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Bridging the Gap: Determinants of Undiagnosed or Untreated Urinary Incontinence in Women

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Abstract

Background—Over a third of middle-aged or older women suffer from urinary incontinence, but less than half undergo evaluation or treatment for this burdensome condition. With national organizations now including assessment of incontinence as a quality performance measure, providers and healthcare organizations have a growing incentive to identify and engage these women who are undiagnosed and untreated.

Objective—We sought to identify clinical and sociodemographic determinants of patient-provider discussion and treatment of incontinence among ethnically diverse, community-dwelling women.

Study Design—We conducted an observational cohort study from 2003-2012 of 969 women 40 years and older enrolled in a Northern California integrated healthcare delivery system, who reported at least weekly incontinence. Clinical severity, type, treatment, and discussion of incontinence were assessed by structured questionnaires. Multivariable regression evaluated predictors of discussion and treatment.

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Determinants of Undiagnosed Incontinence in Women

Even in an integrated healthcare delivery system, low income and diabetic woman are less likely to discuss urinary incontinence with a healthcare provider.

Results—Mean age of the 969 participants was 59.9 (± 9.7) years, and 55% were racial/ethnic minorities (171 Black, 233 Latina, 133 Asian or Native American). Fifty-five percent reported discussing their incontinence with a healthcare provider, 36% within one year of symptom onset, and with only 3% indicating that their provider initiated the discussion. Over half (52%) reported being at least moderately bothered by their incontinence. Of these women, 324 (65%) discussed their incontinence with a clinician, with 200 (40%) doing so within 1 year of symptom onset.

In multivariable analysis, women were less likely to have discussed their incontinence if they had a household income <\$30,000/year versus \$120,000/year (AOR=0.49, CI=0.28-0.86), or were diabetic (AOR=0.71, CI=0.51-0.99). They were more likely to have discussed incontinence if they had clinically severe incontinence (AOR=3.09, CI=1.89-5.07), depression (AOR=1.71, CI=1.20-2.44), pelvic organ prolapse (AOR= 1.98, CI=1.13-3.46), or arthritis (AOR=1.44, CI=1.06-1.95). Among the subset of women reporting at least moderate subjective bother from incontinence, Black race (aOR=0.45, CI =0.25-0.81, versus white race), and income <\$30,000/year (aOR=0.37, CI=0.17-0.81 versus \$120,000/year) were associated with reduced likelihood of discussing incontinence. Those with clinically severe incontinence (aOR=2.93, CI=1.53-5.61, versus low moderate incontinence by the Sandvik scale) were more likely to discuss it with a clinician.

Conclusions—Even in an integrated healthcare system, lower income was associated with decreased rates of patient-provider discussion of incontinence among women with at least weekly incontinence. Despite being at increased risk of incontinence, diabetic women were also less likely to have discussed incontinence or received care. Findings provide support for systematic screening of women to overcome barriers to evaluation and treatment.

Keywords

comorbidity; healthcare delivery; socioeconomic factors; urinary incontinence; women

Introduction

Over a third of middle-aged and older women suffer from urinary incontinence,¹ a condition leading to depression, social isolation, falls and fractures, and admission to long-term care facilities.²⁻⁵ Despite the burden of this condition, up to half of women with incontinence in the community do not discuss it with a healthcare provider.^{6, 7} Currently, little is known about why so many women with incontinence go undiagnosed and untreated.⁸

To date, studies investigating barriers to diagnosis and treatment have tended to focus on the role of incontinence-specific factors such as severity and type of incontinence.^{6, 9-11} Nevertheless, a variety of other factors may influence whether women obtain treatment, including co-morbid conditions that may take precedence over incontinence, complicate the clinical course of incontinence, or interfere with incontinence management.^{12, 13} Furthermore, sociodemographic factors may influence whether women obtain treatment independent of whether they have access to care.

With national organizations now including assessment and treatment of incontinence as a quality performance measure,¹⁴ healthcare organizations have a growing incentive to

identify and engage patients with incontinence. To provide additional insight into the underdiagnosis and undertreatment of incontinence, we examined determinants of patient-provider discussion of incontinence and treatment utilization, among ethnically diverse women enrolled in an integrated healthcare system, all of whom had a primary care provider and access to care.

