

OPEN

Urinary Incontinence in Pregnant Young Women and Adolescents: An Unrecognized At-Risk Group

Marjorie Jean-Michel, MD,*† Jessica Kroes, MD,† Guillermo A. Marroquin, MD,‡
Emily Man-Shan Chau, MD,§ Carolyn M. Salafia, MD,† and Magdy Mikhail, MD*†

Objectives: The aims of this study were to determine the prevalence of urinary incontinence (UI) in pregnant young women and adolescents, characterize UI subtype, and identify characteristics associated with UI.

Methods: This was a cross-sectional study of pregnant females aged 25 years or below, presenting for routine obstetrical care at a New York City community hospital. Subjects were stratified into 2 groups: adolescents (age, ≤ 19 years) and young adults (age, >19 years). Demographic and obstetric data were collected. The 3 Incontinence Questions questionnaire was used to screen and evaluate UI symptoms.

Results: A total of 98 young females with a mean age of 20.3 ± 2.6 years were enrolled. Most participants were nulliparous (64%). Of parous women, route of previous obstetric delivery was primarily vaginal (83%). Mean gestational age at recruitment was 34.5 ± 7.5 weeks. The prevalence of UI was 52%. Urinary incontinence was associated with the following conditions: strenuous activity, 73%; urinary urgency, 67%; and absence of either, 20%. However, the most predominant UI subtype was with strenuous activity (63%). There was no statistical difference detected in demographic characteristics (such as age, parity, mode of delivery, race, education, and trimester of pregnancy) between continent and incontinent pregnant females ($P > 0.18$). No differences were appreciated between pregnant adolescents and young adult females with UI ($P > 0.18$).

Conclusions: Urinary incontinence was present in 52% of pregnant females aged 25 years or below. By age group, approximately 50% of both adolescents and young adults reported UI during pregnancy. Continent and incontinent patients did not seem to differ demographically. Our study highlights the extent of UI in this segment of the population. This data may support the need for services targeting UI prevention and early intervention in this newly identified at-risk group.

Key Words: urinary incontinence, adolescent pregnancy, teen pregnancy

(*Female Pelvic Med Reconstr Surg* 2018;24: 232–236)

Urinary incontinence (UI) is a common condition affecting almost half of all adult females in the United States.¹ Rates increase substantially with age, from 3.5% in those aged 20 to 29 to 38.2% in those aged 80 or older.² With rapid growth of the geriatric population projected over the next few decades,³ it is not surprising that public attention has focused primarily on the impact of UI on the elderly. Younger women, in whom symptoms of UI

may first appear, are rarely considered. Pregnancy, in addition to age, is considered a strong risk factor for UI. Although the true prevalence in pregnant females has not been well characterized, rates may be as high as 42%.⁴ Far less is understood about UI in those who are both young and pregnant.

Teenage pregnancy is an important public health issue in the United States. Over the past few decades, substantial progress has been made in limiting its prevalence. From 1991 to 2014, rates decreased from 61.8 to 24.2 births per 1000.^{5,6} However, certain segments of the population are disproportionately affected. In 2013, Hispanic and black adolescent girls aged 15 to 19 had double the birth rates of their white counterparts (41.7, 39.0, and 18.6 births per 1000, respectively).⁷ This racial gap has persisted over the years, making teenage pregnancy a pervasive issue for many. Further compounding this issue is a substantial delay between time of first sexual encounter and first pelvic examination in low-income adolescents,⁸ in whom high pregnancy rates exist, suggesting limited gynecologic care in this subset of the population. The pregnant state therefore represents a unique opportunity to further explore UI in young females who may not seek gynecologic care otherwise.

To better define the age limits of our target population, we reviewed the definition of adolescence in the literature. The American Academy of Pediatrics defines adolescence as the period between puberty and adulthood. It is categorized into 3 separate stages: early adolescence (ages 11–14), middle adolescence (ages 15–17), and late adolescence (ages 18–21).⁹ The position statement of the Canadian Pediatric Society defines adolescence from ages 10 to 19, marking a period that "...begins with the onset of physiologically normal puberty, and ends when... adult identity and behavior are accepted."¹⁰ This description agrees with that of the World Health Organization and attributes the variability of definition to different global sociocultural milestones despite consistent biological changes.¹¹ Other sources define adolescence as ages 15 to 19 when discussing adolescent pregnancy and ages 19 to 24 when assessing pelvic floor disorders in young females.^{12,13} We therefore focused our study on females aged 25 years or below. Our primary objective was to describe the prevalence of UI in a cohort of young pregnant females seeking obstetric care in adolescence (≤ 19 years of age) and young adulthood (20–25 years of age). We sought to characterize UI subtype and identify patient characteristics associated with UI in these groups.

