

Bladder Failure, Passive Incontinence and Overflow Incontinence

Bladder failure

- Detrusor underactivity
- Detrusor hypocontractility

ICS definition “detrusor underactivity”

...a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or failure to achieve complete bladder emptying within a normal time span”

The bladder is a simple beast...?

In response to any insult (*ageing, ischaemia, obstruction, inflammation*)
it...

**Becomes
overactive....**

**Gives
up....**

Or does a bit of both...?

61% of 77 Nursing Home women
experience detrusor hyperreflexia ¹

42% of pregnant women
experience SUI during their last
pregnancy²

12% of 99 women experience
impaired detrusor contractility³

Or transforms from one to the other....

1. Resnick, NM. *et al. N Engl J Med* 1989;320:1-7; 2. Groutz, A. *et al. Neurourol Urodyn* 1999;18:419-425;
3. Arbanel, J. *et al. Urology* 2007;69(3):436-440.

Prevalence of the problem

Study	Population	Size	Age range, yr	Diagnostic criteria	Prevalence of DU, % (% of acontractile detrusors)
Fusco et al. [21]	Male	541	26–89	$P_{det@Q_{max}} \leq 30$ and $Q_{max} \leq 12$	10
Kuo [22]	Male	1407	46–96	Relaxed sphincter EMG with open membranous urethra during voiding and low flow rate	10.6
Nitti et al. [23]	Male	85	18–45	Bladder outlet obstruction index <20 and uroflow <12 ml/s	9
Wang et al. [24]	Male	90	18–50	$P_{det@Q_{max}} < 30$, $Q_{max} < 15$	10
Kaplan et al. [25]	Male	137	18–50	$P_{det@Q_{max}} < 45$ cm and $Q_{max} < 12$ ml	23 (5)
Karami et al. [26]	Male	456	18–40	ICS definition	12.9 (10.5)
Arbabanel et al. [27]	Male	82	>70	$P_{det@Q_{max}} < 30$ cm H ₂ O and $Q_{max} < 10$ ml	48
	Female	99	>70		12
Jeong et al. [28]	Male	632	>65	Bladder Contractility Index <100 (men)	40.2
	Female	547	>65	$Q_{max} \leq 12$, $P_{det@Q_{max}} \leq 10$ (women)	13.3
Resnick et al. [29]	Male	17	87	In the absence of obstruction, Underactive detrusor:	41.2
	Female (institutionalised)	77		“Failure to empty in the absence of an increase abdominal pressure.” DHIC: “Involuntary detrusor contraction that emptied less than half of volume instilled”	37.7
Resnick et al. [30]	Female (institutionalised)	97	87.6*	“Reproducible failure of the involuntary contraction to empty at least half of bladder contents in the absence of straining, urethral obstruction, and detrusor-sphincter dyssynergia”	45*
Groutz et al. [31]	Female	206	62.6 ± 15.8 yr [†]	ICS definition	19
Valentini et al. [32]	Female	442	>55	“Impaired detrusor contraction leading to prolonged voiding time and high residual volume”	13.8

DHIC = detrusor hyperreflexia with impaired contractility; DU = detrusor underactivity; EMG = electromyogram; ICS = International Continence Society; $P_{det@Q_{max}}$ = detrusor pressure at the time of maximum flow; Q_{max} = maximum flow rate.
* DHIC.
[†] Mean plus or minus the standard deviation.

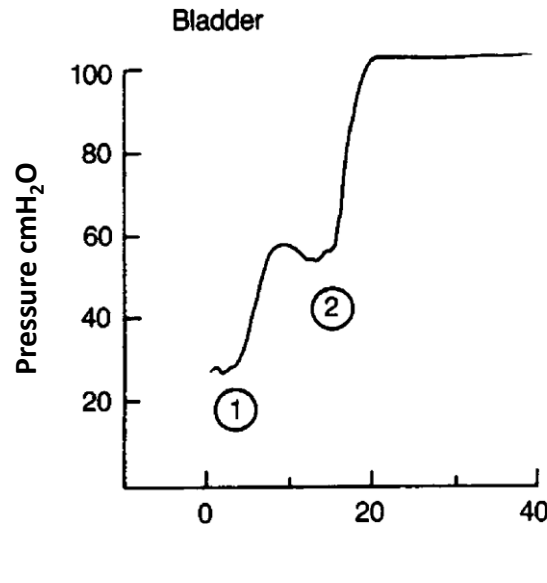
What is DHIC?

