Isolated Urinary, Fecal, and Double Incontinence: Prevalence and degree of soiling in stroke survivors

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Funding sources: Medical Research Council and the National Health Service Research and Development Program on Cardiovascular Disease and Stroke

Running head: Prevalence of fecal incontinence in stroke
Key words: Epidemiology, Fecal incontinence, Urinary incontinence, Stroke
Abstract

Objectives: To investigate the prevalence of isolated urinary and fecal, and double incontinence in community living stroke survivors and to assess the degree of soiling.

Design: Community based postal survey.

Setting: 64,749 community dwelling residents (aged 40+) living in Leicestershire (UK) were randomly selected from the Leicestershire Health Authority register. Residents living in institutional settings were excluded.

Measurements: Respondents were asked about previous stroke, urinary and bowel symptoms, general health and demographic details including age, sex and ethnicity. Urinary incontinence was defined as leakage several times a month or more often. Major fecal incontinence was defined as soiling of underwear, outer clothing, furnishings or bedding several times a month or more often.

Results: A 65% response rate to the postal survey was obtained with the return of 39,519 eligible questionnaires, with 4% (n=1483) reporting stroke. Five percent of stroke survivors reported major fecal incontinence, with 4.3% reporting both fecal and urinary incontinence and 0.8% reporting isolated fecal incontinence. Major fecal incontinence was four and a half times more prevalent in stroke survivors than the non-stroke population, and stroke survivors were also twice as likely to report soiling of furnishings or bedding. The presence of fecal incontinence in both the stroke and non-stroke population is influenced by functional limitations.

Conclusions

Fecal incontinence is common in stroke survivors and the degree of soiling can be considerable. Future research needs to explore the impact fecal incontinence can have on the lives of stroke survivors and on how it can best be managed in those living in the community.
Introduction

For people aged 60 years and over the prevalence of fecal incontinence has been reported by 7-8% (1) (2) (3), with rates increasing with age and in those living in institutional settings. (4) (5) Double incontinence (urinary and fecal) is more common than isolated fecal incontinence in older people. (5) Stroke, advancing age and poor general health have all been identified as independent risk factors for the presence of both urinary and fecal incontinence (1) (6) (7) (8) (9) (10) and it is argued that the presence of double incontinence compounds the risk of institutionalization. (7) (11).

Amongst stroke survivors both urinary and fecal incontinence are common and are associated with stroke severity and overall poor long-term prognosis. (12) Prevalence estimates for urinary incontinence range from 32-79% in the acute stage of stroke, decreasing to 25-28% at time of hospital discharge, and is still present in 12-19% of stroke survivors some months after their stroke. (13) (14) Prevalence estimates of fecal incontinence in stroke survivors are slightly lower and it is suggested that between 31-40% of stroke patients experience this on hospital admission, 18% at time of discharge and between 7-9% of stroke survivors still have problems with fecal incontinence six months after their stroke. (13) (14) (15) More recently it has been reported that 15% of stroke survivors still report fecal incontinence 3 years after their stroke and being incontinent increases the risk of long-term care placement and death. (11) This paper only investigated the prevalence of fecal incontinence in a stroke population and was unable to make comparisons with a non-stroke population.

Bowel continence was characterized by the Barthel Index and defined as ‘occasional accident’ or ‘all of the time’ when questioned if they ‘lose control of their bowel motions’. They were however unable to look at degree of soiling or distinguish
between monthly and yearly fecal incontinence, both of which have been identified as essential when assessing the severity of fecal incontinence (16).