Materials and Methods

PARTICIPANTS AND SETTING

This research was conducted within an observational study of risk factors for urinary tract dysfunction in middle-aged and older women, the Reproductive Risks of Incontinence Study at Kaiser (RRISK). Details about the methods used to construct the cohort have been reported previously.¹⁵⁻¹⁷ Briefly, participants were women aged 40 to 80 years enrolled in Kaiser Permanente Northern California (KPNC), an integrated healthcare delivery system serving approximately 30% of the northern California population. Because the original goal of the RRISK study was to examine the effect of childbirth on incontinence risk, women had to have been continuously enrolled in KPNC since the age of 21 years and to have given birth to at least half their children within the KPNC system to facilitate abstraction of obstetric records. Women were sampled from within race/ethnicity strata to ensure an overall composition of 20% Black, 20% Latina white, 20% Asian or Native American, and 40% non-Latina white women. For the second and third data waves of RRISK (RRISK2, 2003-2008; and RRISK3, 2008-2012), 20% of participants were also recruited from the KPNC Diabetes Registry to ensure robust participation by diabetic women.¹⁸

For this study, analyses focused on participants who reported at least weekly incontinence during either RRISK2 or RRISK3, the two waves in which detailed information about patient-provider discussion of incontinence and treatment utilization were collected (N=969). For those reporting at least weekly incontinence during both waves, data from the most recent wave were used to capture their cumulative experience with seeking and undergoing treatment. All data were collected through clinic- or home-based study visits, and informed consent was obtained at the time of data collection. All procedures were approved by the institutional review boards of the University of California San Francisco and Kaiser Permanente Division of Research.

MEASUREMENTS

Frequency, severity, and clinical type of incontinence were assessed using structured-item questionnaire measures previously validated against a detailed 7-day voiding diary.¹⁵ Participants were asked, "During the past 12 months, on average, how often have you leaked urine, even a small amount?" Women reporting at least weekly leakage were then asked to clarify the frequency and average amount of urine loss per episode. The validated Sandvik Severity Scale was used to classify clinical incontinence severity as "low moderate," "high moderate," or "severe" based on frequency and amount of urine lost per episode.¹⁹ Participants were also asked to indicate the level of bother associated with their urine loss, with response options including not at all, slightly, moderately, quite a bit, and extremely.

Clinical type of incontinence was assessed by asking women to distinguish leakage occurring when they felt the urge to urinate but could not reach a bathroom in time (urgency incontinence) from leakage occurring when they laughed or coughed, or during physical activities (stress incontinence). Women with a majority of stress-type episodes in the past 7 days were classified as having stress-predominant incontinence; those with majority urgency-type were considered as having urgency-predominant incontinence. Women reporting a combination, with neither type comprising the majority, were considered to have “mixed incontinence.” If the majority of episodes occurred without activity or urgency, the label “other-type” incontinence applied. Among women with weekly incontinence, interviewer-administered questionnaires assessed patient-provider discussion and treatment of incontinence. Women were first asked, “Have you ever discussed your urine leakage with your doctor or healthcare provider?” Those who replied affirmatively were asked who initiated the discussion; how long they had experienced symptoms prior to discussion; and the types of providers involved, including primary care, specialist (gynecologists, and more), and allied health professionals. Women who denied discussing their leakage were asked to indicate their primary reason from a list derived from past qualitative research,²⁰⁻²³ including: preferring to manage leakage on their own or tending to put up with leakage; considering incontinence to be a small or insufficiently bothersome problem; believing incontinence to be a normal part of aging; not knowing what help was available or where to seek it; being too embarrassed to discuss their leakage; not wanting to bother their provider; or not wanting exams, tests, or surgery.

Women who reported discussing incontinence were asked about treatments recommended by their provider for this condition. Pharmacologic treatments included antimuscarinics, antispasmodics, tricyclic antidepressants, phenazopyridine, and vaginal estrogen. Behavioral treatments included timed voiding, pelvic floor exercises, and biofeedback. Surgical/invasive treatments included retropubic suspension, retropubic or abdominal sling, tension-free vaginal tape, needle suspension, anterior or cystocele repair, anterior colporrhaphy and urethropexy procedures.

Using questionnaires, patients identified comorbid health conditions providers had diagnosed them with from a list of conditions prior research has linked with incontinence. These included cardiometabolic (myocardial infarction, angina, other coronary heart disease, diabetes mellitus, hypertension), gynecologic (pelvic organ prolapse, endometriosis), neuropsychiatric (stroke, Parkinson’s disease, depression), respiratory (asthma, chronic obstructive pulmonary disease), gastrointestinal (irritable bowel syndrome, inflammatory bowel disease), musculoskeletal conditions (arthritis), and cancer.^{24, 25} Diabetes diagnosis was further confirmed using data from the KPNC Diabetes Registry which contains abstracted clinical records indicating use of a glycemic control medication or serial fasting blood glucose greater than 125 mg/dL. Comorbid conditions with a minimum prevalence of 5% in the study population were included in analyses.

