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Title: Is urinary continence considered in the assessment of older people after a fall in England and Wales?: Cross-sectional clinical audit results

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Keywords: Falls, Urinary incontinence, Clinical Audit, Older People

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Abstract: ABSTRACT

**OBJECTIVES:** To investigate adherence to the urinary function assessments of the national falls guidelines for England and Wales.

**STUDY DESIGN:** Secondary data analysis of the 2006 National Clinical Audit of Falls and Bone Health.

**SETTING:** Acute hospitals in the UK

**PARTICIPANTS:** Patients aged 65 years and older with a fragility fracture as a result of a fall.

**MAIN OUTCOME MEASURES:** Data were analysed to determine whether patients with fragility fractures received an assessment of urinary function including continence status; whether impairment was detected and if action was taken to prevent continence related falls.

**RESULTS:** 63% (2009) of 3184 patients were assessed for urinary continence following a hip fracture and 41 % (817) of these identified a problem. 21% (1187) of 5642 patients with non-hip fragility fractures were assessed and a problem was found in 27% (316). Hip fracture patients were more likely ( $p < 0.0001$ ) to receive a continence assessment and have problems detected. Only about half of those with problems had any intervention or a referral to a continence service. Admission to hospital for non hip fracture patients was a strong predictor of being assessed ( $p < 0.0001$ ).

**CONCLUSION:** Rates of assessment and action for those with who fall and have continence problems are low despite current national guidelines

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14<sup>th</sup> December 2010

Dear Sir/Madam

**Manuscript: Is continence considered in the assessment of older people after a fall in England and Wales? Cross-sectional clinical audit results**

I would be very grateful if you would consider the attached manuscript for publication in the Maturitas.

Yours sincerely,

Rhodri Edwards  
Research Fellow  
Department of Geriatric Medicine



UCL Hospitals is an NHS Foundation Trust comprising: The Eastman Dental Hospital, The Heart Hospital, Hospital for Tropical Diseases, National Hospital for Neurology and Neurosurgery, The Royal London Homoeopathic Hospital and University College Hospital (incorporating the former Middlesex and Elizabeth Garrett Anderson Hospitals).

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1<sup>st</sup> March 2011

Dear Ms O'Brien,

**Manuscript: Is urinary continence considered in the assessment of older people after a fall in England and Wales? Cross-sectional clinical audit results**

Thank you for your e-mail regarding this manuscript.

We have now made a number of revisions to the manuscript following comments and suggestions made by the reviewers and we would be grateful if you would now consider the attached manuscript for publication in the Maturitas.

The changes made to the manuscript include

- The title now specifies "urinary" continence
- In the method section we have added detail to how patients were selected and who conducted the audits. We have emphasised that patients selected were aged 65 and above, consecutive presentations with hip or non hip fragility fractures resulting from a fall between the 1<sup>st</sup> October 2006 to 31<sup>st</sup> December 2006. We have specified the definition of fall used and detailed the exclusion criteria. We have set out that a local audit lead was identified to conduct the audit at each site. We have detailed that a multidisciplinary team collated information from primary and secondary care.
- We have added detail in the method section as to what checks were in place to ensure data quality and reliability. We have added a note to explain guidance and definitions were provided to answer each question. We have explained the web based tool offered some consistency checks. In addition we have explained what reliability and checking methods were used.
- We have added a paragraph in the discussion section to address the possibility that continence was assessed in primary care but not documented or picked up by the audit.

With these amendments I hope you will now consider this manuscript for publication.

Yours sincerely,

Rhodri Edwards  
Research Fellow  
Department of Geriatric Medicine



UCL Hospitals is an NHS Foundation Trust comprising: The Eastman Dental Hospital, The Heart Hospital, Hospital for Tropical Diseases, National Hospital for Neurology and Neurosurgery, The Royal London Homoeopathic Hospital and University College Hospital (incorporating the former Middlesex and Elizabeth Garrett Anderson Hospitals).

**Is urinary continence considered in the assessment of older people after a fall in  
England and Wales?: Cross-sectional clinical audit results**

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## **ABSTRACT**

**OBJECTIVES:** To investigate adherence to the urinary function assessments of the national falls guidelines for England and Wales.

