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POPULATION-BASED STUDY OF INCIDENCE AND PREDICTORS OF URINARY INCONTINENCE IN AFRICAN AMERICAN AND WHITE OLDER ADULTS

Patricia S. Goode, MSN, MD^{1,2}, Kathryn L. Burgio, PhD^{1,2}, David T. Redden, PhD^{1,3}, Alayne Markland, DO, MSc^{1,2}, Holly E. Richter, PhD, MD², Patricia Sawyer, PhD², and Richard M. Allman, MD^{1,2}

¹Birmingham/Atlanta Geriatric Research, Education, and Clinical Center (GRECC), Department of Veterans Affairs Medical Center, Birmingham, AL

²University of Alabama at Birmingham School of Medicine

³University of Alabama at Birmingham School of Public Health

Abstract

PURPOSE—To determine incidence and predictors of incident urinary incontinence over 3 years in community-dwelling older adults.

MATERIALS & METHODS—A population-based, prospective cohort study was conducted with a random sample of Medicare beneficiaries, stratified to be 50% African American, 50% men, and 50% rural. In-home baseline assessment included standardized questionnaires and short physical performance battery. Three annual follow-up interviews were conducted by telephone. Incontinence was defined as any degree of incontinence occurring at least once a month in the past 6 months.

RESULTS—Participants were 490 women and 496 men, age 65 to 106 years (mean=75 years). Prevalence of incontinence at baseline was 41% in women and 27% in men. Three-year incidence of incontinence was 29% (84/290) in women and 24% (86/363) in men. There were no differences by race in prevalent or incident incontinence. In multivariable logistic regression models for women, significant independent baseline predictors of new incontinence included: stroke (OR 3.4, $p=.011$), incontinence < monthly (OR 3.3, $p=.001$), past or current post-menopausal estrogen (OR 2.3, $p<.006$), slower time to stand from a chair 5 times (OR 1.3, $p<.045$), and higher Geriatric Depression Scale Score (OR 1.2, $p=.016$). For men, significant independent baseline predictors of new incontinence included: incontinence < monthly (OR 4.2, $p<.001$) and lower score on the composite Physical Performance Score (OR 1.2, $p<.001$).

CONCLUSIONS—Prevalence of incontinence among community-dwelling older adults was high with an additional 29% of women and 24% of men reporting incident incontinence over 3 years of follow-up. Infrequent incontinence is a strong risk factor for developing at least monthly incontinence in both men and women.

Keywords

Urinary Incontinence; Epidemiology; Incidence; African Americans

Corresponding Author: Patricia S. Goode, MD, VA Medical Center, GRECC/11G, 700 19th St S., Birmingham, AL 35233, **Phone:** 205/934-3259, **FAX:** 205/558-7068, pgoode@uab.edu.

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INTRODUCTION

Annual incidence of incontinence ranges from 8–18% in community-dwelling older adults (≥ 60 years of age).^{1–5} The range of incidence estimates varies due to the definition of incontinence used (frequency and type), annual incidence reporting, and the types of cohorts used. Few studies report incidence specifically in men^{1, 5} or in racially mixed cohorts.^{3, 4, 6, 7} Remission rates are also important to consider in the natural history of incontinence and these range from 3–28%.^{1, 2, 4}

Most of the data about risk factors have been derived from cross-sectional studies and thus examine prevalent incontinence, with little data from longitudinal studies examining incident incontinence. Longitudinal studies provide needed data that describe the development, risk factors, and sequelae of this costly condition. From the longitudinal studies of community-dwelling older adults, risk factors for incident incontinence in men and women include age and impairment in functional status.^{2, 3} Among women, estrogen,^{4, 7} hysterectomy,⁴ and increased body mass index⁶ correlated with incident incontinence. White race/ethnicity has been associated with an increased risk of incident incontinence in women,⁴ whereas among peri-menopausal women, African American race/ethnicity was a risk factor for increased urge incontinence.⁶

The purpose of this study was to determine the incidence of urinary incontinence in older adults and examine potential risk factors associated with the development of incontinence over a three-year period, as part of the University of Alabama at Birmingham (UAB) Study of Aging.⁸

MATERIALS AND METHODS

Sample

From November 1999 to February 2001, the UAB Study of Aging enrolled 1,000 participants from Medicare beneficiary lists in five west central Alabama counties. The methodology has been published previously,⁸ but will be described briefly here. Recruitment was stratified to include 25% African American women, 25% African American men, 25% white women, and 25% white men. Within each of these strata, participants were selected to be 50% rural and 50% urban.