Other sociodemographic characteristics were also assessed by self-administered questionnaire. Participants were asked to self-identify as non-Latina white/Caucasian, Latina/Hispanic, African American/Black, Asian American/Asian, or Native American. They reported their highest level of educational attainment up to completion of graduate or

professional school. Household income for the past 12 months was reported in \$30,000 increments; income levels were then consolidated into three categories: <\$30,000 (less than half the area median income), \$30,000 to \$119,999, and \$120,000 (nearly twice the area median income).²⁶ Employment status was reported as working full-time for pay, part-time (< 30 hours per week), retired, unemployed or disabled.

STATISTICAL ANALYSES

Sociodemographic and clinical characteristics were examined using numbers (percentages) and means (standard deviations). Self-reported rates of patient-provider discussion and treatment utilization were also summarized using descriptive statistics. Among participants reporting no discussion of incontinence with a provider, the distribution of self-reported reasons for not discussing incontinence was also examined.

Multivariable logistic regression models evaluated sociodemographic and clinical characteristics associated with patient-provider discussion and treatment utilization among women with at least weekly incontinence. All models included clinical severity and type of incontinence severity, co-morbid conditions with at least 5% prevalence in the sample, as well as sociodemographic variables such as race/ethnicity, age, educational attainment, employment status, and household income. Variables were considered to be independent predictors of discussion or treatment outcomes if they were associated at $p < .05$ in multivariable analysis. All analyses were performed using SAS statistical software version 9.3 (SAS Institute Inc., Cary, NC, USA).

Results

Of the 969 women reporting at least weekly incontinence, mean (SD) age was 59.9 (9.7) years, and less than half were Non-Latina white (Table 1). The majority had at least some college education. Over two thirds reported annual household incomes of \$30,000-\$120,000. Nearly one fifth had mixed-type incontinence. Over 10 percent had clinically severe incontinence. Over half reported moderate or greater bother with incontinence. More than half reported three or more comorbid conditions.

Approximately 55% of women reported discussing incontinence with a healthcare provider (Table 2) with 40% of these women reporting discussing their symptoms with a specialist. Women initiated the discussion of incontinence for over 95% of patients, with only 3% reporting that a provider initiated discussion. Nearly two thirds waited for more than a year after the onset of symptoms before consulting a provider. Of women who discussed their incontinence with a provider, about three quarters reported being prescribed behavioral treatment, one quarter pharmacologic treatment, and 17% surgery (treatment categories not mutually exclusive).

Of women who denied discussing incontinence with a provider, the most common reason for not discussing their symptoms was that they considered their incontinence to be a small or insufficiently bothersome problem (Table 3). Other common reasons included a preference to manage the problem on their own, belief that they should “put up with” incontinence, or

view that incontinence was a normal part of aging. Embarrassment, fear of medical action, and not knowing where to seek help were less frequently cited reasons.

In multivariable analyses, lower household income was associated with decreased likelihood of reporting discussing incontinence with any provider or with a specialist (Table 4). Women with only a high school education were less likely to report discussing incontinence within the first year, compared to women with professional or graduate school education. Neither age nor employment status predicted patient-provider discussion.

Women were more likely to report having discussed their incontinence with a healthcare provider, with a specialist, or within the first symptomatic year if they had more clinically severe symptoms (Table 4). In contrast, clinical incontinence type was not an independent predictor of having this discussion after adjustment for other characteristics.

Women with diabetes were less likely to report having discussed their incontinence with a provider and less likely to seek treatment within the first symptomatic year (Table 4). In contrast, women with either pelvic organ prolapse or depression were more likely to report discussing it with a provider and specialist, and to seek treatment within that year. Those with arthritis were also more likely to report having discussed with a provider and specialist. No significant associations were found for any other comorbid conditions.

Among women who reported discussing their incontinence with a provider, those with urgency-predominant or with more clinically severe incontinence were more likely to have been prescribed pharmacologic therapy (Table 5). Those with moderate-high to high clinical incontinence severity were more likely to have been prescribed behavioral treatment than those with low-moderate severity.