**STUDY DESIGN:** Secondary data analysis of the 2006 National Clinical Audit of Falls and Bone Health.

**SETTING:** Acute hospitals in the UK

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**MAIN OUTCOME MEASURES:** Data were analysed to determine whether patients with fragility fractures received an assessment of urinary function including continence status; whether impairment was detected and if action was taken to prevent continence related falls.

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**CONCLUSION:** Rates of assessment and action for those with who fall and have continence problems are low despite current national guidelines

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## **Introduction**

Falls and urinary incontinence are major problems amongst older people. Both are associated with significant morbidity, and consumption of health care resources [1,2,3,4]. Falls in older people result from a complex interaction between intrinsic factors (such as age, specific diseases and gait and balance disorders) and extrinsic environmental factors [1,2,5,6]. Previous studies examining risk factors for falls have identified; a previous falls history; fear of falling; postural hypotension; use of sedative medication; prescription of multiple medicines; impaired mobility, transfers and muscle strength; balance and gait deficits; visual and cognitive impairment as well as environmental hazards as modifiable predictors of falls [1,7,8,9]. A number of multifactorial interventions have been effective in reducing the risk of falling in clinical trials [7,9,10,11,12].

Urinary incontinence as a risk factor or predictor for falls has probably received less attention [13]. However, a relationship between falls, urinary incontinence and some lower urinary tract symptoms (LUTS) has been established. Lower urinary tract symptoms examined have included urinary incontinence, urinary urgency and nocturia; all which have a positive association with falls [14,15,16,17,18,19,20]. A meta-analysis of nine studies investigating falls and urinary incontinence in community dwelling older people showed the odds of falling were increased (odds ratio [OR] 1.54, 95%CI 1.41 to 1.69) in the presence of urge incontinence and in the presence of mixed incontinence (OR 1.92, 95% CI 1.69 to 2.19) [21]. Reported odds ratios are higher for people living in

institutional care [15,16,22]. A further study investigating the relationship of lower urinary tract symptoms in men and falls showed the one year cumulative incidence of falls increased by 11 % for men with moderate LUTS and 33 % for men with severe symptoms [20]. Treatment of the bladder problem might theoretically lead to a reduction in falls. However, there are no intervention trials which test this assumption [13].

In 2004 the National Institute for Clinical & Healthcare Excellence (NICE) which covers the National Health Service in England, Wales and Northern Ireland set out guidelines on falls assessment and prevention. As part of this multi-factorial, multi-disciplinary model of investigation and intervention, specific recommendations regarding continence care were laid out [23].

Unfortunately, despite the impact of urinary and faecal incontinence upon the lives of sufferers, continence care is often overlooked in the management of specific diseases where it is particularly relevant. The National Audit of Continence Care for Older People reported deficiencies in the organisation of services as well as the assessment and management of urinary incontinence in the elderly [24]. In the 2008 National Sentinel Stroke Audit only 60% (2044/3402) stroke patients with incontinence had a documented clinical management plan to promote continence [25].

The 2006 National Clinical Audit of Falls and Bone Health investigated the care received by individuals who had fallen and sustained a fragility fracture [26]. Here we report data from the audit concerning the extent to which the continence assessment aspects of the NICE guidelines were followed.

## **Aim**

To investigate adherence to the urinary function assessments of the NICE falls guidelines in patients presenting with falls resulting in fragility fractures.

## **Method**

All acute hospitals in England, Wales, Northern Ireland and the Channel Islands were eligible to participate in the audit. Each participating site submitted clinical data concerning the standards of care for the first 20 consecutive patients with a hip fracture and first 40 with a non-hip fragility fracture resulting from a fall presenting consecutively to their service between 1<sup>st</sup> October 2006 and 31<sup>st</sup> December 2006. All patients were aged 65 or over. A fall was defined as an event whereby an individual comes to rest on the ground or lower level with or without loss of consciousness. Non hip fractures were defined as vertebral, radius ulna, humeral or pelvic fractures [26].

