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## Prevalence of pelvic floor disorders in women with suspected gynecological malignancy: a survey-based study

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### Abstract

**Introduction and hypothesis**—Understanding of pelvic floor disorders among women with gynecological cancer is limited. The objective of this study was to describe the prevalence of pelvic floor disorders in women with suspected gynecological malignancy before surgery.

**Methods**—A cross-sectional study was performed of women aged 18 with a suspected gynecological malignancy who enrolled in the University of North Carolina Health Registry/ Cancer Survivorship Cohort (HR/CSC) from August 2012 to June 2013. Demographics were obtained from the HR/CSC self-reported data; clinical data were abstracted from the electronic medical record. Subjects completed validated questionnaires (Rotterdam Symptom Checklist and the International Consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms) to assess bladder and bowel function.

**Results**—Among 186 women scheduled for surgery for gynecological malignancy, 152 (82 %) completed baseline assessments before surgery. Mean age was  $58.1 \pm 13.3$  years, and mean BMI was  $33.6 \pm 8.8$  kg/m<sup>2</sup>. The majority of subjects had uterine cancer (61.8 %), followed by ovarian (17.1 %) and cervical (11.1 %). At baseline, the rate of urinary incontinence (UI) was 40.9 %. A third of subjects reported stress UI, and one quarter reported urge UI. The overall rate of fecal incontinence was 3.9 %, abdominal pain was 47.4 %, constipation was 37.7 %, and diarrhea was 20.1 %. When comparing cancer types, there were no differences in pelvic floor symptoms.

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Compliance with ethical standards

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**Conclusion**—Pelvic floor disorders are common in women with suspected gynecological malignancy at baseline before surgery. Recognizing pelvic floor disorders in the preoperative setting will allow for more individualized, comprehensive care for these women.

### Keywords

Fecal incontinence; Gynecological cancer; Pelvic floor disorders; Urinary incontinence

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### Introduction

Quality of life is very important to women suffering from gynecological malignancies. Although eradicating disease is the primary focus of treatment, quality of life in the survivorship phase is an equally valued dimension of care for these women [1–3]. Pelvic floor disorders can be debilitating, and the associated psychological, emotional, and physical stressors have been shown to have a negative impact on women’s quality of life [4]. Women experiencing pelvic floor dysfunction often present with a myriad of symptoms, including pelvic organ prolapse, urinary incontinence (UI), fecal incontinence (FI), and sexual dysfunction. Because of a number of interacting factors, including social stigma and barriers to care, these disorders are not consistently reported by patients [5, 6].

Gynecological surgery, in addition to radiation and chemotherapy, has been recognized as a risk factor for pelvic floor dysfunction, but the extent of that risk for women with gynecological cancers has not been well elucidated [7–10]. One contributing factor is that screening for pelvic floor disorders in women with a gynecological malignancy is not common practice [11]. Given that the majority of women with a gynecological malignancy undergo surgical management and/or chemotherapy or radiation, these women may be at a higher risk of experiencing symptomatic pelvic floor dysfunction than the general population, and early diagnosis may be an opportunity to improve quality of life for these women following treatment.

While pelvic floor dysfunction has been identified as a problem frequently faced by survivors of gynecological cancer [12–14], the prevalence of pelvic floor dysfunction manifesting as UI, FI, and other bladder and bowel disorders in these women at baseline, before cancer treatment, remains unclear [15]. It is critical to identify the baseline rate of pelvic floor dysfunction in this at-risk population to provide comprehensive care to these women. Thus, the primary objective was to describe the prevalence of specific pelvic floor disorders in women with suspected gynecological malignancy at baseline before cancer treatment. Secondary objectives included assessing the effect of socio-demographic and clinical factors on the prevalence of these pelvic floor disorders.

