

Accidental bowel leakage in the mature women's health study: prevalence and predictors

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SUMMARY

Background: The 2007 National Institutes of Health incontinence consensus panel emphasised the need for classification and identification of persons at risk for faecal incontinence (FI). **Objectives:** To explore the prevalence of FI; to characterise severity and 'bother'; and to identify factors associated with FI in a large sample of community-dwelling women. **Design, setting, and participants:** A cohort of US women ≥ 45 years old was surveyed via an internet-based questionnaire between September 2009 and April 2010. **Main outcome measure:** Accidental leakage of liquid or solid stool at least once in the last 12 months. **Key results:** Eighty-five per cent of those surveyed (5817/6873) participated and were predominantly white, well educated and insured. The prevalence of FI at least once in the past year was 18.8% (1096/5817; 95% CI: 17.8–19.9%) and 97% of these women were bothered by this frequency of leakage. Among 938 respondents with FI, 71.1% (667) preferred the term 'accidental bowel leakage' (ABL) over faecal or bowel incontinence. Bowel disorders, urinary incontinence, stroke, age 55–64, diabetes mellitus and prior vaginal delivery were associated with an increased odds of FI, whereas being married, Black or American Indian/Alaska Native race/ethnicity, and income \geq \$40,000 per year were associated with a decreased odds of FI. **Conclusions:** Nearly one-fifth of mature US women suffer from bothersome leakage of stool at least yearly and the overwhelming majority prefer the term 'Accidental Bowel Leakage.' Those with bowel disorders and urinary incontinence are most likely to experience ABL. Incorporating questions regarding ABL or bowel and bladder disorders into routine screening may aid in identifying silent sufferers of ABL.

Introduction

Faecal incontinence (FI) is an important and under-recognised health concern with significant negative impacts. Sufferers of FI may be unable to participate in social activities or remain gainfully employed and often do not seek treatment (2,3). In 2007, the National Institutes of Health (NIH) convened a consensus panel about incontinence in adults (4). This panel concluded that efforts to raise public awareness 'should aim to eliminate stigma, promote disclosure and care-seeking and reduce suffering' (4). It also emphasised the need for a classification system for FI and identification of persons at risk for its development.

Estimates of the prevalence of FI among community-dwelling United States (US) women vary widely from 5% to 24% (5–17). This large range results from

a lack of consistency in the definitions used for FI, from differences in populations studied, and from differences in scientific methodology. Historically, definitions of FI were based on frequency of episodes, time period during which leakage occurred and type of leakage (liquid and/or solid stool vs. isolated leakage of flatus). The International Continence Society (ICS), however, defines FI as 'the involuntary loss of liquid or solid stool that is a social or hygienic problem' (1). Unfortunately, there is no universally accepted definition of FI that incorporates this social or hygienic impact. Thus, identification of prevalence and risk factors for FI remains a challenge.

The objectives of this study were to (i) explore prevalence of FI using several definitions in a large sample of mature, community-dwelling US women; (ii) characterise severity and 'bother' of FI; and (iii)

What's known

The International Continence Society (ICS) defines FI as 'the involuntary loss of liquid or solid stool that is a social or hygienic problem' (1). Unfortunately, there is no universally accepted definition of FI that incorporates its social or hygienic impact, and estimates of the prevalence of FI among community-dwelling United States (US) women vary widely. Further, identification of risk factors for this important and under-recognised health condition remains challenging.

What's new?

In the largest internet community-based assessment of FI among US women to date, we report a prevalence of almost 20%, even when incorporating related 'bother'. Further, the overwhelming majority of women with FI prefer the term 'Accidental Bowel Leakage' to describe it. We suggest that this term, rather than the medical term 'faecal incontinence,' be used when communicating with patients and the public, to reduce embarrassment and promote care-seeking.

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Disclosures

Heidi Brown has nothing to disclose. Steven Wexner is a paid consultant in the field of faecal incontinence for Salix, Ventrus, Renew Medical, Inc., Mediri Therapeutics, and Medtronic. Mark Segall is a paid consultant for Renew Medical, Inc. Kelly L. Brezoczky is a former employee of Renew Medical, Inc. Emily Lukacz is a paid consultant for Pfizer, consultant and recipient of grant funding from Johnson and Johnson, and research and educational grant funding from National Institutes of Health and Renew Medical, Inc. Renew Medical, Inc. markets devices for the treatment of faecal incontinence.