Patients were excluded if they presented with multiple fractures, were not local to the hospital, had a documented life expectancy of less than 1 year, died up to 3 months after the fall or their presentation was delayed by more than 5 days [26].

Sites were recruited for participation along with the local primary care trust to ease hospital and community collaboration. Local audit leads were identified at each site and advised to set up a multi disciplinary group to collate the data required from both primary and secondary care sources. Clinical notes were assessed retrospectively for documented evidence of specific activities set out in the audit questions. Guidance and definitions were provided on how to answer each question. Data were submitted using a web based tool to a secure internet site which involved no transmission of personally identifiable data.

This data entry tool had a routing and consistency check built in. In order to establish reliability (agreement between auditors) sites were asked to re audit their first five cases using a different auditor. Auditors were asked to check a summary of their electronic data against hard copies prior to submission. Checks were made to ensure the data was largely consecutive and review the types of exclusions [26].

Standards for the assessment of continence were taken from the National Institute of Health and Clinical Excellence guidelines, 'Falls: the assessment and prevention of falls in older people' [23]. Four questions were asked in relation to continence:

- Did the patient have an assessment of urinary function including continence status?
- Was there any impairment detected?
- Was there any intervention to prevent falls related to bladder function?
- Were appropriate referrals made for continence problems from the assessment?

Guidance provided indicated that an assessment of urinary function including continence status must involve documentation noting the presence of long term urinary catheter, urgency, frequency and nocturia. Regarding intervention and referral, the guidance required documentation to demonstrate that steps were taken to facilitate access to toileting and facilitate continence; such as referral to a continence advisor if there was any impairment of urinary function or continence.

Data were analysed using SPSS version 15 and STATA 8. Binary regression methods (STATA 'binreg' software) were used to obtain risk ratios for whether patients were

assessed, impaired, treated and referred, with 95% confidence intervals adjusted for hospital clustering effects. Because of similarities in practice styles and organization within hospitals, patients treated at one hospital are more likely to receive similar care than are patients treated at different hospitals and without adjustment for cluster similarity, confidence intervals and p values might be erroneous.

## **Results**

Ninety one percent (157/173) of hospital trusts participated in the audit and supplied data on 3184 hip and 5642 non hip fragility fracture patients.

The mean (standard deviation) age of patients with hip fractures was 82 (7) years and non hip fractures 79 (8) years. A majority of patients in both groups were female; 80% (2555) of patients with hip fractures and 86% (4880) of patients with non hip fractures. Sixty eight percent (2152) of patients with hip fractures and 81% (4558) of patients with non hip fractures lived in their own home prior to sustaining their injury.

Of the non-hip fracture patients, 3582 (63%) had radius / ulna fractures, 1511 (27%) humerus, 438 (8%) pelvic and 190 (3%) vertebral fractures, with 79 of these patients having multiple fractures

99.8% (3179) of patients with hip fractures were admitted to hospital. Fractures of other areas resulted in 34% (1942) of patients being admitted. Of the non-hip fractures not admitted to hospital, 96% (3548/3700) returned to their usual place of residence. .

Rates of continence assessment, detected impairment, intervention and appropriate referral for hip and non-hip fragility fractures are shown in Table 1. Patients with a hip

fracture were three times more likely to have an assessment of urinary function that included continence status than those who had fallen and sustained a non-hip fracture. They were also more likely to have an impairment detected. However, they were no more likely to receive any intervention to prevent continence related falls. Indeed, non hip fracture patients were referred more frequently to a continence service, and were more likely to have intervention or referral.

Amongst patients with non hip fragility fractures the type of injury sustained had some bearing on whether a continence assessment was undertaken. Only 15% (527/3517) of patients with a radius/ulnar fracture received a continence assessment, whereas 23% (330/1456) of patients with a humerus fracture (risk ratio 1.56, 95% CI 1.34-1.81,  $p < 0.001$ ), 42% (75/178) of patients with vertebral fractures (risk ratio 2.81, 95% CI 2.28-3.47,  $p < 0.001$ ) and 51% (210/412) of patients with pelvic fractures (risk ratio 3.40, 95% CI 2.85-4.06,  $p < 0.001$ ) received an assessment. Forty-four percent (35/79) of patients with multiple (non hip) fractures received an assessment (risk ratio 2.96, 95% CI 2.25-3.89,  $p < 0.001$ ).