- First described 1987
- Not Detrusor Hyperactivity with Impaired Contractility, but Detrusor Hyperactivity with Impaired Contractile function
- Uninhibited detrusor contraction which empties less than ½ of bladder volume
- Occurred in 1:3 incontinent institutionalised patients in original series (n=32, 27F)

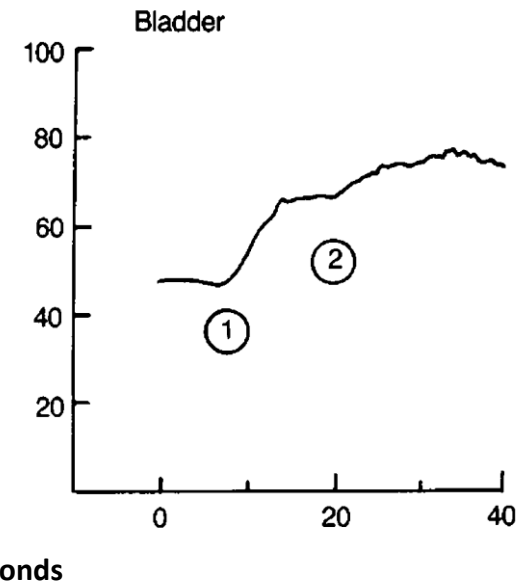
What is DHIC?

- Patients with DSD, SCI, USI, BOO excluded from the series
- Speed of contraction & ΔP reduced
- Isovolumetric pressure reduced (index of contractility?)

Pressure tracing of uninhabitable voiding contraction in a patient with detrusor hyperreflexia



Pressure tracing from a patient with detrusor hyperactivity with impaired contractile function



BOO: bladder outlet obstruction; DHIC: detrusor hyperactivity with impaired contractile function; DSD: detrusor sphincter dyssynergia; SCI: spinal cord injury; USI: urodynamic stress incontinence.

Resnick, NM. & Yalla, SV. *JAMA* 1987;257(22):3076-3081.

- Dichotomised in the sample – not a spectrum, but small sample

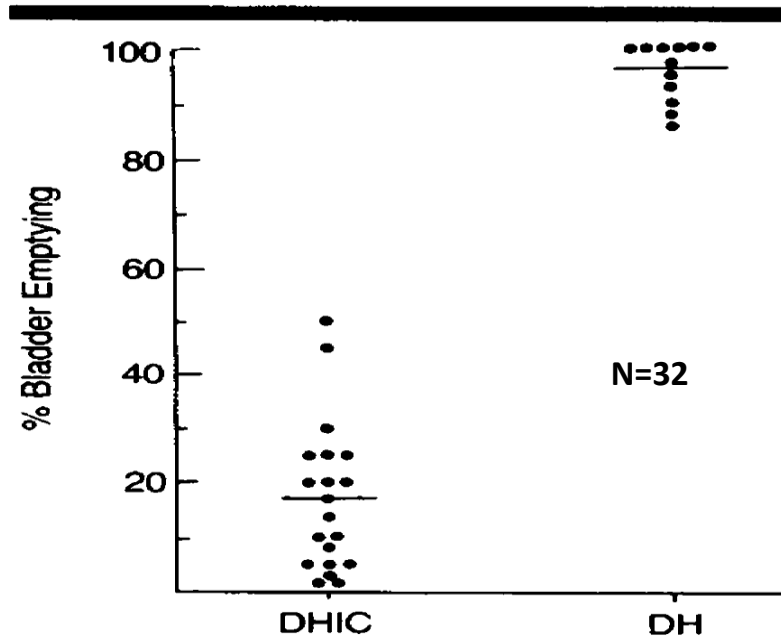


Fig 1.—Percent of total bladder volume evacuated by uninhibitable voiding contraction. Bimodal distribution can be seen, with mean value of 17% for detrusor hyperactivity with impaired contractile function (DHIC) and 96% for detrusor hyperreflexia (DH) ($P < .001$).