Prior presentations

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(2) At least one episode of accidental leakage of stool in the last 12 months (as above in 1) AND a report of 'bother' rated as slightly, somewhat, very much, or greatly.

(3) At least one episode of accidental leakage of stool in the last 12 months (as above in 1) AND social or hygienic implications. This definition was constructed using five questions related to social or hygienic aspects of FI. Respondents who answered affirmatively to one or more of these were categorised as considering their FI to be a social or hygienic problem. The five questions are listed in Appendix S1.

(4) At least monthly accidental leakage of stool in the last 12 months (as above in 1).

(5) At least weekly accidental leakage of stool in the last 12 months (as above in 1).

Women with FI were asked whether they experienced eight components of FI (urgency, frequency, leakage without warning of which they were aware or unaware, stress leakage, concomitant accidental leakage of gas, leakage of small amounts and nocturnal bowel movements) and if so, whether they were bothered. Respondents were then asked, among those components that bothered them greatly or very much, which bothered them *the most*.

Statistical analysis

To detect a prevalence of 15% with 95% confidence intervals and a margin of error of 0.01, a sample size target of 4898 was calculated. Descriptive analyses were performed to characterise consistency, frequency, duration, treatment of FI and scores were calculated to quantify severity. Chi-square testing and logistic regression modelling were used to identify variables associated with FI. Variables with biological plausibility and those identified as factors associated with FI in previous studies were included in a multivariate logistic regression model. SPSS version 19.0 (SPSS Inc., Chicago, IL, USA) was used for analyses.

Results

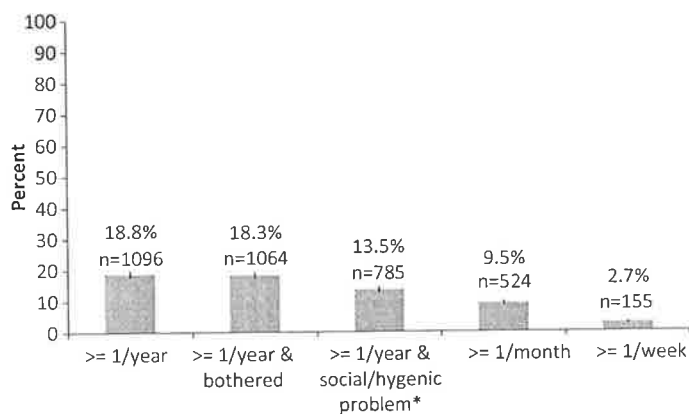
Among 6873 women invited to participate, 84.6% ($n = 5817$) completed the survey. Response rates for the three waves were as follows: wave 1: 576/743 (77.5%); wave 2: 4679/5445 (85.9%); minority wave: 562/685 (82.0%). Respondents were more likely to be married (61.3 vs. 56.6%, $p = 0.015$) and to identify as white (79.6 vs. 72.5%, $p < 0.001$). Non-responders were more likely to be employed (47.3 vs. 51.9%, $p = 0.006$), to identify as Hispanic/Latina/Spanish origin (11.1 vs. 5.8%, $p < 0.001$) and to have completed at least some college education (70.5

vs. 58.6%, $p < 0.001$). The median age category was the same for both respondents and non-responders, and there were no differences in household size, income, or geographic region. Overall the sample for these analyses was predominantly well-educated and insured, with a median age range of 55–59 years, and most identified their race/ethnicity as white (Table 1).