Whether or not non-hip fracture patients were admitted to hospital was a strong predictor of having a urinary function assessment (Table 2), but showed little relation to rates of impairment, intervention or referral.

Measured predictors of patients having a continence assessment are summarised independently in Table 3. Whether or not patients were admitted during standard hours (Monday to Friday 0800-1800) was also analysed but differences were not statistically

significantly different. Assessment rates for hip-fracture patients varied little by age, gender and residence of origin (Table 3). Assessment rates for non-hip-fracture patients varied little by gender and residence but older non-hip fracture patients were more likely to be assessed.

## **Discussion**

The prevalence of urinary incontinence in the adult populations is estimated to be between 20-30% in women and 5-10% in men [3,27]. This increases with age and up to 60% of people in institutional care are thought to suffer with the condition [28]. The level of impairment of urinary function detected in those assessed in the audit (27% for non hip fractures and 41% for hip fracture patients) reflects the population prevalence for incontinence. However, given that other urinary tract symptoms besides incontinence influence falls risk, it is likely these were not addressed in this group of fallers. The higher level of impaired urinary function detected amongst patients with hip fractures vs non-hip fractures may reflect greater frailty, functional dependency and cognitive impairment in this group. Comorbidity, dependence or pre-fall continence were not measured in the audit.

The National Audit of Falls and Bone Health showed widespread deficiencies in the clinical services provided to older people who have fallen and sustained a fragility fracture [26]. The findings in terms of continence care confirm a poverty of assessment particularly for patients who sustained non hip fractures where only 21% of patients received an assessment. Only about half of patients with a detected impairment of

urinary function received any intervention for their urinary problems or received a referral to an appropriate continence service.

Better rates of continence assessment in patients with hip fractures (63%), probably reflects the fact that almost all these patients were admitted to hospital. This is borne out by the much higher rates in non-hip fracture patients who are admitted. In the non hip fracture group patients with vertebral and pelvic fractures were more likely to receive an assessment. Such fractures are potentially more disabling and as a result a greater proportion of these patients may be admitted to hospital for further management.

The frequency of assessment was slightly better than the findings of the National Audit of Continence Care for Older People which reported a documented continence history in 45% (1651/3682) of incontinent hospital patients [24].

Given the increased risk of falling associated with incontinence it is of concern that an assessment is so frequently neglected and that even where a problem is identified most often nothing is done about it.

The presumed importance of hospital admission in determining whether a continence assessment is performed has important implications for the organisation of care. Only one third of the non hip fractures were admitted to hospital and a high proportion of those discharged returned to their usual place of residence. The authors of the audit highlight this and suggest assessments and interventions not initiated in hospital will need to be carried out in primary care or other community settings [26]. This is likely to be true for continence assessments and is in general agreement with “Good Practice in Continence Care” the current standards for service delivery [29].



The sheer challenge of this is highlighted in the findings of the National Audit of Continence Care for Older People which reported the availability of continence advisors as approximately one to 8,400 men and women with urinary incontinence [24].

Whether the National Audit of Falls and Bone Health was truly able to identify all continence assessments carried out in primary care following the incident fall and fracture may be questioned. Certainly the audit report acknowledged some difficulties in sharing information at a local level with some general practitioners unwilling for practice staff to release information due to concerns regarding consent. Additionally, some assessments may have been performed and documented in notes not accessible to the clinical auditors; given our experience in the national Audit of Continence Care, this is an unlikely possibility.

The National Audit of Falls and Bone Health investigation of continence is somewhat limited. This probably reflects the broad range of issues it was required to evaluate. The audit only asked if continence was assessed, if a problem found and, if so, was it addressed. Many questions remain unanswered.