In-home Interview and Testing

Trained interviewers used a structured questionnaire for sociodemographic information, medical conditions, self-reported health status, health behaviors, and performance testing in each participant's home. The study protocol was approved by the UAB Institutional Review Board. Informed consent was obtained from each participant prior to beginning the interview and testing. The questionnaire included the 15-item Geriatric Depression Scale,⁹ Folstein's Mini Mental State Examination (MMSE),¹⁰ the 12-item Medical Outcomes Study Short-Form Health Survey (SF-12)¹¹ consisting of two summary indexes, the Mental Component Summary (MCS) and the Physical Component Summary (PCS). A comorbidity count was created by giving one point for each disease category of the Charlson Comorbidity Index without regard to condition severity.⁸ For further evaluation of cognitive function, specifically executive function, a scored clock drawing test was used.¹²

In addition to the interview, physical performance was assessed using the short physical performance battery which included (1) time to walk nine feet, (2) time to stand up from a firm seat five times with arms folded across the chest, and (3) balance, evaluated by ability to stand for ten seconds first with feet together, then semi-tandem (side of heel of one foot touching the big toe of the other foot), and then tandem (heel of one foot directly in front of

and touching the toes of the other foot).¹³ For each task, scores ranged from 0 to 4, with 4 indicating the best performance. A composite score was obtained by summing scores from the individual tasks.

Verification of Health History

After the in-home assessment, each participant's physicians were contacted by mail to confirm medical diagnoses. Hospital discharge summaries were requested for participants who had been hospitalized within three years of the interview.

Definition of Incontinence

Urinary incontinence at baseline was determined by the questions: "Have you ever leaked even a very small amount of urine?" and "Has this happened in the past year?" At each follow-up interview, participants were asked, "In the past 6 months, have you leaked even a small amount of urine?" Participants responding affirmatively to these questions were then asked about the frequency of incontinence episodes. For the purpose of the study, participants were considered incontinent only if they reported incontinence episodes occurring at least once a month. This is consistent with several other epidemiologic studies of urinary incontinence.^{6, 7} There were no questions on type of incontinence or on any treatments for incontinence received during the three years of follow-up.

Data Analysis

Potential risk factors for urinary incontinence were identified from the baseline data. Due to differences in risk factors, men and women were analyzed separately. Univariate analyses were conducted to evaluate which factors were correlated with urinary incontinence, using Chi-square analyses for categorical variables and ANOVA for continuous variables. After this screening, variables with $p \leq 0.05$ were entered into a multivariable forward stepwise logistic regression. Variables that were highly correlated were entered separately and the resulting models evaluated for goodness of fit. SAS 9.3 was used to perform statistical analyses.

RESULTS

Demographics

Of the 1000 participants of the Study of Aging, 490 women and 496 men had data on continence status at baseline and years 1–3, and were included in the analyses. The characteristics of the participants are shown in Table 1. Mean age was 75 (SD=7) with a range of 65 to 106 years.

Response Rates

for the 290 women continent at baseline, response rates were 95% of women alive at year one (3 dead and 14 missing), 92% at year two (8 dead and 22 missing), and 84% at year 3 (3 dead and 44 missing). Response rates for the 363 men continent at baseline were 93% of men alive at year one (13 dead and 23 missing), 89% at year two (8 dead and 38 missing), and 77% at year three (14 dead and 76 missing).

Prevalence and Incidence of Urinary Incontinence

The prevalence of urinary incontinence at baseline was 41% of women and 27% of men. Figure 1 depicts the incidence of incontinence at one, two, and three years for men and women. Detailed diagrams of the continence status for men and women over the 3 years of the study are found in Figure 2 and Figure 3. For the women continent at baseline, 42/273 (15%) developed incontinence at one year, 29/217 (13%) were continent at year 1, but

developed incontinence at two years, and 13/172 (8%) were continent years 1 and 2, but developed incontinence at three years. The overall incidence of new incontinence over 3 years in women was 29% (84/290). For men continent at baseline, 38/327 (12%) developed incontinence at 1 year, 31/269 (12%) at 2 years, and 17/208 (8%) at 3 years. The overall incidence of new incontinence over 3 years in men was 24% (86/363). Remission rates for participants incontinent at baseline over the 3 years were 39% (60/156) for women and 55% (51/92) for men.