The prevalence of FI ranged from 3 to 19% depending on the definition used (Figure 1). Using a definition of at least one episode of leakage per year, the prevalence of FI was 18.8% (1096/5817; 95% CI: 17.8–19.9%). The addition of some degree of 'bother' minimally decreased the prevalence to 18.3% (1064/5817; 95% CI: 17.3 – 19.3%). Bother was defined as response of 'greatly, very much, somewhat, or slightly' when asked 'How much are you bothered by the accidental loss of control of any amount of liquid or loose stool, or solid or liquid stool?' Including those with at least once a year FI and one or more affirmative responses to social or hygienic impact decreased the prevalence to 13.9% (785/5659; 95% CI: 13.0–14.8%). (Note the variation in denominator as 938 of 1096 women with FI responded to the questions about social and hygienic impact). Prevalence of at least monthly and weekly FI were 9.0% (524/5817; 95% CI: 8.3–9.8%) and 2.7% (155/5817; 95% CI: 2.3–3.1%) respectively. As 97.1% (1064/1096) of women with stool leakage at least once per year expressed 'bother' related to it, we chose to use FI frequency of once or more per year for subsequent analyses.

Among 1096 respondents with FI, only 30.9% (339) and 40.3% (442) had heard the terms 'FI' and 'bowel incontinence,' respectively. Among 938 respondents with FI in the last year for whom data were available about preferred terminology, 71.1% (667) preferred the term 'accidental bowel leakage' (ABL); 22.5% (211) preferred 'bowel incontinence' and 6.4% (60) preferred 'FI.' We therefore refer to FI as 'accidental bowel leakage' (ABL) henceforth.

Overall, age category 55–64 years old, white race/ethnicity, annual income $< \$40,000$, bowel disorders, diabetes mellitus or prediabetes, prior stroke, UI and prior vaginal delivery were significantly more common in those with ABL than those without (Table 1). Those without ABL were more likely to be college graduates, employed, married and nulliparous. There was no difference in health insurance status between the two groups. Among those with ABL, 95.2% (95% CI 93.9–96.4%) reported accidental leakage of loose or liquid stool, 86.6% (95% CI 84.6–88.6%) reported accidental leakage of gas and 35.5% (95% CI 32.7–38.3%) reported accidental leakage of formed or solid stool. Almost half had



* N = 5659 (Note different denominator for this definition because 938 of 1096 women with FI responded to the questions about social and hygienic impact)

Figure 1 Prevalence of accidental bowel leakage (ABL) using various definitions (N = 5817)

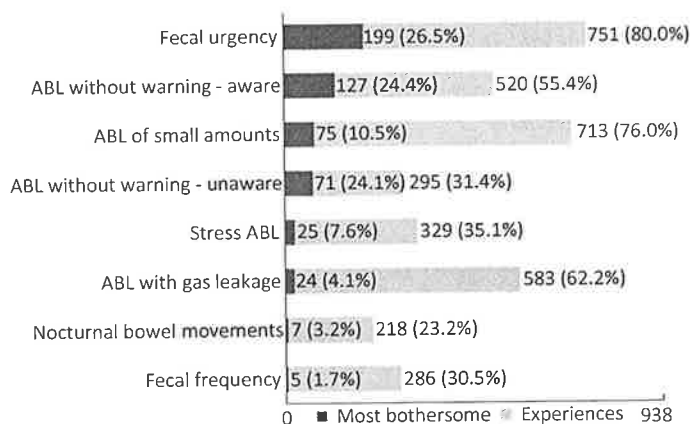


Figure 2 Aspects of accidental bowel leakage (ABL) and their associated 'bother' (N = 938)

the greatest odds of ABL. In addition, prior stroke, age 55–64, self-reported diabetes mellitus or prediabetes, and prior vaginal delivery were associated with increased odds of ABL. Being married, identifying one's race/ethnicity as Black/African-American or American Indian/Alaska Native and annual income \geq \$40,000 were associated with a decreased odds of ABL.

Discussion

Our data suggest that nearly one-fifth of mature US women suffer from bothersome leakage of stool in the absence of acute diarrhoeal illness at least once a year. While some may dispute a frequency of once a year as a public health concern, 97% of those who reported this frequency of ABL were bothered by it. The nature and impact of ABL is arguably more serious than that of urine leakage; thus a more inclusive definition may be more appropriate to identify sufferers. This study also demonstrates that the overwhelming majority of women with FI prefer the term

'Accidental Bowel Leakage'. On the basis of this survey, we suggest that this term be used rather than the medical term 'FI' when communicating with patients and the public.