The quality of the continence assessment is not evaluated. Neither does the audit provide any information as to whether continence status changed as a result of the patients fragility fracture. It is common enough in clinical practice to find patients on ortho-geriatric wards catheterised as part of their hospital journey. This National Audit did not assess whether this was performed appropriately. Certainly inappropriate catheterisation has been identified as a problem in the care of patients with stroke [30].

It may be expected given the increased functional dependency patients suffer following a hip fracture that more might leave hospital with urinary incontinence than arrived. If this is so then the importance of a plan to promote continence becomes all the more important and compelling.

Age, gender and usual place of residence seem to have little effect on whether a continence assessment was carried out although older non hip fracture patients were more often assessed. Unfortunately the data available from the National Audit do not allow an analysis of other possible factors that might predict whether a continence assessment was performed. It might be expected that patients who received an orthogeriatric assessment or were cared for following a hip fracture pathway may be more likely to receive such an assessment. Other factors; co-morbidity, presence of a long term catheter, length of hospital stay, occurrence of other multifactorial risk assessments and discharge destination may also influence this.

Finally although the epidemiological evidence provides evidence to support an association between urinary incontinence and lower urinary tract symptoms as risk factors for falls it remains unclear as to whether successful intervention and continence management reduces falls risk. It is time for an intervention study to look at urinary incontinence, lower urinary tract symptoms and falls [13].

## **Contributors**

Rhodri Edwards and Adrian Wagg prepared the manuscript. Finbarr Martin secured funding, and provided clinical leadership of the national audit work including design, testing and facilitation of data collection, and collation and analysis of results. Rob

Grant, Derek Lowe, Jonathan Potter and Janet Husk were involved with design, management, analysis and reporting of the national audit as well as preparation of the manuscript.

## **Funding**

None declared

## **Competing Interests**

Rhodri Edwards received a grant from Pfizer to conduct a research project to investigate lower urinary tract symptoms and falls. This was unrelated to the current manuscript. Finbarr Martin has been responsible as a specialist clinical advisor for the UK government's Department of Health for developing and promoting implementation of policies in the field of falls prevention: this includes consideration of continence issues. He has a professional interest in promoting the dissemination of findings from audit relevant to this matter. Adrian Wagg has received research funding for other continence related studies.

## **Ethical Approval**

Neither individual patient consent nor research ethics approval was required for this audit, as advised by the Patient Information Advisory Group (PIAG) and the information governance committee of the Healthcare Commission.

## References

- [1] Tinetti ME, Speechley M, Ginter SF. Risk factors for falls amongst elderly persons living in the community. *N Engl J Med* 1988;319:1701-7
- [2] Nevitt MC, Cummings SR, Kidd S et al. Risk factors for recurrent nonsyncopal falls: a prospective study. *JAMA* 1989;261:2663-8
- [3] Thomas TM, Playmat KR, Blannin J et al. Prevelence of urinary incontinence. *Br Med J* 1980; 281: 1243-5
- [4] Scuffham P, Chaplin S, Legood R. Incidence and cost of unintentional falls in older people in the United Kingdom. *J Epidemiol Community Health* 2003; 57: 740-4
- [5] King MB, Tinetti ME. Falls in community dwelling older persons. *J Am Geriatr Soc* 1995; 43:1146-54
- [6] Tromp AM, Smit JH, Deeg DJH et al. Predictors for Falls and Fractures in the Longitudinal Aging Study Amsterdam. *J Bone Miner Res* 1998;13:1932-39
- [7] Tinetti ME, Baker DI, McAvay G et al. . A multifactorial Intervention to Reduce the Riak of Falling among Elderly People Living in the Community. *N Engl J Med* 1994; 13:331:821-27
- [8] Friedman SM, Munoz B, West SK et al. Falls and fear of falling: which comes first? A longitudinal prediction model suggest strategies for primary and secondary prevention. *J Am Geriatr Soc* 2002; 50(8):1329-35