MATERIALS AND METHODS

We performed a cross-sectional study conducted at a hospital-based obstetric unit at Bronx-Lebanon Hospital Center, Bronx, NY, between January 2013 and March 2015. Approval by the hospital's institutional review board was obtained (study ID 06131301). Eligible candidates were pregnant females aged 25 years or below presenting to the labor and delivery triage unit for routine obstetric care or admitted to the maternity ward. Subjects were able to understand English or Spanish or were willing to use telephone translation services. They were asked to self-report their age, race, highest level of education, number of pregnancies, number of previous vaginal deliveries

From the *Division of Female Pelvic Medicine & Reconstructive Surgery, †Department of Obstetrics & Gynecology, Bronx-Lebanon Hospital Center, Bronx, NY; ‡Department of Obstetrics & Gynecology, Essentia Health-St Mary's Hospital, Detroit Lakes, MN; and §Department of Family Medicine, Summa Health Systems/Barberton Campus, Barberton, OH.

Correspondence: Marjorie Jean-Michel, MD, Division of Female Pelvic Medicine & Reconstructive Surgery, Department of Obstetrics & Gynecology, Bronx-Lebanon Hospital Center, Bronx, NY 10457.
E-mail: mjmichel@bronxleb.org.

The authors have declared they have no conflicts of interest.

Copyright © 2018 The Author(s). Published by Wolters Kluwer Health, Inc. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: 10.1097/SPV.0000000000000445

(VDs), and/or cesarean deliveries (CDs) and gestational age. Those within 24 hours of obstetric delivery (postpartum day 0–1) were also included. Gestational age and parity of postpartum females corresponded to their designation before obstetric delivery during their current hospital visit. We excluded patients who exceeded the target age or were less than 12 weeks pregnant at the time of study enrollment. Recruited participants were administered the 3 Incontinence Questions (3IQ) questionnaire (Appendix 1), a validated tool used to distinguish between the common types of UI and available in both English and Spanish.^{14,15} The types of UI assessed in the questionnaire are as follows: UI associated with physical activity (stress UI [SUI]), UI associated with strong desire to empty the bladder (urgency UI [UUI]), UI associated with both SUI and UUI (mixed UI [MUI]), and UI occurring without SUI or UUI (of unknown cause or described as “other UI”). The first question confirms the presence of UI. The second question reviews the various forms of UI to promote familiarity, whereas the final question establishes the diagnosis of UI subtype (stress only or stress predominant, urge only or urge predominant, other cause or other cause predominant, or MUI). By the nature of the questions posed by the questionnaire, which seeks to characterize bladder symptomatology in the 3 months preceding study enrollment, all subjects meeting inclusion criteria were pregnant during the period queried. Questionnaire responses and demographic characteristics between continent and incontinent females and between incontinent females by age group were compared. Comparisons between groups categorized by type of leakage were studied using χ^2 and/or contingency table analyses, and with continuous variables using the Mann-Whitney *U* test, using SPSS 20.0 (IBM, Chicago, IL) with a 2-tailed *P* value less than 0.05 considered significant.

RESULTS

A total of 125 females were screened (8 declined participation, 13 did not complete the questionnaires, 6 were less than 12 weeks gestational age) (Fig. 1). Ninety-eight were successfully enrolled. The mean age of all study participants was 20.3 ± 2.6 years. Mean gestational age at recruitment was 34.5 ± 7.5 weeks. Most participants were nulliparous (64%). In multiparous females, VD was the primary route of previous obstetric delivery (83%). The racial/ethnic composition of our study group was predominantly minority (65% Hispanic, 30% African American/black), and the highest level of education achieved was high school (67%). Pregnant adolescents comprised 38% of participants, whereas young adults accounted for 62%. Mean age in adolescents was 17.6 ± 1.4 and 21.8 ± 1.7 in young adult women. The mean gestational age in each group was 35.5 ± 6.5 and 33.8 ± 8.0 , respectively. Additional characteristics of the 2 groups are listed in Table 1.