Detrusor contractile function in association with age

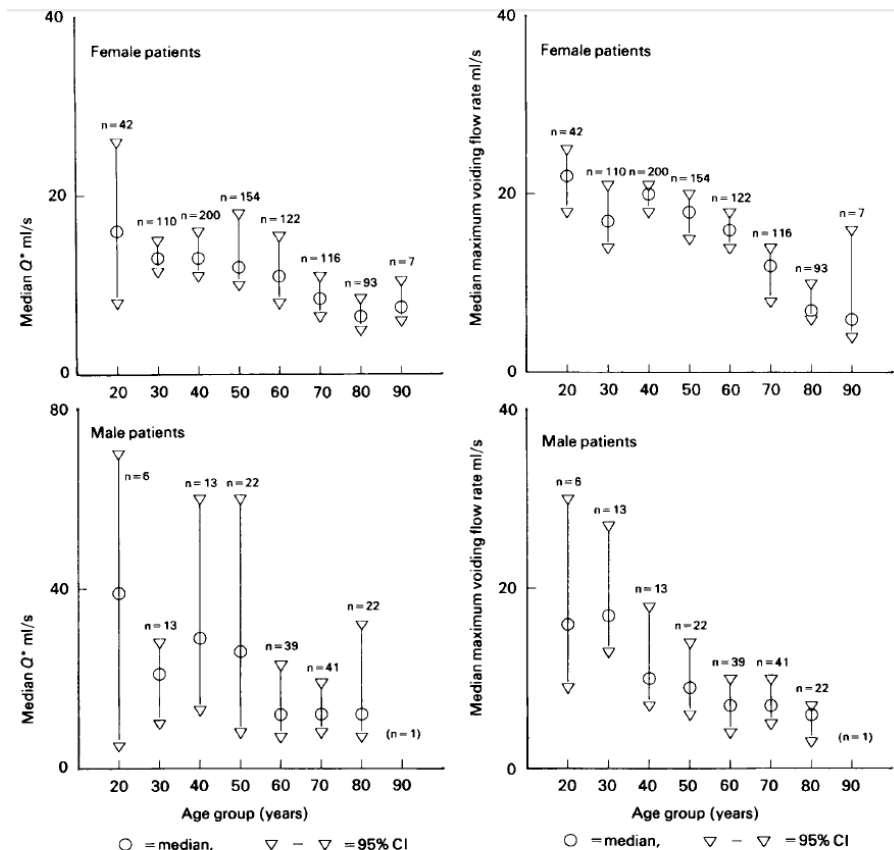


Fig. 4 Median Q^* and 95% CI from 844 women and 157 men with sufficient data to calculate Q^* , by age group.

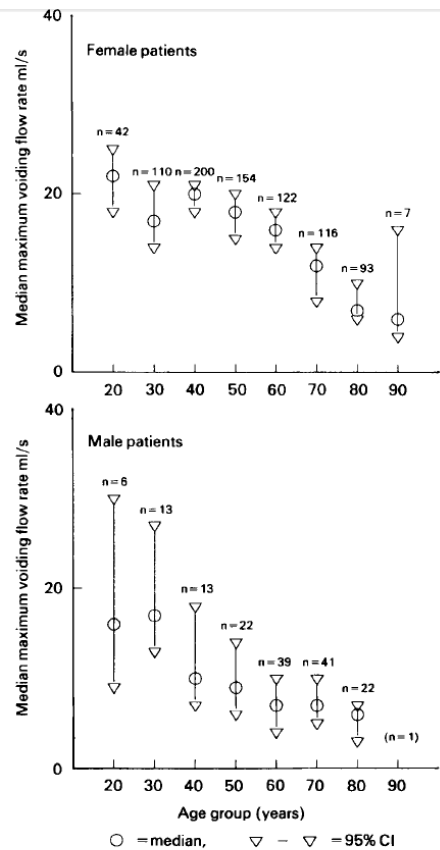


Fig. 5 Median maximum flow rate and 95% CI from 844 women and 157 men with sufficient data to calculate Q^* , by age group.