- [9] Tinetti ME. Preventing Falls in elderly Persons. *N Engl J Med* 2003;348:42-9
- [10] Close J, Ellis M, Hooper R et al. Prevention of falls in the elderly trial (PROFET): a randomised controlled trial. *Lancet* 1999;353:93-97
- [11] Wagner EH, LaCroix AZ, Grothaus L et al. Preventing disability and falls in older adults: a population based randomised trial. *Am J Public Health* 1994; 84:1800-6
- [12] Wolf SL, Barnhart HX, Kutner NG et al. Reducing frailty and falls in older persons: an investigation of tai chi and computerised balance training. *J Am Geriatr Soc* 1996; 44:489-97
- [13] Morris V, Wagg A. Lower urinary tract symptoms, incontinence and falls in elderly people: time for an intervention study. *Int J Clin Pract* 2007;61:320-323
- [14]** Tromp Am, Pluijm SMF, Smit JH et al. Fall-risk screening test: A prospective study on predictors for falls in community-dwelling elderly 2001;54:837-44
- [15] Graafmans WC, Ooms ME, Hofstee MA et al. Falls in the Elderly: A Prospective Study of Risk Factors and Risk Profiles. *Am J Epidemiol* 1996;143:1129-36
- [16] Chen JS, March LM, Schwarz J et al.. A multivariate regression model predicted falls in residents living in intermediate hostel care. *J Clin Epidemiol* 2005;58:503-8

- [17] Byles J, Millar CJ, Sibbritt DW et al.. Living with urinary incontinence: a longitudinal study of older women. *Age and Aging* 2009;38:333-338
- [18] Brown JS, Vittinghoff E, Wyman JF et al. Urinary Incontinence: does it increase risk for falls and fractures? Study of osteoporotic fractures research group. *J Am Geriatr Soc* 2000; 48: 721-5
- [19] Stewart RB, Moore MT, May FE et al. Nocturia: a risk factor for falls in the elderly. *J Am Geriatr Soc.* 1992;40:1217-20
- [20] Kellogg Parsons J., Mougey J, Lambert L, et al. Lower urinary tract symptoms increase risk of falls in older men. *BJUI.* 2009;104(1):63-69
- [21] Chiarelli PE, Mackenzie LA, Osmotherly PG. Urinary Incontinence is associated with an increase in falls: a systematic review. 2009. *Australian Journal of Physiotherapy*; 55:89-95
- [22] Delbaere K, Close JCT, Menz HB et al. Development and validation of fall risk screening tools for use in residential aged care facilities. *MJA* 2008;189:193-196
- [23] The assessment and prevention of falls in older people. NICE Guidelines, London, UK. 2004.
- [24] Wagg A, Potter J, Peel P et al. National audit of continence care for older people: management of urinary incontinence. *Age and Aging* 2008;37:39-44
- [25] National Sentinel Stroke Audit Phase II (clinical audit). The Clinical Effectiveness and Evaluation Unit, Royal College of Physicians, London. 2009.

- [26] National Clinical Audit of Falls and Bone Health in Older People. The Clinical Effectiveness and Evaluation Unit, Royal College of Physicians, London. 2007.
- [27] Royal College of Physicians of London. Incontinence: Causes, Management and Provision of services. London. Royal College of Physicians , 1995
- [28] McGrother CW, Castleden CM, Duffin H et al. A profile of disordered micturition in elderly at home. Age and Aging 1987; 16:105-10
- [29] Department of Health 2000 : Good Practice in continence services. Crown Copyright
- [30] Wilson D, Lowe D, Hoffman A et al. Urinary incontinence in stroke: results from the UK National Sentinel Audits of Stroke 1998-2004. Age and Aging 2008;37:542-546

Table 1 : Continence assessment, detection of impairment, intervention and appropriate referral for hip fracture and non-hip fragility fracture patients.

	Hip # (3184)		Non-hip # (5642)		Risk ratio	95% Confidence Interval for risk ratio*	p value*
	%	n	%	n			
Assessment of continence	63	2009	21	1187	3.00	2.67-3.37	<0.0001
Impairment detected	41	817/2009	27	316/1187	1.53	1.34-1.74	<0.0001
Intervention to prevent related falls	37	300/817	39	123/316	0.94	0.79-1.13	0.53
Appropriate referral	28	232/817	40	125/316	0.72	0.59-0.87	0.0004
Intervention OR referral	46	376/817	54	172/316	0.85	0.73-0.98	0.02

\* using Binary regression methods (STATA 'binreg' software) to adjust for within-hospital clustering effects.