We attempted to capture the ICS definition of FI that is a social or hygienic problem by extrapolating responses in the survey relating to social or hygienic impact. Using this criterion, nearly 14% of women were considered to have FI, which is similar to data from a population-based mail survey of over 4000 Southern Californian women who reported a prevalence of 16% for bothersome leakage of stool (11). Furthermore, a survey of 247 women seeking care in a gynaecology office reported a prevalence rate of 17% for 'involuntary loss of faeces sufficient to be considered a problem by the patient,' regardless of frequency (21). The only validated instrument for assessment of ABL in epidemiologic studies limits questions about accidental bowel leakage to the preceding 3 months (22). On the basis of our finding that 97% of women with ABL at least once in the last year are

consistency and frequency. Individuals with bowel disorders may have frequent liquid stools leading to incontinence despite potentially anatomically and even functionally intact anal sphincters. Our data demonstrate that those with UI and bowel disorders do in fact have highest odds of ABL. Thus, those with UI, IBS and IBD should be specifically targeted when screening for ABL. Well-established risk factors for FI include prior vaginal delivery, neurologic problems (such as prior stroke) and diabetes, all of which were confirmed in this sample. The prevalence of FI was higher in women who identified as white and lower in women who identified as black or African-American in our study, and this finding has been documented in multiple other samples (11,14,31,32). The effects of age in our study are not as definitive and this may be a reflection of the internet-based survey methodology and low number of elderly respondents.

The strengths of this study include the large sample of mature women and the high response rates. We incorporated questions from validated questionnaires where available and surveys were administered in a private, anonymous setting. Limitations lie in the lack of a universally accepted definition of FI and the inherent potential for recall and reporting bias with any survey research. We attempted to overcome the former limitation by presenting a variety of definitions using frequency, 'bother', and social or hygienic impact. The survey methodology did not accomplish a true population-based design in terms of over-sampling women in the United States for all age ranges, women living in specific rural/urban areas and women without access to health care resources. While these data may not be generalisable to the entire population, given that women responding via internet may be inherently different than those who respond via mailed survey, we are reassured that our prevalence rates are within range of other widely cited reports using similar definitions. Finally, with respect to predictors of ABL, reporting and recall bias related to confounding variables make true risk difficult to ascertain. We did not have data on obesity, anal sphincter injury, assisted vaginal delivery, prior hysterectomy, hormonal status, or a comprehensive medical history for complete assessment of all potential risk factors.

Despite its limitations, this study is the largest national internet community-based assessment of FI conducted in the US to date, and reveals a prevalence of almost 20%, even when incorporating 'bother' related to this condition. Given the overwhelming preference for the term 'accidental bowel leakage' rather than 'FI,' perhaps a shift in terminology will reduce embarrassment and allow individuals

to more frequently report the problem and seek treatment for it, as it did for the diagnosis 'impotence,' now better known as Erectile Dysfunction or ED. Validated instruments have been developed for the quantification of severity of FI (20) as well as for assessment of prevalence in the community over the last 3 months (22). Validation of these instruments assessing a year-long time period of symptoms may help further understand the severity and impact of this important but under-recognised condition.

In conclusion, nearly one-fifth of mature US women suffer from bothersome leakage of stool at least yearly and the overwhelming majority prefer the term 'Accidental Bowel Leakage.' As women with bowel disorders and UI are most likely to experience ABL, incorporating questions regarding ABL or bowel and bladder disorders into routine screening may aid in identifying silent sufferers of ABL. Patients and providers may obtain more information on ABL and bowel control issues by visiting <http://www.bowelcontrol.nih.gov/>.

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Author contributions

Heidi Brown participated directly in the literature search, figures, data analysis and interpretation, and manuscript writing. Steven Wexner and Mark Segall participated directly in the study design, data interpretation and manuscript writing. Kelly Brezoczky participated directly in the literature search, figures, study design, data collection, data interpretation and manuscript writing. Emily Lukacz participated directly in the literature search, figures, study design, data analysis and interpretation and manuscript writing.

Supporting Information

Additional Supporting Information may be found in the online version of this article: