, no assessment is complete without them. Symptoms explained verbally can easily be misinterpreted, so an objective measure of bladder function is essential to support correct diagnosis and treatment. **NT**

TABLE 4. BLADDER DIARY: INTERSTITIAL CYSTITIS

	Drinks		Urine output		Pad changes
Record when applying new pad					
	Volume	Type of fluid	Volume	Leakage	
6am Got up	100ml	Water	90ml	✓	Rectangular pad
7am	150ml	Tea	60ml		
8am	250ml	Tea and Juice	75ml		
9am			60ml		
10am	200ml	Coffee	90ml	✓	
11am			60ml		
12pm	250ml	Soup	60ml		
1pm	150ml	Water	60ml		
2pm	150ml	Coffee	75ml		
3pm			90ml	✓	Rectangular pad
4pm	200ml	Tea	75ml		
5pm			60ml		
6pm	150ml	Water	60ml		
7pm			90ml	✓	
8pm	200ml	Wine	60ml		
9pm			60ml		
10pm	200ml	Tea (decaffeinated)	75ml		
11pm Bedtime	100ml	Water	90ml	✓	Rectangular pad
12am			60ml		
1am			60ml		
2am			60ml		
3am	50ml	Water	60ml		
4am			75ml		
5am			60ml		
TOTAL	2,150ml		1,665ml	5	3
Summary					
Fluid intake					
Number of drinks in 24 hours (volume)			13 (2,150ml)		
Caffeinated drinks			5		
Alcohol			1		
Urine output and incontinence					
Number of voids each day			17		
Number of voids each night			7		
Maximum void			90ml		
Incontinent episodes			5		
Pad use					
Product name (number used in 24 hours)			Rectangular pad (3)		

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