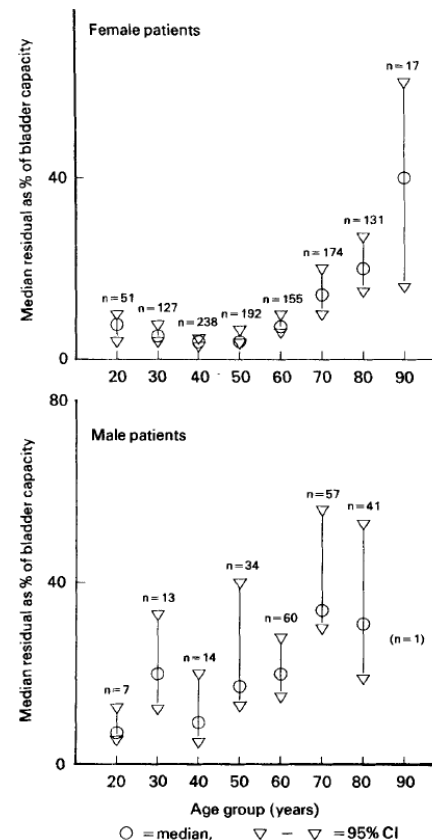


Fig. 3 Median residual volume as a percentage of bladder capacity and 95% CI. (From 1085 women and 228 men who voided incompletely, by age group).

Detrusor contractile function in association with DO

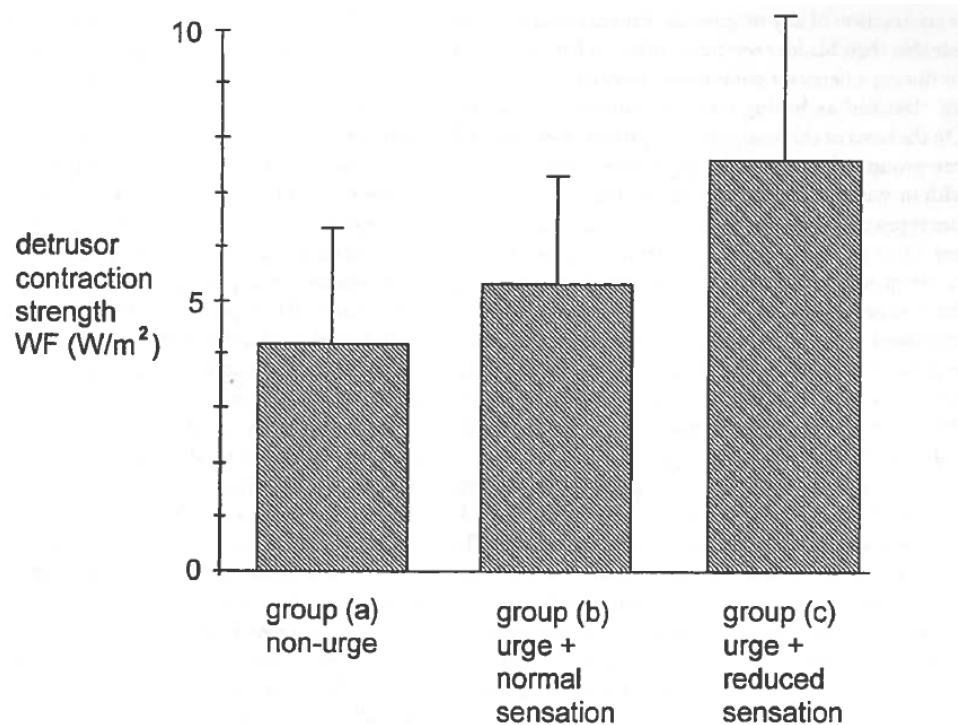


Fig. 2. Detrusor contraction strength during voiding (value of Watts factor WF at maximum flow during pressure-flow study of voiding), showing mean values and standard deviations in the three patient groups. The differences among the groups are statistically significant ($P < 0.0005$).

