Isolated Urinary, Fecal, and Double Incontinence: Prevalence and Degree of Soiling in Stroke Survivors

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

DESIGN: Community-based postal survey.

SETTING: Leicestershire, United Kingdom.

PARTICIPANTS: Sixty-four thousand seven hundred forty-nine community-dwelling residents (aged ≥40) 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, and 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; 4% (n = 1,483) reported stroke. Five percent of stroke survivors reported major fecal incontinence, with 4.3% reporting fecal and urinary incontinence and 0.8% reporting isolated fecal incontinence. Major fecal incontinence was four and a half times as prevalent in stroke survivors as in the nonstroke population, and stroke survivors were also twice as likely to report soiling of furnishings or bedding. Functional limitations influence the presence of fecal incontinence in the stroke and nonstroke population.

CONCLUSION: Fecal incontinence is common in stroke survivors, and the degree of soiling can be considerable. Future research needs to explore the effect fecal incontinence can have on the lives of stroke survivors and on how it can best be managed in those living in the community. J Am Geriatr Soc 54:1915–1919, 2006.
in community-dwelling stroke survivors, previous research having been focused on hospital-based stroke patient populations. The aim of this study was to compare the prevalence of urinary, fecal, and double incontinence of community-dwelling stroke survivors and a nonstroke population drawn from the same community-based population.

**METHODS**

An epidemiological community-based postal survey was distributed to a random sample of 64,749 Leicestershire residents aged 40 and older. The sample was derived from the Leicestershire Health Authority register, and 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 and older. 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, and overall general health and demographic details, including age, sex, and ethnicity. The question used to determine whether a person had ever had a stroke had been developed previously and has been shown to have a high degree of sensitivity (95%) and specificity (96%).

Urinary and fecal incontinence were defined as leakage several times a month or more often. Previous research on fecal incontinence, not specific to stroke, has used a variety of indicators to measure the extent of fecal incontinence. These include the frequency of fecal leakage, the degree of soilage, the use of pads, and the consistency of pads. The respondents in this study were asked about the frequency of fecal leakage using 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)” There were six response categories to 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 whether the leakage from their bowels usually caused minor staining of underwear, soiling of underwear, soiling of outer clothing, or soiling of furniture or bedding. These two measures (frequency and degree of soilage) have been identified as essential to any grading system to assess the severity of fecal incontinence. Urinary incontinence was defined as monthly urinary leakage 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, furnishings, 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 or dressing or having a long-term health problem that 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-square tests were used to compare binary and nominal variables between the stroke and nonstroke 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 dependent variable in these analyses.) Analysis was performed using SPSS version 9 for Windows (SPSS, Inc., Chicago, IL). This study had ethical approval from the local ethical committee in Leicestershire.

**RESULTS**

**Response Rate**

Of the 64,749 questionnaires mailed, 3,810 (6%) were excluded, because the person no longer lived at the address, had moved to a residential or nursing home, or had died. Of the remaining 60,939 questionnaires mailed, 39,519 were returned (65%), and of these, 39,311 (99%) were analyzable. Response rates were lowest in the youngest and oldest age groups (40–49 and ≥80) and slightly lower in men. Analysis was conducted on 38,633 individuals who responded to the stroke question (excluding 1.7% missing data). Nonresponders (n = 676) to the stroke question were significantly more likely than responders (n = 38,633) to be female (37% vs 46%, P < .001) and older (median age 69 vs 58, P < .001).

**Comparison Between the Stroke and Nonstroke Population**

The overall prevalence of stroke was 4% (n = 1,483). Fifty-four percent of stroke survivors were male, compared with 46% in the nonstroke group (P < .001, Table 1). The stroke survivors on the whole represented a significantly older group than the nonstroke population (median age 72 vs 57, P < .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 nonstroke 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 nonstroke population (7.4% vs 2.9%; Table 1). Similarly, 5% of stroke survivors reported major fecal incontinence, compared with 1.4% of the nonstroke population. The prevalence of double incontinence, defined as major fecal and monthly urine leakage, was more than four times as
Table 1. Characteristics of Stroke Survivors and Nonstroke Population Included in the Study

| Characteristic                        | Stroke Survivors  | Nonstroke Population | P-value |
|---------------------------------------|-------------------|----------------------|----------|
| Age, median (interquartile range)     | 72 (64–79)        | 57 (48–68)           | <.001*   |
| Male, n (%)                           | 802 (54.1)        | 16,959 (45.7)        | <.001    |
| Female, n (%)                         | 681 (45.9)        | 20,191 (54.3)        | <.001    |
| Living alone, n (%)                   | 408 (27.5)        | 6,532 (17.6)         | <.001    |
| Owned/mortgaged accommodation, n (%) | 960 (64.7)        | 30,265 (81.5)        | <.001    |
| Retired, n (%)                        | 1,091 (73.6)      | 14,159 (38.1)        | <.001    |
| White, n (%)                          | 1,346 (90.8)      | 34,196 (92.0)        | .60      |
| South Asian (Indian, Bangladeshi, Pakistani), n (%) | 105 (7.1)       | 2,192 (5.9)          | .60      |
| Needed help completing questionnaire, n (%) | 1,455 (98.1)     | 36,777 (98.9)        | <.001    |
| General health poor, n (%)            | 285 (19.2)        | 1,434 (3.9)          | <.001    |
| Functional limitations, n (%)         | 1,014 (68.4)      | 9,198 (24.8)         | <.001    |
| Fecal incontinence, n (%)             |                   |                      |          |
| Any                                   | 103 (6.9)         | 1,054 (2.8)          | <.001    |
| Major                                 | 70 (4.7)          | 510 (1.4)            | <.001    |
| Minor                                 | 33 (2.2)          | 544 (1.5)            |          |

* Mann-Whitney U tests.

high in stroke survivors than in the nonstroke population (4.3% vs 0.9%, P < .001). Isolated fecal incontinence was also significantly higher in the stroke population. The presence of isolated urinary incontinence was reported in 25% (339/1,342) of the stroke sample compared with 14% (4,924/35,490) of the nonstroke population (P < .001).