Participants with asthma or a history of stroke were more likely to report pharmacologic therapy for incontinence and those with asthma were more likely to have received behavioral treatments compared to women without these conditions. Surgical options were more commonly offered to women with pelvic organ prolapse.

Women of increasing age and Black race were more likely to report that their provider recommended behavioral treatment. On the other hand, women with less than professional schooling, or with lower household income, were less likely to receive such a recommendation. Black and Asian women were less likely to report receiving a recommendation for surgery relative to white women.

Of the 52% of women with moderate or greater bother with their incontinence, 324 (65%) discussed their incontinence with a clinician, 242 (48%) discussed it with a specialist, 200 (40%) discussed it within one year, and 18 (4%) reported their provider initiated the discussion.

Among the subset of women reporting at least moderate bother from incontinence, Black race (aOR=0.45, CI=0.25-0.81, versus white race), and income <\$30,000/year (aOR=0.37, CI=0.17-0.81 versus \$120,000 per year) were associated with reduced likelihood of discussing incontinence. Those with clinically severe incontinence (aOR=2.93,

CI=1.53-5.61, versus low moderate severity by the Sandvik scale) were more likely to discuss it with a clinician

Comment

In this study of community-dwelling women with weekly or more frequent incontinence, nearly half indicated that they had never discussed their incontinence with a healthcare provider. Further, fewer than 5% reported that their provider had ever initiated a discussion about incontinence. Of those who had discussed their incontinence, nearly two thirds indicated that they were symptomatic for more than a year prior to discussion. These findings suggest that even among women with frequent incontinence and streamlined and affordable access to primary care and specialist services, rates of patient-provider discussion of incontinence remain low, and rates of provider-initiated screening for incontinence are even lower.

Our findings also indicate that some comorbid conditions that tend to coexist with incontinence, such as depression, may increase the likelihood of discussing incontinence with a provider. These results may reflect increased overall healthcare utilization by women with depression;²⁷ alternatively, women with depression may perceive greater bother associated with incontinence, or may be more likely to present to providers with somatic symptoms such as incontinence before their depression is recognized. Asthma and arthritis, two other conditions that increase risk of incontinence, also appeared to result in more frequent interactions with the healthcare system, and thus create more frequent opportunities for clinical evaluation.

In contrast, diabetes mellitus, which has also been identified as a risk factor for incontinence,²⁸⁻³⁰ was associated with lower rates of patient-provider discussion and longer delays in obtaining evaluation. As a chronic condition, diabetes tends to be associated with more frequent healthcare visits to monitor glycemic control and prevent end-organ complications; however, these visits may not result in improved recognition or management of incontinence if providers focus on other complications of diabetes that they consider higher priority. Additionally, diabetic women may be less bothered by incontinence in relation to other diabetes-related symptoms.

Several past studies of middle-aged or older women with incontinence have reported that fewer than half of women seek care.^{1, 6, 10, 31-35} Our cohort may have been slightly more motivated to seek care than a general incontinence population since they not only had weekly incontinence with a shift toward more severe symptoms, but were also enrolled in a cohort study focused on urinary tract dysfunction.

Interestingly, women reporting higher household income were substantially more likely to discuss their incontinence with a healthcare provider in general and a specialist in particular. This contrasts with a study of Boston area women, which showed that socioeconomic status, defined as a compound variable of race/ethnicity and income, was not associated with treatment-seeking.³² While lower income has previously been identified as a general predictor of underutilization of care,³⁶ lack of access to care is often hypothesized to be the

primary mechanism, whereas our population had both access to care and an assigned primary care provider. Other factors that may drive the relationship observed in our study include prohibitive copays, increased job or family responsibilities hindering ability to visit a provider, and de-prioritization of this health issue amidst the psychosocial challenges inherent to lower socioeconomic status.³⁷

Over a quarter of women with weekly incontinence in this study claimed that they did not seek treatment because they considered their incontinence to be a small problem or not sufficiently bothersome. This raises the important caveat that some women may not feel in need of intervention despite frequent symptoms.^{11, 38} Nevertheless, the majority of participants who did not seek care cited primary reasons that do not preclude bother or possibility of benefiting from treatment. Furthermore over a third of women who reported being at least moderately bothered by incontinence did not discuss it with a provider.