### Materials and methods

This was a cross-sectional, IRB-approved (IRB #13-2668) analysis of data collected for a large hospital database, the University of North Carolina at Chapel Hill (UNC) Health Registry/Cancer Survivorship Cohort (HR/CSC). The UNC HR/CSC integrates a comprehensive database of clinical, epidemiological, and patient interview data with repositories of biological specimens and tumor tissue. Patients are identified and recruited

through UNC Health Care outpatient oncology clinics and are recruited at the time of their new patient clinic visit. Eligible patients for the database must:

1. Be aged 18 years or over
2. Provide a North Carolina mailing address
3. Speak English or Spanish

Patients who were unable to provide informed consent or participate in interview questionnaires were excluded from participation in the HR/CSC. Trained staff conduct the interviews using a computer-assisted telephone interview software tool specifically developed for the HR/CSC. Interview questionnaire topics include medical and social history, and general and cancer-specific health assessments. Patient age and self-reported race/ethnicity are also included in the HR/CSC.

Inclusion criteria for this study were further restricted to HR/CSC patients recruited through the gynecological oncology clinic, who were referred for the assessment and treatment of suspected gynecological malignancies, and completed the baseline interviews, including cancer-site-specific questionnaires, before any cancer treatment. The study cohort included all subjects enrolled in the UNC HR/CSC database who presented for treatment of gynecological malignancies from August 2012 to June 2013. The electronic medical record was used to abstract relevant clinical data at the time of the new patient visit, including age, body mass index (BMI), comorbid conditions, mental health history, insurance status, and cancer site. The clinical data abstracted from the medical record were merged with the HR/CSC demographic and questionnaire data using an honest broker system. The HR/CSC subsequently provided a de-identified data set for our analysis.

Women completed baseline-condition-specific quality of life questionnaires for the HR/CSC, including the Rotterdam Symptom Checklist (RSC) [16] and the International Consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms (ICIQ-FLUTS) [17]. These questionnaires are validated to assess symptoms related to a broad range of symptoms experienced by cancer patients, including bladder and bowel dysfunction. Specifically, bladder symptoms include stress urinary incontinence (SUI), urge urinary incontinence (UUI), urgency, frequency, nocturia, and enuresis. Bowel symptoms include FI, abdominal pain, constipation, and diarrhea.

The RSC is a 39-item questionnaire used to measure a wide range of symptoms reported by cancer patients, including UI. The questionnaire also assesses bowel dysfunction such as abdominal pain, constipation, diarrhea, and leakage of stool. Severity of symptoms is measured using a four-point Likert-type scale that includes such items as physical distress, psychological distress, activity level, and overall quality of life over the past week. The rate of SUI was determined by a response of “yes” to “leaks when you cough and sneeze.” The rate of UUI was determined by a response of “yes” to “leaks before you can get to the toilet.” For the analysis of the effect of age on pelvic floor symptoms, RSC responses were considered to be present if subjects rated their symptoms as occurring “quite a bit” or “very much.”

The ICIQ-FLUTS is a 12-item questionnaire, which evaluates female lower urinary tract symptoms and their impact on quality of life. Within the questionnaire there are three subscales that assess filling symptoms (nocturia, urgency, pain in bladder, and daytime frequency), leaking symptoms (UUI, SUI, unexplained incontinence, and enuresis), and voiding symptoms (hesitancy, straining, and interrupted stream). Symptom severity is graded on a ten-point Likert-type scale. The rate of SUI determined by a positive response to the question, “Does urine leak when you are physically active, exert yourself, cough or sneeze?” while the rate of UUI was determined by a positive response to the question, “Does urine leak before you can get to the toilet?” For the analysis of the effect of age on pelvic floor symptoms, ICIQ responses were considered to be present if subjects rated their symptoms as occurring “most of the time” or “all of the time.” The ICIQ-FLUTS survey was only provided to uterine and ovarian cancer patients as part of the cancer-site-specific survey.