The overall prevalence of UI in our study group was 52% (Table 2). The participants experienced UI during pregnancy at the following rates: 73% SUI, 67% UUI, and 20% other UI. The rates of UI subtype by symptom predominance however were as follows: 63% SUI, 31% UUI, 6% other UI, and 0% MUI. In pregnant adolescents and young adults, UI prevalence was 54% and 51%, respectively. Comparable rates of UI subtypes were reported in both groups. Again, SUI was the predominant UI subtype in both (50% and 71%, respectively). We were not able to detect a significant difference in age group, parity, race/ethnicity, level of education, or trimester of pregnancy between continent and incontinent females ($P > 0.18$). Similarly, there was no identifiable difference in these characteristics between pregnant adolescents with UI and pregnant young adults with UI ($P > 0.18$) (Table 3).

DISCUSSION

We identified a 52% prevalence of UI in young pregnant females aged 25 years or below. Both pregnant adolescents (age, ≤ 19 years) and young adults (age, 20–25 years) were just as likely to report UI (54% and 51%, respectively). These findings support our observation of a predominance of UI in the young pregnant females of our practice, approaching rates seen in older pregnant women and the general population.^{1,16} At our institution, which serves a predominantly Hispanic population in the South Bronx of New York where those below 18 years of age comprise more than a quarter of the population, we find the highest rate of teenage pregnancy in New York State (86.6 per 1000), and far in excess of the national average (24.2 per 1000).^{17,18} In our experience, women with symptoms of UI are younger, have increased parity at a younger age, and have limited health literacy. Our review of the literature revealed a paucity of studies focused on UI in very young pregnant females, prompting further investigation of the impact of UI in this segment of our community.

As suggested by our study results, pelvic floor injury sustained in young females may be more significant than previously suspected. Young age may not be protective. A recent study by Quiroz et al¹⁹ investigating the extent of levator ani damage by ultrasound in low-risk primiparous women based on age found an inverse relationship between age and severity of levator ani damage. In fact, a greater proportion of those with the most advanced levels of muscle damage were significantly younger (85% in age < 25 , 0% in 25–29, and 14% in age > 30 years). This questions the long-held axiom that younger is stronger. The rapidity and adaptability of pelvic floor muscle remodeling in the young gravid female in response to pregnancy-induced muscle damage are not well understood. Whether this

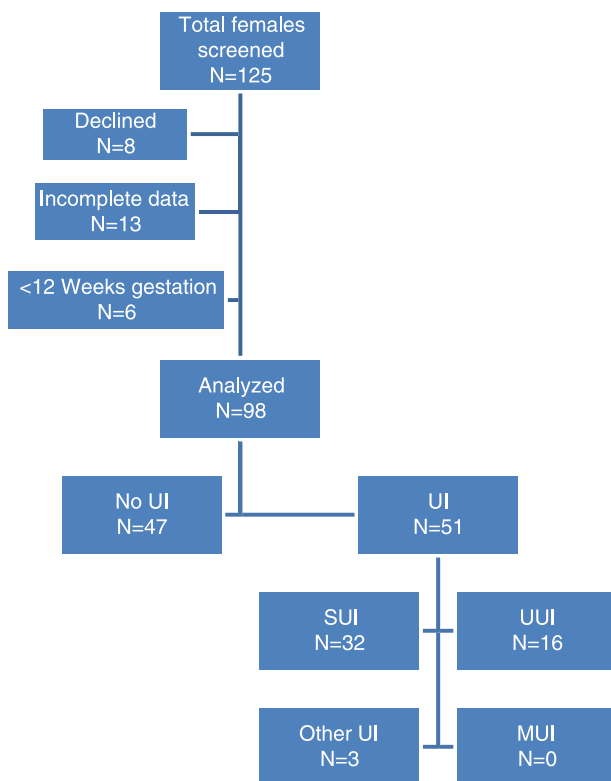


FIGURE 1. Flow chart of study participants.