This study benefits from a large, diverse participant sample, characterization of both incontinence severity and type, and assessment of a wide variety of factors with the potential to influence incontinence treatment. However, this research also has several important limitations. First, we relied on participant report for incontinence status, comorbid conditions, and provider interactions around incontinence. Both under- and over-reporting of these factors may have influenced associations observed in analysis. Further, we utilized interviews in data collection, which has been associated with poorer reporting of sensitive topics such as incontinence.³⁹ Our reports of incontinence were robust, however, with over a third of all participants reporting weekly or more frequent incontinence. Another limitation is that only women with at least weekly incontinence were asked to provide information about discussion and treatment. As a result, our study did not include women who had previously suffered from incontinence, underwent evaluation, and were successfully treated, nor those with less frequent incontinence.

Our study also focused primarily on participant characteristics that might influence discussion of incontinence, but there are likely important provider- and system-level factors that contribute to underdiagnosis or undertreatment. Prior studies have suggested that the KPNC population may underrepresent the very poor and very wealthy, despite being similar to the general northern California population in other respects.⁴⁰ Additionally, generalizability may be limited because women in this study had few barriers to care, with relatively easy access to affordable primary and specialist care. Future research should examine patterns of patient-provider discussion and treatment utilization for incontinence in other insured populations.

Recently, national organizations have begun to incorporate evaluation and treatment of incontinence in older women into quality performance measures, creating a greater incentive systematic screening for this condition. Accordingly, since the conclusion of RRISK, KPNC has begun screening for incontinence via an intake questionnaire. Data on the impact of such initiatives are needed to indicate whether they can not only increase rates of evaluation of incontinence, but also improve clinically meaningful outcomes.

Our findings point to a continuing gap in patient-provider communication regarding incontinence, a prevalent and burdensome chronic condition in women. Certain populations—diabetic women, lower income women—may be in particular need of outreach, as they may be at increased risk of incontinence but less likely to obtain incontinence care, independent of whether they have access to healthcare services.

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Table 1

Self-Reported Demographic and Clinical Characteristics of Women with Weekly Urinary Incontinence (n=969)

| Characteristic | N(%) |
|--|-------------------|
| Age, years, mean (\pmSD) | 59.9 (\pm 9.7) |
| Race/ethnicity | |
| Non-Latina white | 432 (44.6) |
| Black | 171 (17.6) |
| Latina white | 233 (24.0) |
| Asian | 133 (13.7) |
| Education level | |
| High school or less | 197 (20.3) |
| At least some college | 591 (61.0) |
| At least some Professional/graduate school | 181 (18.7) |
| Household income | |
| Less than \$30,000/year | 131 (14.2) |
| \$30,000-\$119,999/year | 643 (69.6) |
| \$120,000/year or more | 150 (16.2) |
| Employment status | |
| Working full/part time for pay | 470 (48.5) |
| Not working for pay | 499 (51.5) |
| Clinical type of incontinence^a | |
| Stress-predominant | 368 (38.0) |
| Urgency-predominant | 349 (36.0) |
| Mixed stress and urge | 152 (15.7) |
| Other or unspecified | 100 (10.3) |
| Clinical incontinence severity^b | |
| Score 3 = Low Moderate | 460 (47.5) |
| Score 4 = Moderate High | 396 (40.9) |
| Score 6-8 = Severe | 112 (11.6) |
| Self-reported bother associated with incontinence | |
| Not at all/slightly | 457 (47.8) |
| Moderately/Quite a bit/Extremely | 500 (52.3) |
| Comorbid chronic conditions | |
| Total number of conditions, Mean (\pmSD) | 2.9 (\pm 2.0) |
| Cancer | 142 (14.7) |
| Asthma | 257 (26.5) |
| Chronic Obstructive Pulmonary Disease | 57 (5.9) |
| Myocardial infarction, angina, or other heart disease | 79 (8.2) |

| Characteristic | N(%) |
|--|------------|
| Hypertension | 556 (57.4) |
| Stroke | 52 (5.4) |
| Depression | 229 (23.6) |
| Irritable bowel syndrome | 117 (12.1) |
| Diabetes | 309 (31.9) |
| Arthritis | 426 (44.1) |
| Pelvic organ prolapse^c | 82 (8.5) |

^aStress incontinence was defined as leakage occurring when participants laughed or coughed, or during physical activities. Urgency incontinence was defined as leakage occurring when participants felt the urge to urinate but could not reach a bathroom in time.

^bSeverity of incontinence was assessed using the validated Sandvik validity scale, based on a combination of frequency and volume of leakage.

^cPelvic organ prolapse was defined as a dropping, bulging, or protrusion of the bladder, vagina, uterus, and/or rectum.