Of stroke survivors who reported major fecal incontinence, 27% (197/709) reported that the amount of leakage of feces soiled their furnishings or bedding, compared with 11% (355/3,109) of the nonstroke population (P < .001), suggesting that the fecal incontinence in the stroke population was more severe than in those who had not had a stroke (Table 2). The greater odds of major fecal incontinence in stroke survivors were attenuated although 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 (odds ratio (OR) = 1.33, 95% confidence interval (CI) = 1.01–1.76, 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 they had experienced a stroke (OR = 4.02, 95% CI = 3.27–4.95).

DISCUSSION

These findings confirm previous research that urinary and fecal incontinence are more prevalent in stroke survivors than in those who have not had a stroke8,14,15 and that greater functional limitation or more-advanced age cannot wholly explain this. The severity of fecal incontinence, expressed as 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 groups of patients with stroke. This study shows that stroke survivors were three and a half times as likely to report major fecal incontinence, with double incontinence being more than four times as high in stroke survivors as in the nonstroke population.

The 5% prevalence of major fecal incontinence reported in this sample of stroke survivors is lower than in the two studies that investigated the prevalence of fecal incontinence 6 months after the onset of a stroke14,15 It is also considerably lower than the most recent published study of fecal incontinence poststroke, which reported that fecal incontinence was 15% 3 years poststroke.11 The use of different definitions of fecal incontinence may partially explain this. It is also difficult to make direct comparisons, because the definitions of fecal incontinence in those studies are not clear14,15 or the sample populations studied were different.11 The validity of the Barthel Index for assessing fecal incontinence has been called into question, because it can not distinguish between individuals who have only one fecal incontinence episode and those with more frequent episodes.18

The present study took a community perspective, whereas other studies that have reported on fecal incontinence in stroke survivors obtained their sample through hospital admission records. It has also incorporated not only frequency of fecal leakage, but also 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 it was not pos-

Table 2. Severity of Fecal Leakage in Stroke and Nonstroke Population Reporting Monthly Fecal Incontinence

| Severity of Fecal Leakage | Stroke (n = 70) | Nonstroke (n = 510) | Total (N = 580) |
|---------------------------|----------------|--------------------|----------------|
| Furnishing or bedding     | 19 (27)        | 55 (11)            | 74 (13)        |
| Outer clothing            | 5 (7)          | 32 (6)             | 37 (6)         |
| Underwear                 | 46 (66)        | 423 (83)           | 469 (81)       |

Note: Chi-square = 15.24, P < .001.
sible 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 was beyond the scope 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 nonresponse bias to the postal questionnaire was undertaken, and there was no evidence of nonresponse bias in reporting urinary symptoms. 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 anticholinergic drugs, or other comorbid conditions.

The management of bladder and bowel problems is seen as an essential area of a stroke survivor’s rehabilitation in the United Kingdom and the United States. Through the Agency for Health Care Policy and Research, a national practice guideline for poststroke rehabilitation highlights the need for bowel management programs to be implemented in survivors with persistent fecal incontinence. Similarly in the United Kingdom, national guidelines for stroke suggest that hospitals should have established assessment and management protocols for urinary and fecal incontinence. Furthermore, continence services should cover the hospital and the community to ensure continuity of care. Further research into whether community stroke survivors have sought help specifically for their urinary and fecal incontinence is needed 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. Urinary incontinence is often cited as one of the reasons why caregivers relinquish their role in the community and place older people into residential homes, with the presence of fecal incontinence compounding the risk of institutionalization. The present study went 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 as the nonstroke 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. Fecal incontinence can also contribute to decreased levels of social activities, which in turn could isolate not only stroke survivors but also the people who care for them. Future research needs to investigate how best to manage or treat these symptoms in stroke survivors to reduce the risk of the survivor and caregiver becoming socially isolated within the community. Healthcare professionals working in 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. 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 their homes.

**Table 3. Multivariate Logistic Regression Model: Relationship Between Major Fecal Incontinence and Stroke**

| Explanatory Factor | Model 1 | Model 2 |
|--------------------|---------|---------|
| Stroke (yes vs no) | 1.75    | 1.33    |
| Sex (female vs male) | 0.75    | 0.79    |
| Age (years > 40)   | 1.03    | 1.02    |
| Urinary incontinence (yes vs no) | 10.53   | 8.10    |
| Functional limitations (yes vs no) | —      | 4.02    |

* Adjusted for age, sex, and urinary incontinence.
† Adjusted for age, sex, urinary incontinence, and functional limitation.

**CONCLUSION**

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 are likely to be an important contributor to decreased morale in stroke survivors and their caregivers.

**ACKNOWLEDGMENTS**

Financial Disclosure: Funded by the Medical Research Council and the National Health Service Research and Development Program on Cardiovascular Disease and Stroke.

Author Contributions: Katherine Brittain: study design, recruitment, data analysis, interpretation and preparation of manuscript. Sarah Perry, Chris Shaw, and Carol Jagger: study design, recruitment, interpretation and editing of manuscript. Ruth Matthews: data analysis, interpretation and editing of manuscript. John Potter: study design, interpretation and editing of manuscript.

Sponsor’s Role: None.
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