TABLE 1. Demographic Data of Continent and Incontinent Pregnant Females

	All, N = 98 (%)	Continent Subjects, N = 47 (%)	Incontinent Subjects, N = 51 (%)	P
Age, y				0.19
Adolescents ≤19	37 (38)	17 (36)	20 (39)	
Young adults 20–25	61 (62)	30 (64)	31 (61)	
Parity				0.18
P0	63 (64)	27 (57)	36 (71)	
P ≥1	35 (36)	20 (43)	15 (29)	
Mode of delivery	N = 35	N = 20	N = 15	0.23*
VD only	29 (83)	16 (80)	13 (87)	
CD only	3 (9)	3 (15)	0	
CD and VD	3 (9)	1 (5)	3 (13)	
Race/ethnicity				0.19†
African American	28 (29)	10 (21)	18 (35)	
Hispanic	64 (65)	33 (70)	31 (61)	
Other	6 (6)	4 (9)	2 (4)	
Level of education				0.63‡
<High school	11 (11)	3 (6)	8 (16)	
High school	67 (68)	33 (70)	34 (67)	
>High school	20 (20)	11 (23)	9 (18)	
Trimester of pregnancy				0.95§
First	1 (1)	1 (2)	0	
Second	18 (18)	8 (17)	10 (20)	
Third	79 (81)	38 (81)	41 (80)	

*P value listed compared the 2 most common delivery modes.

†P value listed compared African American and Hispanic racial/ethnic groups.

‡P value listed compared high school versus all other.

§P value listed compared second and third trimesters of pregnancy.

differs at all from that in the adult gravid female is also not known. Although many cases of UI have been shown to resolve over time in most adult women,^{20,21} it is unknown whether UI presenting in pregnancy very early on in life (such as in adolescence or young adulthood) persists after pregnancy or progresses more rapidly over the reproductive lifetime of the

affected female. Additional studies are needed to better understand these important questions.

We were unable to detect any statistical difference in age, race, or mode of delivery between continent and incontinent pregnant adolescents and young adults. Although education level was inquired, we did not specifically address health literacy. It is well understood that levels of comprehension and maturity change rapidly during adolescence. Whether this affected our study cannot be ascertained. Overall comprehension of UI has been demonstrated in validation studies of the 3IQ questionnaire showing good reproducibility and acceptable accuracy. However, the original validation work was performed in women age 40 or older. This may limit the applicability of the 3IQ as a screening tool in younger females and potentially impact the validity of our findings. Unfortunately, questionnaires specifically designed for young women are unavailable and further contribute to the lack of adequate representation of adolescents in clinical trials overall.

There are several strengths of our study. We describe UI in young adults and adolescents during pregnancy, a unique cohort that has not been well characterized in the literature. A validated assessment tool was used to screen patients. Our study population was predominantly minority females, an underrepresented group in scientific investigations overall. Still yet, the characterization of all such women as a single entity should be viewed with caution. Given the breadth of diversity in geographic origin, genetic profile, and environmental influence, minority females may not behave as a single homogenous group.

Several limitations to our study exist. Our sample size was small and may reflect some of the challenges encountered when

TABLE 2. 3 Incontinence Questions Questionnaire Responses

	All, N (%)	Adolescents, N (%)	Young Adults, N (%)	P
UI	N = 98	N = 37	N = 61	
Present	51 (52)	20 (54)	31 (51)	0.19
UI present during*	N = 51	N = 20	N = 31	
SUI	37 (73)	13 (65)	24 (77)	0.33
UUI	34 (67)	15 (75)	19 (61)	0.31
Other UI	10 (20)	5 (25)	5 (16)	0.44
UI subtype	N = 51	N = 20	N = 31	
SUI	32 (63)	10 (50)	22 (71)	0.13
UUI	16 (31)	9 (45)	7 (23)	0.09
Other UI	3 (6)	1 (5)	2 (6)	0.83
MUI	0	0	0	1.00

Percentages may exceed 100 because of rounding.

*Question allows for more than 1 response, thus total may greatly exceed 100%.

TABLE 3. Characteristics of Females With UI Based on Age Group

	All, N = 52 (%)	Adolescents, N = 20 (%)	Young Adults, N = 31 (%)	P
Parity				0.18
P0	36 (71)	17 (85)	19 (61)	
P ≥ 1	15 (29)	3 (15)	12 (39)	
Mode of delivery (<i>in P ≥ 1</i>)	N = 15	N = 3	N = 12	0.39*
VD only	13	2 (67)	11 (92)	
CD only	0	0	0	
CD and VD	2	1 (33)	1 (8)	
Race/ethnicity				0.61†
African American	18 (35)	4 (20)	14 (45)	
Hispanic	31 (61)	16 (80)	15 (48)	
Other	2 (4)	0	2 (6)	
Level of education				0.44‡
<High school	8 (16)	1 (5)	6 (19)	
High school	34 (67)	17 (85)	17 (55)	
>High school	9 (18)	1 (5)	8 (26)	
Trimester of pregnancy				0.24§
First	0	0	0	
Second	10 (20)	3 (15)	7 (23)	
Third	41 (80)	17 (85)	24 (77)	

*P value listed compared the 2 most common delivery modes.