The primary aim of this study was to report the prevalence of pelvic floor symptoms in a population of women with suspected gynecological malignancy. Thus, an a priori power calculation was not performed. Univariate summary statistics were generated using simple frequencies for categorical variables, and Student’s *t* test was used for the continuous variables of age and BMI. With regard to age, the distribution was confirmed to be normal via histogram, as well as Kolmogorov–Smirnov or Shapiro–Wilk tests. Secondary analyses were performed to compare symptom scores by age and by cancer site. Age was also dichotomized into > or < 50 years to estimate menopausal status. Fisher’s exact test was used to compare pelvic floor symptom scores by age > or < 50 years. Because each cancer type had relatively small numbers, the data were analyzed using nonparametric testing. Specifically, the Kruskal–Wallis test was used to compare these categorical data for multiple group comparisons. A *p* value < 0.05 was considered statistically significant. Data were analyzed using IBM SPSS version 18.0 (IBM SPSS, Chicago, IL, USA).

## Results

Among 186 women with a suspected gynecological malignancy who enrolled in the HR/CSC during the study period, 152 (82 %) completed a baseline assessment before surgery. The majority of women were Caucasian, parous, post-menopausal, and had private insurance. The most common type of gynecological malignancy was uterine cancer, followed by ovarian, cervical, vulvar/vaginal, and other, which included gastrointestinal and unspecified gynecological cancer (Table 1). A small percentage of subjects had a gastrointestinal malignancy at the time of the final pathological assessment after surgery. Given that the women with primary gastrointestinal cancer underwent identical debulking procedures to the women diagnosed with ovarian cancer, they were included in the analysis.

Responses to the RSC questionnaire revealed a high prevalence of UI in this population (Table 2). ICIQ-FLUTS responses reflected a similarly high rate of urinary symptoms. Filling and leaking dysfunction were common, with a lower rate of voiding dysfunction in the study cohort. More than half of women reported symptoms of SUI (59.5 %), and more than one third reported UUI (33.9 %). There were no differences in urinary symptoms among cancer types, with relatively high rates of bladder dysfunction in all cancer types based on both RSC and ICIQ-FLUTS responses.

Regarding bowel dysfunction, bothersome symptoms were reported in the study cohort (Table 2). Although the overall rate of FI was low, half of the women rated their symptoms “somewhat” to “quite a bit” bothersome, and one third of women with constipation rated their symptoms as “quite a bit” or “very much” bothersome. Whereas there were relatively high rates of abdominal pain and constipation in all cancer types, there were no differences in any type of bowel dysfunction based on cancer type.

To assess the impact of age on pelvic floor disorders, the cohort was divided into women age < 50 versus ≥ 50 years, approximating the age of menopause. Based on age, there were differences seen in the rates of abdominal pain, constipation, pain in bladder, and urge incontinence (leakage before getting to the toilet; Table 3). When modeling age as a continuous variable, there were no differences in bladder or bowel function.

## Discussion

The objective of this study was to describe the prevalence of pelvic floor disorders in women with suspected gynecological malignancies at baseline before cancer surgery. In this study, the majority of women reported bothersome pelvic floor dysfunction at baseline before surgical treatment. These findings support the fact that pelvic floor disorders are a significant quality of life issue not only for survivors of gynecological malignancies, but also for women with suspected disease.

Interestingly, the rates of self-reported UI differed greatly between the two questionnaires used in this study. While the SUI rate reported by the ICIQ-FLUTS was nearly 60 %, the rate reported by the RSC was 40.1 %, which is closer to the previously reported rates in the general population [18]. While the ICIQ-FLUTS forms were only administered to uterine and ovarian cancer patients, this cannot fully explain the difference between the reported rates as the RSC rates of SUI reported by uterine and ovarian cancer patients was 32.0 %. While the reason for this difference is unclear, the ICIQ-FLUTS questionnaires were administered after the uterine and ovarian cancer patients had already provided responses to the RSC questionnaire, which may have introduced a form of bias. More studies are needed to evaluate whether cancer type affects the presentation of pelvic floor disorders in this population.