Predictors of Urinary Incontinence

For women not incontinent at baseline, factors predictive of incontinence over the next 3 years on univariate analysis ($p < .05$) included history of stroke, postmenopausal estrogen use, fecal incontinence, urinary incontinence less frequently than monthly, Geriatric Depression Scale score, SF-12 Physical Component Summary score, and physical performance on timed chair stands. These were entered into multivariable analysis with the final model shown in Table 2. For men not incontinent at baseline, factors predictive of urinary incontinence over the next 3 years on univariate analysis ($p < .05$) included history of falls, poor vision, constipation, incontinence less frequently than monthly, Geriatric Depression Scale score, SF-12 Mental and Physical Component Summary score, and Composite Physical Performance score. These were entered into multivariable analysis with the final model shown in Table 3.

Variables not significantly related to incident urinary incontinence in either men or women included age, race, body mass index, income, education, living alone, hospitalization within the last 3 years, comorbidity score, arthritis, congestive heart failure, peripheral vascular disease, diabetes, fecal incontinence, constipation, poor vision, history of falls, 10 pound or more weight loss or gain in the past year, SF-12 Physical and Mental composite scores, clock drawing test score, and Mini Mental State Exam score; for women alone parity and current hormone replacement therapy; and for men alone history of prostate cancer, enlarged prostate, stroke and depression.

DISCUSSION

The report of the Third International Consultation on Incontinence notes that most studies of incident incontinence are in White women and that longitudinal studies of incidence, remission, and natural history are scarce and should be encouraged.¹⁴ This 3-year longitudinal, population-based study of older adults is unique among incidence studies in its sampling to include equal numbers of participants based on gender and race. We found the annual incidence of urinary incontinence to range from 8% – 15% in women and 8 – 12% in men with no differences between African Americans and whites. This is comparable to the three existing studies including both men and women aged 60 or 65 years.^{1, 3, 5}

Definitions of incontinence vary since there is no universally accepted definition of incontinence. Most epidemiologic studies include a specific timeframe in the definition, and several evaluating incident incontinence used a definition that includes at least monthly incontinence.^{6, 7} Including a timeframe for defining incontinence has face validity from a clinical viewpoint. Many older persons with incontinence do not consider it a problem if the incontinence is infrequent and often will decline treatment even if it is offered. However, our study confirms the findings of the MESA study that infrequent or intermittent incontinence is a risk factor for more frequent incontinence.¹ We found a relative risk of 3.3 in women and 4.2 in men for incontinence less than once a month to progress to at least monthly. Thus, clinicians can advise patients that infrequent incontinence is a strong risk factor for developing more frequent incontinence in both men and women, and potentially target this group for prevention. The effectiveness and feasibility of a relatively simple

preventive intervention for women with no or infrequent incontinence has been shown by Diokno and colleagues.¹⁵ After a 2-hour informational session followed 2 to 4 weeks later by an individualized session, twice as many women remained completely continent or continued to have only infrequent incontinence one year later.

Incontinence is often a chronic condition that has periodic exacerbations and remissions. Remission rates for participants incontinent at baseline over the 3 years of our study were 39% for women and 55% for men. Gender differences in remission have also been documented in studies of 1-year and 5-year incidence.^{1, 5} In most epidemiologic studies, remission is reported globally, without data on treatment. This is true of our study as well. It is quite possible that some participants improved because they received treatment over the course of the study. However, it is also possible that variability of self-report may account for a portion of remissions. Kirschner-Hermanns and colleagues evaluated the reliability of self-report using structured telephone interviews with questions on the frequency of incontinence, administered two weeks apart and obtained a correlation of 0.82.¹⁶ The authors note that their study would have shown an “incidence rate” of 10% and a “remission rate” of 5%. Thus, although the reliability of self-report is a factor that must be considered in interpretation of epidemiologic studies, it does not account for all the variability in reports of incontinence in longitudinal studies.

Although it is well established that obesity can cause incontinence or contribute to the severity of the condition,¹⁴ our study did not find body mass index or weight gain of 10 pounds or more to be related to incident incontinence. Further, intentional weight loss has been shown to result in improvement or remission of incontinence,¹⁷ but loss of 10 pounds in the past year was not protective of developing new incontinence in our study. Future studies of intentional weight loss should include older participants and add incontinence as an endpoint to determine if regaining continence could be an additional health benefit of successful dieting in older as well as younger persons.

Functional impairment, particularly mobility limitation, is an established risk factor for incontinence.¹⁴ The relationship may be a direct consequence of difficulty getting to the bathroom and removing clothing in time or could be related to common multi-factorial causes of both immobility and incontinence. In men, poorer performance on a timed composite physical performance test which included a 9-foot walk, standing from sitting 5 times, and 3 balance exercises¹³ was predictive of incident incontinence. In women the single timed measure of standing from a chair 5 times was a stronger predictor than the composite physical performance measure. Future research is warranted to determine whether interventions to improve mobility could also improve continence.