†P value listed compared African American and Hispanic racial/ethnic groups.

‡P value listed compared high school versus all other.

§P value listed compared second and third trimesters of pregnancy.

conducting research in young individuals. Nonetheless, we believe we were successful in highlighting the extent of disease in this unrecognized at-risk group. A short, validated questionnaire available in both English and Spanish was selected as our assessment tool of choice because it best suited the needs of our patient population. Consequently, identification of other pelvic floor disturbances, such as genital prolapse, defecatory dysfunction, sexual dysfunction, and pelvic pain, was not explored. Information about medical comorbidities was also not elicited, although certain conditions are believed to increase the risk of such disorders. This additional information would have certainly been enlightening given the disproportionate overrepresentation of chronic illnesses such as asthma, obesity, and diabetes in low income, inner-city populations.^{22,23} Of further interest is the impact of pregnancy-related conditions, that is, gestational diabetes or excessive weight gain, on the development of pelvic floor disorders in the future. After considering the young age of our study group, potential barriers to study participation, and the emotionally charged experience of pregnancy, we intentionally focused on evaluating UI alone. We opted for the 3IQ to limit the burden of questions, enhance the quality of the data captured, and improve study participation. Further investigation with larger, prospective, longitudinal studies using more comprehensive surveys would be best suited to explore the many questions that remain.

In addition to routine psychosocial screening in this particularly challenging obstetric group, we believe our findings support the need for UI screening in young pregnant adults and adolescents as well. Simple interventions, such as pelvic floor exercises, may limit the progression of disease and delay the need for invasive treatment so early in life. Implementation of pelvic floor exercises during pregnancy has been shown to enhance pelvic floor muscle strength and improve quality of life measures.²⁴ The potential impact of this relatively simple intervention not only during

pregnancy, but early in life, is promising. Future studies may shed light on whether the benefits of Kegel exercises are best appreciated in high-risk populations early in their development of pelvic floor disease.

Increased awareness of the existence of UI in pregnancy is an important first step. The obstetrician/gynecologist and primary care provider serve important roles in its identification. Incorporation of simple questions (such as the 3IQ) during routine visits may help to alleviate patient embarrassment in sharing their most intimate experiences, instill a sense of self-empowerment in their own care, and present a unique opportunity to make a meaningful change in one's young life. Such a small step may have a lasting impact on disease progression on an individual level and relieve its economic burden on a national level. We hope our study helps initiate the conversation with young pregnant females and contributes to a much-needed area of research.

REFERENCES

1. Markland AD, Richter HE, Fwu CW, et al. Prevalence and trends of urinary incontinence in adults in the United States, 2001 to 2008. *J Urol* 2011;186:589–593.
2. Wu JM, Vaughan CP, Goode PS, et al. Prevalence and trends of symptomatic pelvic floor disorders in U.S. women. *Obstet Gynecol* 2014;123(1):141–148.
3. Hobbs F, Stoops N. *Demographic Trends in the 20th Century*. Washington, DC: United States Census Bureau, United States Government Printing Office; 2002. Available at: www.census.gov/prod/2002pubs/censr-4.pdf.
4. Wesnes SL, Rortveit G, Bø K, et al. Urinary incontinence during pregnancy. *Obstet Gynecol* 2007;109:922–928.
5. Centers for Disease Control and Prevention. Birth Rates (Live Births) per 1,000 Females Aged 15–19 Years, by Race and Hispanic Ethnicity, Select