There is little published research that investigates the prevalence and severity of isolated fecal and double incontinence in community dwelling stroke survivors, previous research having been focused on hospital based stroke patient populations.(15) (17) The aim of this study was to compare the prevalence of urinary, fecal and double incontinence between community dwelling stroke survivors and a non-stroke population drawn from the same community based population.
Methods

An epidemiological community based postal survey was carried out on a random sample of 64,749 Leicestershire residents aged 40 years and over. The sample was derived from the Leicestershire Health Authority register, although residents living in institutional settings (residential homes, nursing homes, hospital settings) were excluded. The study forms part of the Leicestershire MRC Incontinence Study which assessed the prevalence and incidence of urinary and bowel symptoms in adults aged 40 years and over. Prevalence data were collected over a period of 21 months from October 1996 to July 1998 using a standardized questionnaire. Respondents were asked about previous stroke, urinary and bowel symptoms, overall general health and demographic details including age, sex and ethnicity. The postal screening question used to determine whether or not a person had ever had a stroke was that developed by O'Mahony et al and is shown to have a high degree of sensitivity (95%) and specificity (96%).

Both urinary and fecal incontinence were defined as leakage several times a month or more often. Previous research on fecal incontinence, not specific to stroke, have used a variety of indicators in order to measure the extent of fecal incontinence. These include the frequency of fecal leakage, the degree of soiling, the use of pads and the consistency of pads. The respondents in this study were asked about the frequency of fecal leakage from a question that asked ‘Do you ever leak from your bowels when you don’t mean to (during the day or night)?’ There were six response categories to both the urine and fecal leakage questions (‘never/rarely’, ‘several times a year’, ‘several times a month’, several times a week’, ‘several times a day’, or ‘continuously’). Respondents were also asked about the degree of fecal
soiling from a question that asked if the leakage from their bowels usually caused:

‘minor staining of underwear’, ‘soiling of underwear’, ‘soiling of outer clothing’ or
‘soiling of furnishing or bedding’. These two measures (frequency and degree of
soiling) have been identified as essential to any grading system to assess the severity
of fecal incontinence.(16) Urinary incontinence was defined as urinary leakage on a
monthly basis or more often, from a question that asked ‘Do you ever leak any urine
when you don't mean to (this means anything from a few drops to a flood during the
day or night)?’

Major fecal incontinence in this study was defined as SOILING of underwear, outer
clothing, furnishing or bedding several times a month or more often. Minor fecal
incontinence was defined as STAINING of underwear several times a month or more
often. Rare or no fecal incontinence included respondents who reported leakage
several times a year or less, irrespective of the degree of soiling. Double
incontinence was defined as monthly urinary and major fecal incontinence and
isolated fecal incontinence was defined as major fecal incontinence without the
presence of urinary incontinence. Functional limitation was defined as having
difficulties with activities of daily living (difficulties with getting around the house,
and/or dressing, and/or having a long term health problem which affects daily
activities).

**Statistical Methods**

Those who did not respond to the stroke question were compared with those who did
using a Mann-Whitney U test for age (continuous variable) and a chi-square test for
sex (binary variable). Chi-squared tests were used to compare binary and nominal
variables between the stroke and non-stroke population. In univariate analyses,
missing data were excluded on individual variables, therefore different denominators
are reported for each variable. Multivariate logistic regression models were used to
explore the association between stroke and fecal incontinence after adjustment for
confounding factors such as age, sex and functional limitation (fecal incontinence
was the dependant variable in these analyses). Analysis was performed using a
Statistical Package for the Social Sciences (SPSS) version 9 for Windows. This
study had ethical approval from the local Ethical Committee in Leicestershire.
Results

Response rate

Out of the 64749 questionnaires mailed, 3810 (6%) were excluded because either the person no longer lived at the address, had moved to a residential or nursing home or was deceased. Of the remaining 60939 questionnaires mailed, 39519 were returned (65%) and of these 39311 (99%) were analyzable. Response rates were lowest in the youngest and oldest age groups (i.e. 40-49 years and 80+ years) and slightly lower in men. Analysis has been carried out on 38633 individuals who responded to the stroke question (excluding 1.7% missing data). Non-responders (n=676) to the stroke question were significantly more likely than responders (n=38633) to be female (37% versus 46%, p<0.001) and older (median age 69 years versus 58 years, p<0.001).

