



REVIEW

Frequency volume charts should be used in men with lower urinary tract symptoms

Prasanna Sooriakumaran ^{a,*}, Christian Brown ^b, Mark Emberton ^b

^a Department of Urology, Royal Surrey County Hospital, Guildford, UK

^b Clinical Effectiveness Unit, Royal College of Surgeons of England, UK

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Abstract A frequency volume chart is a simple, easy-to-use, non-invasive tool that is useful in the assessment of patients with lower urinary tract symptoms. Though more sophisticated techniques are now available for diagnosis, the frequency volume chart should still be considered the first line investigation. In this review we summarize the indications and value of this age old investigation. Urologists and primary care physicians should use the frequency volume chart more frequently in their practice.

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Introduction

The frequency volume (FV) chart is the systematic registration of voiding habits by patients in their own environment for a specified period of time.¹ FV charts have been used for many years, the first charts being introduced in the late 1970s.² In these patients were asked to record with an 'X' each time they voided at night. The first advance came when the 24 h period was divided into daytime when the patient is awake, and night-time when asleep, i.e. when the patient was in bed with the

intention of sleeping, rather than when it was dark.² Such a chart is illustrated in Fig. 1 below.

Frequency chart

Later modifications included asking the patient to document fluid intake (type and volume), the volumes of urine voided, the number of episodes of urgency, incontinence and the use of incontinence aids such as pads.

No standard FV chart exists; they vary from the simple charts measuring the total number of voids in a day, to urinary diaries which record fluid intake, frequency, volume, urge episodes, pad usage, and patient activities in relation to their lower urinary tract symptoms (LUTS).² FV charts

* Corresponding author. Flat 15, Andhurst Court, 2A Coombe Lane West, Kingston, Surrey KT2 7DX, UK. Tel.: +44 7813647076; fax: +44 1483464838.

E-mail address: p.s@doctors.org.uk (P. Sooriakumaran).

| | DAY | NIGHT |
|---------|------|-------|
| DAY 1 | XXX | |
| DAY 2 | XX | |
| DAY 3 | X | + |
| DAY 4 | X | ++ |
| DAY 5 | XX | |
| DAY 6 | XXXX | + |
| DAY 7 | X | + |
| AVERAGE | | |

Figure 1 Simple 7 day frequency chart recording micturition and leaking episodes (adapted from Abrams and Klevmark²). Each time you pass your urine, mark the chart with an X. If you leak or wet the bed, mark the chart with a +. Keep the record for 7 consecutive days (or as long as possible). 'Day' is from the time you get up until the time you go to bed.

also vary in the time period over which the patient is required to fill in the chart; initial charts were commonly over a 7-day period² though 24 or 48 h is usual nowadays.¹ A 1–3 day chart is commonly used in clinical practice and evidence has shown this is as useful as those charts kept for longer periods.³

Patients once suitably counselled can easily fill these charts accurately.⁴ Studies have shown that the information obtained from FV charts, such as voided volumes, correlate well with that obtained from invasive methods of assessing voiding (dys)function such as urodynamic study.^{5,6} Despite the many advantages of FV charts they are not widely used in routine urological practice in the assessment and management of men with LUTS. This contrasts to the assessment of women with lower urinary tract dysfunction where FV charts are widely used.

The purpose of a FV chart is to obtain objective information about a patient's urinary symptoms that would be difficult to elicit from the history alone. They are useful in quantifying symptoms at baseline as part of the diagnostic work up of a patient with LUTS and prior to lifestyle, medical or surgical intervention.^{2,7–9}

In this review we examine the role of FV charts in the assessment and management of men with LUTS. The role of FV charts in women and children will not be discussed.

Role of FV charts in the assessment and diagnosis of men with LUTS

The urinary bladder has two functions: to store and to empty urine.¹⁰ FV charts are an inexpensive and easy-to-use method of assessing bladder function.¹¹

LUTS are experienced by one half of all men over the age of 65.¹² The term LUTS has largely replaced 'prostatism' which tends to suggest that these symptoms are due the prostate alone.¹³ Although benign prostatic hyperplasia (BPH) is probably the most common cause it is rarely the sole culprit. The bladder, kidneys, brain, heart, and urine all contribute. Bladders can be small, stiff (poorly compliant), weak (detrusor failure) or overactive, as a result of long-term obstruction to the outlet by prostatic enlargement. Any of these bladder conditions may also occur independently and be the primary cause of a man's LUTS. It is important that the assessment of men with LUTS does not focus on bladder outflow obstruction alone and all symptoms are considered.

It is known that information from subjective questionnaires e.g. International Prostate Symptom Score (IPSS and self-reporting of symptoms may not always be accurate.¹⁴ It is for these reasons both the EAU and AUA clinical practice guidelines on BPH and LUTS recommend the use of FV charts when assessing men with LUTS in addition to the use of symptom questionnaires. FV charts have been used extensively in the assessment of nocturia^{15,16} and have confirmed a relation between nocturnal urine production and voiding frequency in older men.¹⁷ Studies using FV charts have shown that 25% of older men suffer from severe nocturia (>3 nocturia episodes per night) and produce larger volumes of urine at night (nocturnal polyuria) compared to men who do not have such nocturia.¹⁸ A 3-day FV chart would be sufficient to detect nocturnal polyuria and therefore to be of value in evaluating patients with LUTS.¹⁸ This is a significant finding as treatments directed primarily at the prostate with medication or surgery in this group may be less effective in reducing nocturia. Prior to better understanding of nocturia many patients presenting with this symptom would have had a transurethral resection of the prostate, sometimes with poor results as the pathology is not bladder outflow obstruction. Poor agreement exists between the responses on the FV charts and the IPSS question on nocturia suggesting that the IPSS is not a good indicator of nocturia, further supporting the use of FV charts in the assessment of nocturia.¹⁹

Five diagnostic prototypes of FV charts have therefore been described by Nordling¹⁰ which, in conjunction with patient history, may help categorize patients:

Type 1 with normal single volumes and normal 24 h volume denotes normal bladder function.