Table 2

Self-Reported Patient-Provider Discussion of Incontinence and Provider-Recommended Treatment for Urinary Incontinence

| 2A. Self-reported prevalence of patient-provider incontinence discussion among women with at least weekly urinary incontinence (n=969) | |
|---|--------------|
| | N (%) |
| Discussed with a clinician | 525 (54.7) |
| Discussed with a generalist ^a | 310 (32.4) |
| Discussed with a specialist ^b | 385 (40.2) |
| Provider initiated discussion of leakage | 31 (3.3) |
| Time to patient-provider discussion (<1 year) | 345 (36.4) |
| 2B. Clinician-recommended treatment among women with a history of discussing incontinence with a clinician (n=525)^c | |
| | N (%) |
| Behavioral treatments^d | 399 (76.0) |
| Timing of urination | 156 (29.7) |
| Pelvic floor exercises (Kegel) | 383 (73.0) |
| Biofeedback | 31 (5.9) |
| Pharmacologic treatments^e | 143 (27.3) |
| Vaginal estrogen cream or ring ^f | 23 (4.4) |
| Antimuscarinics ^g | 97 (18.5) |
| Tri- or Tetracyclic antidepressants ^h | 12 (2.3) |
| Surgical treatmentsⁱ | 88 (16.8) |

^aGeneralists included family medicine, internal medicine, nurses, and midwives.

^bSpecialists included gynecologists, urogynecologists, or urologists.

^cValues for each treatment type not mutually exclusive. Across the whole sample, 107 (20%) women received no treatment recommendation, 6 (1%) surgery only, 11 (2%) pharm only, 222 (42.3%) behavioral only; 2 (0.4%) were recommended both pharm and surgery, 47 (9%) behavioral and surgery, 97 (18.5%) behavioral and pharmaceutical, and 33 (6.3%) were recommended all three treatment types.

^dBehavioral treatments included timed voiding strategies, pelvic floor exercises, biofeedback.

^ePharmacologic treatments included antimuscarinics, antispasmodics, antidepressants, urinary tract analgesics (e.g., phenazopyridine), and vaginal estrogen.

^fSubcategories not mutually exclusive

^gAntimuscarinics included oxybutynin, tolterodine, urispas, or probanthin both short- and long-acting.

^hTricyclic or Tetracyclic antidepressants included amitriptyline, imipramine, and nortriptyline, amoxipine, and doxepin.

ⁱSurgical/invasive treatments included retropubic suspension, retropubic or abdominal sling, tension-free vaginal tape, needle suspension, anterior or cystocele repair, anterior colporrhaphy and urethropepy procedures.

Table 3

Primary Reason for Not Mentioning Incontinence to a HealthCare Provider Among Women with Weekly Urinary Incontinence

| Primary reason | Total (%) |
|---|------------|
| Consider incontinence a small problem or not bothersome | 119 (27.4) |
| Can manage on own or tend to put up with leakage | 115 (26.4) |
| Thought incontinence was a normal part of aging | 92 (21.1) |
| Embarrassed to discuss incontinence | 26 (6.0) |
| Don't know what help is available or where to seek it | 24 (5.5) |
| Afraid of surgery or do not want physical exam or tests | 22 (5.1) |
| Do not want to bother doctor about incontinence | 3 (0.7) |
| Other | 34 (7.8) |

Table 4

Adjusted Associations Between Participant Characteristics and Patient-Provider Discussion for Urinary Incontinence