Comparison between the stroke and non-stroke population

The overall prevalence of stroke was 4% (n=1483). Fifty four percent of stroke survivors were male compared with 46% in the non-stroke group (p<0.001, see Table 1). The stroke survivors on the whole represented a significantly older group than the non-stroke population (median age 72 years compared with 57 years, p<0.001) which was reflected in the higher percentage of stroke survivors being retired. Not surprisingly, stroke survivors perceived their general health to be poorer than the non-stroke population, and a larger proportion also reported having difficulties with daily activities (Table 1).

Prevalence of fecal incontinence
In the overall population major fecal incontinence (soiling of underwear or more on a monthly basis) was reported in 1.5% (n=580). Stroke survivors reported a significantly higher prevalence of any fecal incontinence than the non-stroke population, 7.4% compared with 2.9% (see Table 1). Similarly, 5% of stroke survivors reported major fecal incontinence, compared with 1.4% of the non-stroke population. The prevalence of double incontinence, defined as major fecal and monthly urine leakage, was more than four times higher amongst stroke survivors than in the non-stroke population (4.3%, versus 0.9%, p<0.001). Isolated fecal incontinence was also significantly higher in the stroke population. The presence of isolated urinary incontinence was reported in 25% (n=339/1342) of the stroke sample compared with 14% (n=4924/35490) in the non-stroke population (p<0.001).

Of stroke survivors who reported major fecal incontinence, 27% (n=19/70) of stroke survivors reported that the amount of leakage of feces soiled their furnishings or bedding compared with 11% (n=55/510) of the non-stroke population (p<0.001), suggesting that the fecal incontinence in the stroke population was more severe than in those who had not had a stroke (see Table 2). The increased odds of major fecal incontinence in stroke survivors was attenuated though still significant after adjustment for age, sex and presence of urinary incontinence (Table 3). Even when functional limitation was adjusted for the relationship between stroke and fecal incontinence remained (OR 1.33; 95% CI 1.01 to 1.76, see Table 3). There was no significant interaction between the presence of stroke and functional limitation suggesting that those with functional limitations were more likely to report fecal incontinence than those with no mobility problems, regardless of whether or not they had experienced a stroke (OR = 4.02 95% CI 3.27 to 4.95).
Discussion

These findings confirm previous research that both urinary and fecal incontinence are more prevalent in stroke survivors than non-stroke, (8) (14) (15) but that this cannot be wholly explained by their increased functional limitation or more advanced age. The severity of fecal incontinence, expressed by the extent of soiling, is also more severe in stroke survivors. These data suggest that the prevalence of fecal incontinence is only slightly lower in the community than in hospital based stroke patient groups. This study shows that stroke survivors were three and a half times more likely to report major fecal incontinence, with double incontinence being more than four times higher in stroke survivors than the non-stroke population.

The 5% prevalence of major fecal incontinence reported in this sample of stroke survivors is lower than the two studies that have investigated the prevalence of fecal incontinence six months after the onset of a stroke.(14) (15) It is also considerably lower than the most recent published study of fecal incontinence post-stroke, whereby fecal incontinence was reported in 15% three years post stroke (11). This may be partially explained by the use of different definitions of fecal incontinence. It is also difficult to make direct comparisons because their definitions of fecal incontinence are either not clear (14) (15) or their sample populations studied are very different (11). The validity of the Barthel Index for assessing fecal incontinence has been called into question as it can not distinguish between those individuals who have only one fecal incontinence episode and those with more frequent episodes (19).
This present study has taken a community perspective, whereas other studies that have reported on fecal incontinence in stroke survivors have obtained their sample through hospital admission records. It has also incorporated not only frequency of fecal leakage but the degree of soiling that occurs, both being essential when assessing the severity of fecal incontinence (16).