Type 2 with normal single volumes and increased 24 h volume denotes normal bladder

function, but with polyuria as the cause of urinary frequency, which may be due to excessive intake or secondary to diabetes or renal insufficiency.

Type 3 with small single volumes during the day and night is usually due to motor or sensory urgency.

Type 4 with large morning first void volume and variable small volumes during the day is usually seen in psychosomatic conditions.

Type 5 with increased daytime urinary frequency and nocturia but with normal single and 24 h volumes suggest bladder outflow obstruction, typically due to BPH.

The validity and reliability of FV charts has been thoroughly investigated by urodynamics.^{5,6} In men with LUTS suggestive of benign prostatic hyperplasia (BPH), filling cystometric capacities are strongly associated with maximal and mean voided volumes derived from FV charts.⁶ It is known that functional bladder capacity (FBC), defined as the largest single voided volume, declines with age, and this decline in FBC is one of the diagnostic predictors for BPH.²⁰ FV charts allow us to evaluate FBC as well as provide information on urinary frequency, an important symptom as many men with BPH have an overactive bladder secondary to outlet obstruction.^{20–22}

The role of FV charts in monitoring treatment interventions

Completing serial FV charts before and after treatment interventions is a cheap, non-invasive and effective method of monitoring LUTS regardless of the underlying pathology. Involving patients in this way by asking them to complete FV charts may help increase compliance with the current behavioural or medical intervention strategy as if it is effective, as they can personally quantify their improved urinary habits. This is important as discontinuation rates of medical therapy such as alpha-blockers can be as high as 25% in the first three months.

Information obtained from FV charts, such as voided volume or bladder capacity, can be used as effective outcome measures in clinical trials for men with LUTS. They have been used in many randomised placebo controlled trials to supplement the measurement of outcome alongside for example the IPSS, uroflow, post-void residual measurement and urodynamics.⁷ Trials involving behavioural, medical and surgical therapies have all used the data obtained on FV charts as outcome measures.

Studies have used FV charts to assess urinary urge incontinence in older adults.^{23,24} Frequency

of urinary accidents was shown to be consistently reduced after biofeedback, pelvic muscle floor exercises, scheduled voiding, and other behavioural strategies, with the use of patient-recorded FV charts. Posterior tibial nerve stimulation,^{25,26} pelvic floor electrical stimulation,²⁷ and sacral neuromodulation²⁸ have all been assessed in the treatment of urinary incontinence using FV charts in combination with quality of life questionnaires (such as I-QoL and SF-36), pad tests, and urodynamic parameters.

In men with nocturnal polyuria and nocturia, FV charts have shown that furosemide and desmopressin result in a significant reduction in night-time frequency and nocturnal voided volume compared to placebo.^{29,30} These studies defined nocturia as the number of night-time urinary voiding episodes, and polyuria as the production of > 33% of the 24 h urine volume overnight, averaged over a 1-week period. Without the use of FV charts to record urinary frequency and volume measurements, these studies would have been much more difficult to perform.

FV charts have also confirmed that bicalutamide, a non-steroidal anti-androgen, has no significant benefit over placebo in the treatment of BPH.³¹ In this study prostate volume (using transrectal ultrasound planimetry), urinary flow rates (using an uroflowmeter), and pressure-flow examinations (using urodynamics), were used in conjunction with FV charts to assess treatment effect.

Surgical techniques such as transurethral needle ablation of the prostate (TUNA) have been shown to be of value in the management of BPH when assessing symptom impact with the American Urological Association (AUA)-7 symptom index and an added quality of life question, the AUA BPH-Impact Index, and a sexual function score. Objective improvement after TUNA was shown using free-flow uroflowmetry, post-void residual urine volume, and pressure-flow urodynamics; FV charts confirmed significantly decreased daytime frequencies and nocturia in patients after TUNA compared to baseline.

Conclusion

FV charts are non-invasive, inexpensive, and easy-to-use. They are a useful tool in the assessment, diagnosis, and monitoring of interventions in men with LUTS; however, their role in current practice is ill defined. FV charts have been shown to provide objective information regarding fluid intake, voiding patterns both day and night and incontinence.¹⁰ Much of this information is difficult to obtain from the history alone.

Although recommended by the EAU and AUA, FV charts are not widely used. This is more likely to be due to doctors not giving patient charts to complete and relying on history and flow rates, rather than patients failing to complete them. In selected cases this may have an implication for the management of specific patients. Despite their simplicity FV charts are useful and their use should be encouraged, both in primary care and specialist practice.

Competing interests

There are no competing interests for this paper.

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