Residual urine

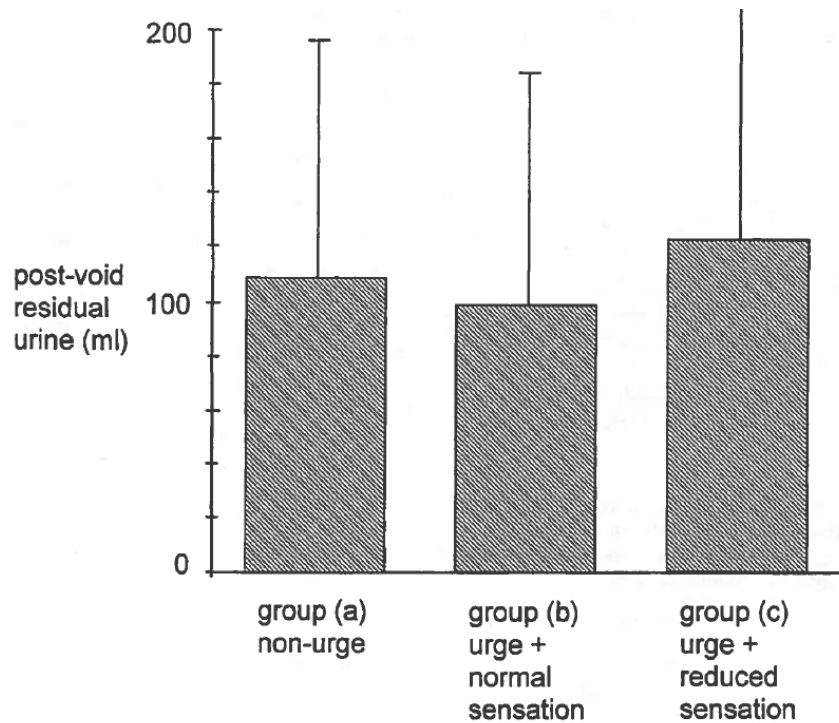


Fig. 1. Residual urine volume (average of three measurements over 24-hour period), showing mean values and standard deviations in the three patient groups. There is no statistically significant difference among the groups ($P=0.75$).

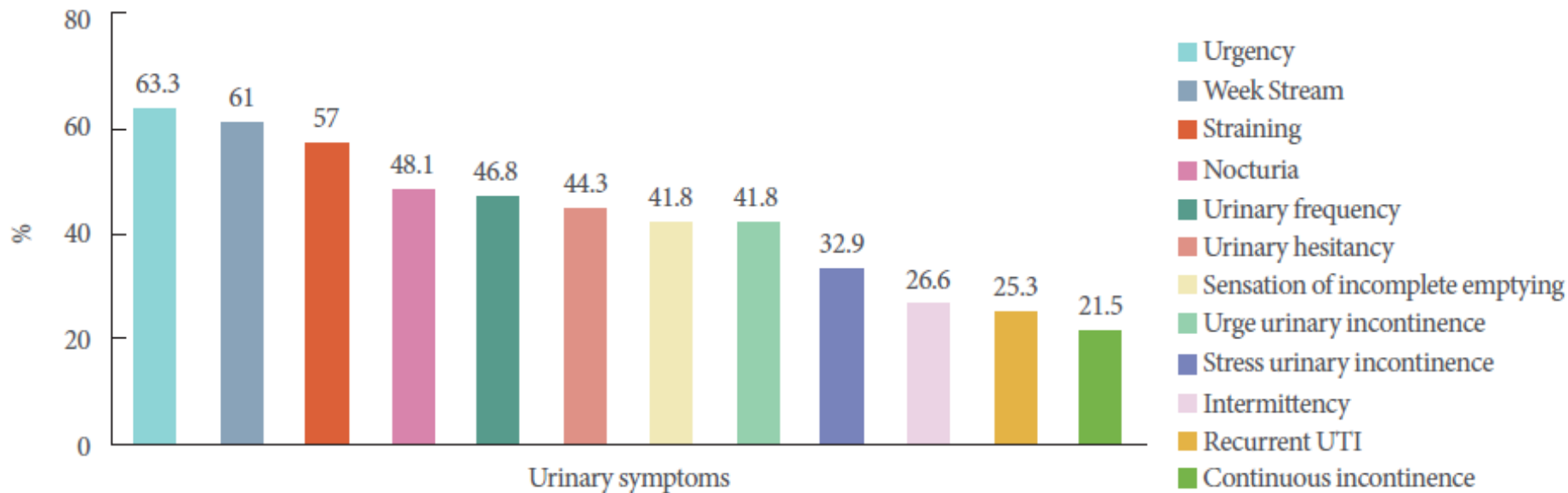
- RU associated with urethral resistance, larger in high volume bladders
- No association with urgency, bladder sensation or cortical perfusion