A limitation of this study is that no data were collected on when the stroke occurred and therefore we are unable to identify the prevalence of fecal incontinence in relation to the specific time after the stroke. It would also have been interesting to investigate the prevalence of fecal incontinence over different time periods but this is past the remit of this study. Response rates for the postal questionnaire were lowest in the youngest and highest age groups and the study sample excluded people living in institutional care. Therefore the prevalence of fecal incontinence in the older population could be an underestimate. However an investigation into the non-response bias to the postal questionnaire was undertaken and there was no evidence of non-response bias in reporting urinary symptoms (20). Although fecal incontinence was not investigated there is no reason to believe that this would show evidence of bias. This study was also unable to investigate other known risk factors for fecal incontinence, for example diabetes mellitus, use of anti-cholinergic drugs or other co-morbid conditions.

The management of bladder and bowel problems is seen as an essential area of a stroke survivor's rehabilitation in both the UK (21) and the USA (22). Through the Agency for Health Care Policy and Research, a national practice guideline for post-stroke rehabilitation highlights the need for bowel management programs to be
implemented in those survivors with persistent fecal incontinence (22). Similarly in
the UK National guidelines for stroke suggest that hospitals should have established
assessment and management protocols for urinary and fecal incontinence.
Furthermore continence services should cover both the hospital and the community
to ensure continuity of care (23) (24). Further research into whether community
stroke survivors have sought help specifically for their urinary and fecal incontinence
is needed in order to explore whether there are any barriers to providing this kind of
service to this particular group.

Recent debates on health care for older people have emphasized the importance of
enhancing quality of life and independence in older people and the need to prevent
inappropriate admissions to long-term care (24). Urinary incontinence is often cited
as one of the reasons why caregivers relinquish their role in the community and place
the older people into residential homes,(5) (25) (26) with the presence of fecal
incontinence compounding the risk of institutionalization.(7) This present study has
gone further than other studies by indicating the severity of fecal leakage reported in
stroke survivors. These results show that stroke survivors with fecal incontinence
were twice as likely to report leakage severe enough to soil their furnishings or
bedding compared with the non-stroke population. Other reasons for incontinence
might include the use of laxatives, autonomic neuropathy, impaired mobility, difficulty
with communication, prescribed drugs and diet and further research into this needs to
be explored.

This study also suggests that functional limitations are an important influencing factor
that can contribute to the presence of fecal incontinence. Severe urinary and fecal
incontinence are shown to be related to mortality in elderly people living at home. (27)

Fecal incontinence can also contribute to decreased levels of social activities (28)

which in turn could isolate not only the stroke survivor but also the person that cares

for them. Future research needs to investigate how best to manage or treat these

symptoms in stroke survivors in order to reduce the risk of both the survivor and

carer becoming socially isolated within the community. Health care professionals

working within primary care and treating patients with stroke should be aware of the

prevalence of fecal incontinence and what relevant treatment options are available.

A recent published review has highlighted several new treatments available for

patients with neurological diseases or damage. (29) Furthermore those professionals

working in the community with older disabled people need to assess ways in which

appropriate aids and appliances can be adapted to promote fecal continence within

t heir homes.
Conclusions

These data show a high prevalence of fecal incontinence in community dwelling stroke survivors. Stroke survivors who reported experiencing fecal incontinence also reported higher levels of fecal soiling which must be an important contributor to decreased morale in both the stroke survivor and their carer.
Table 1: Details of the stroke survivors and the non-stroke population included in this study

<table>
<thead>
<tr>
<th></th>
<th>Stroke Survivors</th>
<th>Non-Stroke Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>Average age (median)</td>
<td>72 years</td>
<td>IQR: 64-79</td>
</tr>
<tr>
<td>Male</td>
<td>54</td>
<td>802</td>
</tr>
<tr>
<td>Female</td>
<td>46</td>
<td>681</td>
</tr>
<tr>
<td>Living alone</td>
<td>28</td>
<td>408</td>
</tr>
<tr>
<td>Owned / mortgaged accommodation</td>
<td>66</td>
<td>960</td>
</tr>
<tr>
<td>Retired</td>
<td>76</td>
<td>1091</td>
</tr>
<tr>
<td>White</td>
<td>92</td>
<td>1346</td>
</tr>
<tr>
<td>South Asian (Indian, Bangladeshi, Pakistani)</td>
<td>7</td>
<td>105</td>
</tr>
<tr>
<td>Needed help completing questionnaire</td>
<td>25</td>
<td>1455</td>
</tr>
<tr>
<td>General health: poor</td>
<td>20</td>
<td>285</td>
</tr>
<tr>
<td>Functional limitations</td>
<td>71</td>
<td>1014</td>
</tr>
<tr>
<td>Any fecal incontinence</td>
<td>7.4</td>
<td>103</td>
</tr>
<tr>
<td>Major fecal incontinence</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td>Minor fecal incontinence</td>
<td>2.4</td>
<td>33</td>
</tr>
</tbody>
</table>