| Predictor | Adjusted Odds Ratio (95% Confidence Interval) | | |
|---|---|-----------------------------|-----------------------------|
| | Discussed with a Clinician | Discussed with a Specialist | Sought treatment in <1 year |
| Age (per 5-year increase) | 1.02 (0.93-1.13) | 0.97 (0.88-1.07) | 1.03 (0.94-1.14) |
| Race/ethnicity | | | |
| Non-Latina white | Reference | Reference | Reference |
| Black | 0.74 (0.49-1.11) | 0.55 (0.35-0.84) * | 1.29 (0.85-1.95) |
| Latina white | 1.23 (0.84-1.79) | 0.97 (0.67-1.40) | 1.25 (0.86-1.82) |
| Asian | 0.74 (0.47-1.14) | 0.67 (0.43-1.06) | 0.74 (0.47-1.18) |
| Education level | | | |
| High school or less | 0.73 (0.45-1.17) | 0.78 (0.48-1.27) | 0.48 (0.30-0.78) * |
| At least some college | 0.83 (0.57-1.22) | 0.88 (0.60-1.28) | 0.78 (0.53-1.13) |
| At least some professional/graduate school | Reference | Reference | Reference |
| Household income | | | |
| Less than \$30,000/year | 0.49 (0.28-0.86) * | 0.36 (0.21-0.64) * | 0.97 (0.56-1.70) |
| \$30,000-\$119,999/year | 0.60 (0.40-0.91) * | 0.56 (0.38-0.84) * | 1.05 (0.69-1.58) |
| \$120,000 or more/year | Reference | Reference | Reference |
| Working full or part time for pay | 0.95 (0.67-1.35) | 0.95 (0.67-1.34) | 0.82 (0.58-1.16) |
| Clinical type of incontinence^a | | | |
| Stress predominant | Reference | Reference | Reference |
| Urge predominant | 0.94 (0.67-1.30) | 1.00 (0.71-1.40) | 1.06 (0.75-1.48) |
| Mixed stress and urge | 0.86 (0.56-1.32) | 0.84 (0.54-1.30) | 0.94 (0.61-1.46) |
| Other or not specified | 1.06 (0.63-1.77) | 1.11 (0.67-1.83) | 1.08 (0.65-1.79) |
| Clinical incontinence severity^b | | | |
| Score 3, Low Moderate | Reference | Reference | Reference |
| Score 4, Moderate High | 2.83 (2.09-3.85) * | 2.59 (1.90-3.55) * | 1.82 (1.33-2.49) * |
| Score 6-8, Severe | 3.09 (1.89-5.07) * | 2.72 (1.69-4.38) * | 2.20 (1.35-3.56) * |
| Cancer | 1.13 (0.74-1.71) | 1.07 (0.70-1.61) | 1.00 (0.66-1.51) |
| Asthma | 1.26 (0.89-1.77) | 1.26 (0.90-1.77) | 1.26 (0.90-1.76) |
| Chronic obstructive pulmonary disease | 1.07 (0.56-2.02) | 0.94 (0.50-1.77) | 0.74 (0.40-1.40) |

| Predictor | Adjusted Odds Ratio (95% Confidence Interval) | | |
|---|---|-----------------------------|-----------------------------|
| | Discussed with a Clinician | Discussed with a Specialist | Sought treatment in <1 year |
| Heart disease: myocardial infarction, angina, or other | 1.25 (0.71-2.20) | 1.15 (0.67-2.00) | 1.11 (0.64-1.93) |
| Hypertension | 1.15 (0.84-1.57) | 1.02 (0.74-1.39) | 1.23 (0.90-1.69) |
| Stroke | 1.12 (0.57-2.19) | 1.11 (0.58-2.11) | 1.24 (0.66-2.32) |
| Depression | 1.71 (1.20-2.44) * | 1.48 (1.05-2.09) * | 1.55 (1.10-2.19) * |
| Irritable bowel syndrome | 1.14 (0.73-1.77) | 1.24 (0.80-1.90) | 1.41 (0.91-2.17) |
| Diabetes | 0.71 (0.51-0.99) * | 0.73 (0.52-1.02) | 0.71 (0.50-0.99) * |
| Arthritis | 1.44 (1.06-1.95) * | 1.48 (1.09-2.01) * | 1.21 (0.89-1.65) |
| Pelvic organ prolapse^c | 1.98 (1.13-3.46) * | 2.33 (1.38-3.93) * | 1.71 (1.02-2.85) * |

Adjusted for all characteristics and conditions listed in this table.

* P<0.05

^aStress incontinence was defined as leakage occurring when participants laughed or coughed, or during physical activities. Urgency incontinence was defined as leakage occurring when participants felt the urge to urinate but could not reach a bathroom in time.

^bSandvik Index

^cPelvic organ prolapse was defined as a dropping, bulging, or protrusion of the bladder, vagina, uterus, and/or rectum.