Clinical features

Indistinguishable from other lower urinary tract dysfunction

- Hesitancy
- Slow stream
- Intermittency
- Straining
- Prolonged void

Urinary flow rate is used as a screening test for BOO but does not distinguish between BOO and DU



Detrusor underactivity was defined by a bladder contractility index of less than 100 on cystometry

The prevalence of detrusor underactivity in this study was 23% (79 of 343)

Average age of the patients was 59.2 years (range, 19–90 years)

Women represented 68.4% (54 of 79) of the patients

Multiple factors to consider

- The presence or absence of sensation of incomplete bladder emptying
- The strength and persistence of the detrusor contraction
- The extent to which the bladder is able to empty
- The degree of outlet resistance

Natural history

- 10 yr follow-up of men diagnosed with DU
- 69 men, mean follow-up: 13.6 yr
- There was no significant deterioration in symptomatic or urodynamic parameters over time
- 11 patients underwent transurethral resection of the prostate, 8 (11.6%) due to worsening LUTS and 3 (4.4%) due to acute retention
- Those with worsening LUTS had repeat flow studies preoperatively that showed no significant change compared with baseline values
- PVR of 108–126 ml at the end of the 10-yr follow-up

Chronic painless retention

- Chronic urinary retention (CUR) was traditionally defined as a PVR >300 ml
- ICS does not commit to an absolute volume
“a non-painful bladder, which remains palpable or percussable after the patient has passed urine”

Treatment

- Treatment options are limited
- Theoretically, the condition can be improved by agents that increase detrusor contractile activity and decrease bladder capacity and/or decrease outlet resistance
- Pharmacotherapy includes the use of muscarinic receptor agonists such as bethanechol¹ to stimulate detrusor muscarinic receptors or cholinesterase inhibitors such as distigmine²
- CIC – where there are symptoms

Distigmine is no longer available for use in the UK²

CIC: clean intermittent catheterization.

1. Bethanechol Summary of Product Characteristics. 2015.

2. Information obtained from: <http://www.mims.co.uk/deleted-products-2013/article/1165289>.

Date accessed: February 2017.

Overflow incontinence

- No prevalence data exist
- Single study suggesting that in pts over 65 with PVR>50mL, “detrusor hypotonicity” existed in 45% of 34 pts

Overflow incontinence

- Urinary incontinence associated with chronic retention of urine
- Neurological, metabolic, infectious, pharmacological causes
 - Bladder failure, outflow tract obstruction, BPE, Herpes zoster, sphincteric overactivation, bladder stones, prolapse, MS, stroke
- Management: Remove remediable causes, consider de-obstructing surgery, CIC
- Alpha – agonists



QS vibrating stimulator

Passive incontinence

- Causes:
 - Severe sphincteric incompetence
 - Uninhibited urethral sphincter relaxation
 - Fistula – rare, but consider if radiotherapy, cancer
 - Urgency incontinence with absent sensation
 - Overflow incontinence

Urine leakage during non-physical activity

English Text: During the past 12 months, {have you/has SP} leaked or lost control of even a small amount of urine without an activity like coughing, lifting, or exercise, or an urge to urinate?

Target: Both males and females 20 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Yes	471	471	
2	No	4474	4945	KIQ050
7	Refused	2	4947	KIQ050
9	Don't know	6	4953	KIQ050
.	Missing	458	5411	

English Text: How frequently does this occur? Would {you/she/he} say this occurs...

Target: Both males and females 20 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Every day,	166	166	
2	A few times a week,	118	284	
3	A few times a month, or	87	371	
4	A few times a year?	98	469	
7	Refused	0	469	
9	Don't know	2	471	
.	Missing	4940	5411	

Treatment

- Difficult!
- PFMT may help
- AM may be of use
- Containment products often required