- Years. Available at: <http://www.cdc.gov/teenpregnancy/about/index.htm>. Accessed January 23, 2015.
6. U.S. Department of Health & Human Services. Trends in Teen Pregnancy and Childbearing. Available at: <http://www.hhs.gov/ash/oah/adolescent-health-topics/reproductive-health/teen-pregnancy/trends.html>. Accessed January 23, 2015.
 7. Hamilton BE, Martin JA, Osterman MJ. *Births: Final Data for 2013*. Hyattsville, MD: National Center for Health Statistics; 2015. Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_01.pdf. Accessed January 23, 2015.
 8. McKee MD, Fletcher J, Schechter CB. Predictors of timely initiation of gynecologic care among urban adolescent girls. *J Adolesc Health* 2006;39:183–191.
 9. American Academy of Pediatrics. Stages of Adolescence. Available at: <https://www.healthychildren.org/English/ages-stages/teen/Pages/Stages-of-Adolescence.aspx>. Accessed May 27, 2016.
 10. Sacks D. Age limits and adolescents. *Paediatr Child Health* 2003;8(9): 577–578.
 11. World Health Organization. Adolescent Development. Available at: http://www.who.int/maternal_child_adolescent/topics/adolescence/dev/en/. Accessed May 27, 2016.
 12. Klein JD. American Academy of Pediatrics Committee on Adolescence. Adolescent pregnancy: current trends and issues. *Pediatrics* 2005;116: 281–286.
 13. Parden AM, Griffin RL, Hoover K, et al. Prevalence, awareness, and understanding of pelvic floor disorders in adolescent and young women. *Female Pelvic Med Reconstr Surg* 2016;22(Suppl 5): 346–354.
 14. Brown JS, Bradley CS, Subak LL, et al. The sensitivity and specificity of a simple test to distinguish between urge and stress urinary incontinence. *Ann Intern Med* 2006;144(10):715–723.
 15. Treszezamsky AD, Karp D, Dick-Biascochea M, et al. Spanish translation and validation of four short pelvic floor disorders questionnaires. *Int Urogynecol J* 2013;24(4):655–670.
 16. Sangsawang B. Risk factors for the development of stress urinary incontinence during pregnancy in primigravidae: a review of the literature. *Eur J Obstet Gynecol Reprod Biol* 2014;178:27–34.
 17. New York State Department of Health. Bronx County Teen Pregnancy Rate per 1,000 Females Aged 15–19 Years. Available at: https://www.health.ny.gov/statistics/chac/birth/b13_58.htm. Accessed May 27, 2016.
 18. Centers for Disease Control and Prevention. Reproductive Health: Teen Pregnancy. Available at: <https://www.cdc.gov/teenpregnancy/about/>. Accessed March 29, 2017.
 19. Quiroz L, Rostaminia G, Pickett SD, et al. The association between risk of levator ani damage and age in primiparous women. *Female Pelvic Med Reconstr Surg* 2016;22(5):S13.
 20. Fritel X, Fauconnier A, Levet C, et al. Stress urinary incontinence 4 years after the first delivery: a retrospective cohort survey. *Acta Obstet Gynecol Scand* 2004;83(10):941–945.
 21. Arrue M, Ibañez L, Paredes J, et al. Stress urinary incontinence six months after first vaginal delivery. *Eur J Obstet Gynecol Reprod Biol* 2010;150(2): 210–214.
 22. Candib LM. Obesity and diabetes in vulnerable populations: Reflection on proximal and distal causes. *Ann Fam Med* 2017;5(6): 547–556.
 23. Mohanan S, Tapp H, McWilliams A, et al. Obesity and asthma: Pathophysiology and implications for diagnosis and management in primary care. *Exp Biol Med (Maywood)* 2014;239(11):1531–1540.
 24. Kahyaoglu Sut H, Balkanli Kaplan P. Effect of pelvic floor muscle exercise on pelvic floor muscle activity and voiding functions during pregnancy and the postpartum period. *Neurourol Urodyn* 2016;35(3): 417–422.

APPENDIX 1. 3 Incontinence Questions Questionnaire

Question

During the last 3 months, have you leaked urine	<ul style="list-style-type: none"> • Yes • No
During the last 3 months, did you leak urine during	<ul style="list-style-type: none"> • When you were performing some physical activity, such as coughing, sneezing, lifting, or exercise? • When you had the urge or the feeling that you needed to empty your bladder, but you could not get to the toilet fast enough? • Without physical activity and without a sense of urgency?
During the last 3 months, did you leak urine most often	<ul style="list-style-type: none"> • When you were performing some physical activity, such as coughing, sneezing, lifting, or exercise? • When you had the urge or the feeling that you needed to empty your bladder, but you could not get to the toilet fast enough? • Without physical activity and without a sense of urgency? • About equally as often with physical activity as with a sense of urgency?