Depression has been reported as being correlated with incontinence, but usually interpreted as a reaction to the incontinence rather than predictive of new incontinence. It is possible that a common condition such as stroke could predispose older adults to both depression and incontinence. It is also possible that some persons were subsequently diagnosed with depression and treated with antidepressants, altering the neurotransmitter levels in the bladder. However, the physiologic effects of increased levels of serotonin and norepinephrine on bladder function would not seem to physiologically predispose patients to incontinence although it is possible considering that some neurotransmitters such as dopamine could adversely affect bladder storage.¹⁸

The evidence base for the effect of hormone replacement therapy on incontinence has become much stronger with data from two large prospective studies, which have demonstrated that estrogen increased rates of incontinence as well as worsened existing incontinence.^{19, 20} Our study did not demonstrate a relationship between current hormone

replacement therapy and the development of incident incontinence, but did demonstrate that ever having postmenopausal hormone replacement therapy was associated with increased risk of developing incontinence. The Heart Estrogen/Progesterone Replacement Study (HERS), linking estrogen to incontinence and other adverse outcomes was published in 2001,¹⁹ the year enrollment was completed for the UAB Study of Aging. Many women across the country discontinued hormone replacement due to the widely disseminated HERS results. One cannot help but wonder about the effect of estrogen withdrawal on the incidence of incontinence, similar to the well accepted effect of menopause.⁶ Perhaps discontinuing hormone therapy is associated with an increased risk of incontinence. A controlled trial of discontinuation of hormone therapy would be challenging, but a clinical registry of women discontinuing or continuing hormone replacement therapy could provide helpful data on symptom burden, particularly incontinence.

In conclusion, the prevalence of urinary incontinence among community-dwelling older adults was high at baseline and an additional 29% of women and 24% of men reported incident incontinence over 3 years of follow-up in this population-based study. The one preventable risk factor with an existing, effective, evidence-based intervention is infrequent incontinence, which is very treatable with behavioral therapy. The other modifiable risk factors of estrogen therapy, depression, and physical performance warrant increased attention, as improvement in these risk factors may also impact on the incidence of incontinence in this growing segment of the US population.

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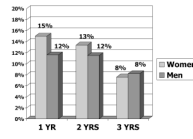


Figure 1.
Incident Urinary Incontinence by Year in Men and Women



Figure 2.
Incidence and Remission of Incontinence in Women



Figure 3.
Incidence and Remission of Incontinence in Men

TABLE 1

CHARACTERISTICS OF PARTICIPANTS

Variable	Groups	African-American Men		African-American Women		White Men		White Women	
		N	%	N	%	N	%	N	%
Age	65-74 years	121	48	114	47	138	56	131	53
	75-84 years	97	39	94	39	88	36	91	37
	85+ years	30	12	36	15	22	9	24	10
Education	6 th grade or less	100	40	74	30	19	8	9	4
	7 th -11 th grade	81	33	88	36	56	23	65	26
	High School Graduate	30	12	53	22	77	31	72	29
	Beyond High School	37	15	29	12	96	39	100	41
Living Situation	Lives Alone	74	30	94	39	40	16	108	44
	Lives with others	174	70	150	62	208	84	138	56
Residence	Rural	126	51	126	52	130	52	129	52
	Urban	122	49	118	48	118	48	117	48

Table 2

Predictors of New Incontinence in Women Multivariable Step-wise Regression

Factor	Odds Ratio	95% Confidence Interval	P-Value
History of Stroke	3.4	1.3 – 8.6	.011
Incontinence Less Frequent than Monthly	3.3	1.6 – 6.6	.001
Postmenopausal Estrogen/HRT ever	2.3	1.3 – 4.3	.006
Slower Time for 5 Chair Stands	1.3	1.0 – 1.6	.045
Depression	1.2	1.0 – 1.4	.016

Table 3

Predictors of New Incontinence in Men Multivariable Step-wise Regression

Factor	Odds Ratio	95% Confidence Interval	P-Value
Incontinence Less Frequent than Monthly	4.2	2.1 – 8.3	<.001
Composite Physical Performance Score *	1.2	1.1 – 1.3	<.001

* Includes timed 9-foot walk, 5 chair stands, and standing balance with feet together, semi-tandem and tandem.