Table 5

Adjusted Associations Between Participant Characteristics and Provider-Recommended Treatment for Urinary Incontinence

| Predictor | Adjusted Odds Ratio (95% Confidence Interval) | | |
|---|---|--------------------|---------------------|
| | Behavioral | Pharmacologic | Surgical/Procedural |
| Age (per 5-year increase) | 1.38 (1.18-1.61) * | 1.06 (0.92-1.22) | 1.07 (0.90-1.28) |
| Race/ethnicity | | | |
| Non-Latina white | Reference | Reference | Reference |
| Black | 2.75 (1.23-6.17) * | 0.88 (0.46-1.67) | 0.33 (0.12-0.92) * |
| Latina white | 0.96 (0.55-1.66) | 0.67 (0.39-1.16) | 1.14 (0.64-2.04) |
| Asian | 0.74 (0.37-1.47) | 0.46 (0.22-1.00) | 0.05 (0.01-0.38) * |
| Education level | | | |
| High school or less | 0.35 (0.15-0.80) * | 0.88 (0.43-1.81) | 1.79 (0.76-4.21) |
| At least some college | 0.46 (0.23-0.93) * | 0.88 (0.51-1.53) | 1.13 (0.54-2.37) |
| At least some professional/graduate school | Reference | Reference | Reference |
| Household income | | | |
| Less than \$30,000/year | 0.27 (0.11-0.65) * | 1.16 (0.52-2.62) | 0.86 (0.32-2.30) |
| \$30,000-\$119,999/year | 0.49 (0.25-0.96) * | 1.03 (0.57-1.87) | 0.96 (0.47-1.95) |
| \$120,000 or more/year | Reference | Reference | Reference |
| Working full or part time for pay | 1.23 (0.72-2.09) | 0.90 (0.53-1.50) | 1.20 (0.64-2.25) |
| Clinical type of incontinence^a | | | |
| Stress predominant | Reference | Reference | Reference |
| Urge predominant | 0.77 (0.45-1.31) | 2.20 (1.30-3.74) * | 1.09 (0.57-2.09) |
| Mixed stress and urge | 1.36 (0.67-2.76) | 1.76 (0.92-3.38) | 2.07 (1.01-4.26) * |
| Other or not specified | 0.76 (0.34-1.67) | 1.89 (0.92-3.91) | 1.22 (0.51-2.95) |
| Clinical incontinence severity^b | | | |
| Score 3, Low Moderate | Reference | Reference | Reference |
| Score 4, Moderate High | 1.72 (1.04-2.87) * | 1.90 (1.14-3.16) * | 1.68 (0.92-3.07) |
| Score 6-8, Severe | 1.10 (0.55-2.22) | 2.29 (1.17-4.49) * | 1.12 (0.48-2.63) |
| Cancer | 0.64 (0.34-1.21) | 0.98 (0.53-1.78) | 0.57 (0.26-1.25) |
| Asthma | 1.82 (1.05-3.14) * | 1.77 (1.12-2.81) * | 1.10 (0.62-1.94) |
| Chronic obstructive | 0.49 (0.21-1.18) | 1.04 (0.46-2.36) | 0.58 (0.17-1.90) |

| Predictor | Adjusted Odds Ratio (95% Confidence Interval) | | |
|---|---|--------------------|---------------------|
| | Behavioral | Pharmacologic | Surgical/Procedural |
| pulmonary disease | | | |
| Heart disease: myocardial infarction, angina, or other | 0.87 (0.38-1.97) | 1.00 (0.48-2.12) | 0.84 (0.33-2.12) |
| Hypertension | 0.89 (0.53-1.47) | 1.14 (0.71-1.84) | 1.68 (0.93-3.04) |
| Stroke | 1.09 (0.36-3.25) | 2.35 (1.05-5.25) * | 0.55 (0.17-1.81) |
| Depression | 1.20 (0.71-2.03) | 1.24 (0.75-2.03) | 0.73 (0.39-1.36) |
| Irritable bowel syndrome | 1.47 (0.72-2.98) | 0.93 (0.49-1.74) | 0.46 (0.19-1.11) |
| Diabetes | 1.06 (0.62-1.81) | 0.60 (0.36-1.02) | 1.34 (0.74-2.44) |
| Arthritis | 0.69 (0.42-1.13) | 1.06 (0.67-1.69) | 1.26 (0.73-2.19) |
| Pelvic organ prolapse^c | 0.92 (0.45-1.88) | 0.87 (0.42-1.79) | 2.71 (1.31-5.60) * |

Adjusted for all characteristics and conditions listed in this table.

* P<0.05

^aStress incontinence was defined as leakage occurring when participants laughed or coughed, or during physical activities. Urgency incontinence was defined as leakage occurring when participants felt the urge to urinate but could not reach a bathroom in time.

^bSandvik Index

^cPelvic organ prolapse was defined as a dropping, bulging, or protrusion of the bladder, vagina, uterus, and/or rectum.