* Mann-Whitney U tests
Table 2: Severity of fecal leakage amongst stroke and non-stroke population reporting monthly fecal incontinence ($\chi^2 = 15.24$, p<0.001)

<table>
<thead>
<tr>
<th>Severity of fecal leakage</th>
<th>Stroke %</th>
<th>Non-Stroke %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n 70)</td>
<td>(n 510)</td>
<td>(n=580)</td>
</tr>
<tr>
<td>Furnishing / bedding</td>
<td>27% (19)</td>
<td>11% (55)</td>
<td>13% (74)</td>
</tr>
<tr>
<td>outer clothing</td>
<td>7% (5)</td>
<td>6% (32)</td>
<td>6% (37)</td>
</tr>
<tr>
<td>Underwear</td>
<td>66% (46)</td>
<td>83% (423)</td>
<td>81% (469)</td>
</tr>
</tbody>
</table>
Table 3: Multivariate logistic regression model: Relationship between major faecal incontinence and stroke

<table>
<thead>
<tr>
<th></th>
<th>Model 1*</th>
<th></th>
<th>Model 2**</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio*</td>
<td>95% Confidence Interval</td>
<td>Odds Ratio*</td>
<td>95% Confidence Interval</td>
</tr>
<tr>
<td>Stroke (yes versus no)</td>
<td>1.75</td>
<td>1.32 - 2.30</td>
<td>1.33</td>
<td>1.01 - 1.76</td>
</tr>
<tr>
<td>Sex (female versus male)</td>
<td>0.75</td>
<td>0.63 - 0.90</td>
<td>0.79</td>
<td>0.66 - 0.95</td>
</tr>
<tr>
<td>Age (years above 40)</td>
<td>1.03</td>
<td>1.03 - 1.04</td>
<td>1.02</td>
<td>1.01 - 1.03</td>
</tr>
<tr>
<td>Urinary incontinence (yes versus no)</td>
<td>10.53</td>
<td>8.76 - 12.65</td>
<td>8.10</td>
<td>6.62 - 9.69</td>
</tr>
<tr>
<td>Functional limitations (yes versus no)</td>
<td>-</td>
<td>-</td>
<td>4.02</td>
<td>3.27 - 4.95</td>
</tr>
</tbody>
</table>

*Model 1: Adjusting for age, sex and urinary incontinence

**Model 2: adjusting for age, sex, urinary incontinence and functional limitation
ACKNOWLEDGEMENT

CONFLICT OF INTEREST

Financial Disclosure(s): All authors should indicate financial support for research, consultantships, and speakers forum, as well as having any company holdings (e.g., stocks) or patents. (List all author(s) name).

Author Name: Katherine Brittain  none
Author Name: Sarah Perry  none
Author Name: Chris Shaw  none
Author Name: Ruth Matthews  none
Author Name: Carol Jagger  none
Author Name: John Potter  none

Author Contributions: Indicate authors’ role in study concept and design, acquisition of subjects and/or data, analysis and interpretation of data, and preparation of manuscript. (List all author(s) name).

Author Name: Katherine Brittain: study design, recruitment, data analysis, interpretation and preparation of manuscript
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Author Name: Carol Jagger: study design, recruitment, interpretation and editing of manuscript
Author Name: John Potter: study design, interpretation and editing of manuscript

Sponsor’s Role: Indicate sponsor’s role in the design, methods, subject recruitment, data collections, analysis and preparation of paper. None

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