The prevalence of bothersome UI reported as “severe” in this study cohort was estimated at 9.7 %, which is higher than the rate reported in the general population [19]. Many women diagnosed with gynecological cancer have complicated medical issues and often present with cancer-related symptoms such as bloating from ascites and mass effects from a tumor, which can exacerbate preexisting pelvic floor dysfunction and in turn may explain the higher rate of bothersome UI in this population. In a similar vein, while the rate of FI in this study at 3.7 % was lower than the overall prevalence of FI among women in the United States [20], the rate of bother related to this symptom was high. The low overall rate of FI in this study may be explained by the study’s sample size, and further studies are needed to better understand the impact of FI in this cohort of women.

This study provides new information on baseline pelvic floor disorders in women with gynecological cancer—a clinical topic about which limited data are available. Other strengths of this study include the use of a robust database of condition-specific outcomes that were collected pre-treatment, eliminating the issue of recall bias. The questionnaires used in this study were validated and administered by trained staff, and the data collected through the questionnaires were patient-reported. Of note in the gynecological oncology setting, standardized questionnaires were found to be more effective in detecting symptomatic UI than provider evaluation alone [21].

A limitation of the study is that the findings were based on questionnaires rather than clinical examination; however, the study's aim was to report on the symptoms of pelvic floor dysfunction, which is better identified with the use of questionnaires rather than by physical examination findings, as mentioned previously [21]. Also, the questionnaires used in this study were predetermined by the HR/CSC, and other questionnaires may capture the rates of symptomatic pelvic floor disorders in this population more accurately. Specifically, patients were not queried regarding bulge symptoms, which are indicative of prolapse, an important and often very bothersome pelvic floor disorder. The rates of pelvic floor prolapse in this population before treatment should be evaluated in future studies.

The study only includes those women who had consented via the HR/CSC and were scheduled for surgery as the primary treatment for their gynecological malignancy. Also, the study population was largely white and did not capture many Hispanic or Asian subjects, which limits the generalizability of the study's findings. The study is also limited by a small sample size for each individual cancer type, which limited the power to detect differences between these groups. A post hoc power analysis revealed a 52 % power to detect a difference in pelvic floor symptoms based on cancer type, limiting the reliability of the lack of association we found between cancer site and symptoms. In addition, as the symptomatology of each cancer type differs, differences in the rates of pelvic floor disorders in these groups cannot be fully commented on based on the small sample size. Gynecological cancer treatment—surgery, chemotherapy and radiation—likely has a large impact on pelvic floor function, and there may also be an association between the underlying cancer disease process and the manifestation of pelvic floor disorders. More investigation is needed to determine whether there is a clinically significant difference in the presentation of symptomatic pelvic floor disorders depending on cancer type. Prospective studies are also needed to explore the impact of gynecological oncology treatments on pelvic floor function and pelvic health-related quality of life. Additionally, research is needed to determine which pelvic health questionnaires most effectively capture symptomatic pelvic floor dysfunction in this population, which patients would benefit from perioperative interventions for their pelvic floor disorders, and which interventions are most appropriate and effective for this cohort.

In conclusion, this study describes the rates of pelvic floor disorders in women with suspected gynecological malignancy before surgical management. The findings demonstrate that the rates of pelvic floor dysfunction are high in this population, with a higher prevalence of bladder dysfunction compared with bowel dysfunction. Given these findings, gynecological oncology providers should consider incorporating screening for pelvic floor



disorders as part of a comprehensive baseline evaluation before the initiation of cancer treatment. Furthermore, as pelvic health has a great impact on the quality of life for women with gynecological malignancies, awareness of these issues should be increased to allow for more individualized and comprehensive perioperative counseling and care for this special population.