Table 2. Continence assessment, detection of impairment, intervention and appropriate referral for non-hip fragility fracture patients

	Admitted to hospital		Not admitted to hospital		Risk ratio	95% Confidence Interval for risk ratio*	p value*
	%	n/n	%	n/n			
Assessment of continence	47	912/1942	7	275/3700	6.32	5.20-7.68	<0.0001
Impairment detected	26	238/912	28	78/275	0.92	0.72-1.18	0.52
Intervention to prevent related falls	41	98/238	32	25/78	1.28	0.85-1.93	0.23
Appropriate referral	40	96/238	37	29/78	1.08	0.78-1.51	0.63

\* using Binary regression methods (STATA 'binreg' software) to adjust for within-hospital clustering effects.

Table 3 Contingence assessment for hip fracture and non-hip fragility fracture patients by patient age, gender and residence in own home

	Hip fractures					Non-hip fractures				
	% assessed	n/n	Risk ratio	95% CI for risk ratio*	P value*	% assessed	n/n	Risk ratio	95% CI for risk ratio*	p-value*
Age 65-74	60	248/416		Baseline		14	268/1872		Baseline	
Age 75-84	64	889/1385	1.08	0.98-1.18	0.12	21	494/2345	1.47	1.26-1.72	<0.0001
Age 85+	63	872/1383	1.06	0.96-1.16	0.25	30	425/1425	2.08	1.74-2.50	<0.0001
Male	65	409/629		Baseline		23	175/762		Baseline	
Female	63	1600/2555	0.96	0.90-1.03	0.28	21	1012/4880	0.90	0.79-1.04	0.15
Not living in own home	63	648/1032		Baseline		23	245/1084		Baseline	
Living in own home	63	1361/2152	1.01	0.94-1.08	0.84	21	942/4558	0.91	0.81-1.04	0.17

\* using Binary regression methods (STATA 'binreg' software) to adjust for within-hospital clustering effects.

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10<sup>th</sup> October 2010

Dear Sir/Madam

**Manuscript : Is continence considered in the assessment of older people after a fall in England and Wales?: Cross-sectional clinical audit results**

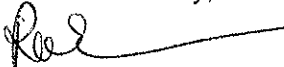
I would be very grateful if you would consider the attached manuscript for publication in Maturitas.

I declare that I participated in this study. My involvement was in the preparation of the manuscript.

I have seen and approved the final manuscript.

I have the following conflicts of interests: I received a grant from Pfizer to conduct a research project to investigate lower urinary tract symptoms and falls. This was unrelated to the current manuscript.

Yours sincerely,



Rhodri Edwards  
Research Fellow/ ST5 Geriatric Medicine  
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# Faculty of Health and Social Care Sciences

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Yours faithfully



Robert Grant MSc GradStat  
Senior Research Fellow in Quantitative Methods

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10.10. 2010

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8<sup>th</sup> November 2010

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Yours sincerely,

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Yours sincerely,



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18 October 2010

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Yours sincerely,

Adrian Wagg  
Professor of Healthy Ageing  
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Yours sincerely,

A handwritten signature in black ink that reads "Derek Lowe".

Derek Lowe MSc  
Clinical Effectiveness and Evaluation Unit, Royal College of Physicians of London

Clinical Effectiveness and Evaluation Unit  
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## Supporting Information

### Is continence considered in the assessment of older people after a fall in England and Wales?: Cross-sectional clinical audit results

Rhodri Edwards MB MRCP <sup>a</sup>, Finbarr C Martin MD <sup>b</sup>, Robert Grant MSc GradStat <sup>c</sup>, Derek Lowe MSc <sup>b</sup>, Jonathan Potter DM <sup>b</sup>, Janet Husk MSc <sup>b</sup> and Adrian Wagg MD <sup>b,d</sup>

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