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**Table 1**

## Overall characteristics of the study cohort

Characteristic	<i>n</i> (%)
Age (years)	58.1 ± 13.3 <sup>a</sup>
Race	
White	120 (79.0)
Black	22 (14.5)
Other	10 (6.5)
BMI (kg/m <sup>2</sup> )	33.6 ± 8.8 <sup>a</sup>
Insurance status	
None	32 (21.0)
Medicare only	5 (3.2)
Medicaid	7 (4.6)
Private	108 (71.0)
Substance use	
Tobacco	13 (8.6)
Marijuana	1 (0.7)
Polysubstance	4 (2.6)
Cancer site	
Uterine	94 (61.8)
Ovarian	26 (17.1)
Cervical	17 (11.1)
Vulvar	9 (5.9)
Gynecological, nitric oxide synthase	3 (2.0)
Gastrointestinal	3 (2.0)
Stage	
I–II	98 (64.5)
III–IV	46 (30.3)
Unstaged	8 (5.3)
Route of surgery	
Minimally invasive	78 (52.7)
Laparotomy	62 (41.9)
Groin	8 (5.4)

<sup>a</sup>Analysis performed using Student's *t* test

**Table 2**

Rate of pelvic floor symptoms by cancer type, based on the Rotterdam Symptom Checklist

Pelvic floor symptom	Questionnaire response	All, <i>n</i> (%)	Uterine, <i>n</i> (%)	Ovarian, <i>n</i> (%)	Cervical, <i>n</i> (%)	Vulvar/vaginal, <i>n</i> (%)	<i>p</i> value
Any urinary incontinence	Never	87 (59.6)	58 (62.4)	13 (48.1)	11 (64.7)	5 (55.6)	0.51
	Once a week	15 (10.3)	12 (12.9)	3 (11.1)	0 (0)	0 (0)	
	2–3 times/week	19 (13.0)	8 (8.6)	7 (25.9)	4 (23.5)	0 (0)	
	Once a day	14 (9.6)	9 (9.7)	2 (7.4)	1 (5.9)	2 (22.2)	
	Several times a day	9 (6.2)	4 (4.3)	2 (7.4)	1 (5.9)	2 (22.2)	
	All the time	2 (1.4)	2 (2.2)	0 (0)	0 (0)	0 (0)	
Stress urinary incontinence	Yes	46 (74.2)	27 (77.1)	11 (78.6)	4 (50.0)	4 (80.0)	0.62
	No	16 (25.8)	8 (22.9)	3 (27.3)	4 (50.0)	1 (20.0)	
Urge urinary incontinence	Yes	38 (67.9)	23 (67.6)	10 (71.4)	3 (60.0)	2 (66.7)	0.74
	No	18 (32.1)	11 (32.4)	4 (28.6)	2 (40.0)	1 (33.3)	
Abdominal pain	Not at all	79 (53.4)	54 (56.8)	14 (51.9)	5 (2.9)	6 (66.7)	0.17
	A little	44 (29.7)	31 (32.6)	3 (11.1)	7 (41.2)	3 (33.3)	
	Quite a bit	13 (8.8)	5 (5.3)	5 (18.5)	3 (17.6)	0 (0)	
	Very much	12 (8.1)	5 (5.3)	5 (18.5)	2 (11.8)	0 (0)	
Constipation	Not at all	85 (57.4)	60 (63.2)	13 (48.1)	7 (41.2)	5 (55.6)	0.20
	A little	43 (29.1)	25 (26.3)	9 (33.3)	7 (41.2)	2 (22.2)	
	Quite a bit	12 (8.1)	6 (6.3)	4 (14.8)	0 (0)	2 (22.2)	
	Very much	8 (5.4)	4 (4.2)	1 (3.7)	3 (17.6)	0 (0)	
Diarrhea	Not at all	118 (79.7)	76 (80.0)	21 (77.8)	15 (88.2)	6 (66.7)	0.82
	A little	24 (16.2)	17 (17.9)	3 (11.1)	1 (5.9)	3 (33.3)	
	Quite a bit	1 (0.7)	0 (0)	1 (3.7)	0 (0)	0 (0)	
	Very much	5 (3.4)	2 (2.1)	2 (7.4)	1 (5.9)	0 (0)	
Fecal incontinence	Yes	5 (3.4)	3 (3.2)	1 (3.7)	1 (5.9)	0 (0)	0.27
	No	142 (96.6)	91 (96.8)	26 (96.3)	16 (94.1)	9 (100)	

All analyses performed using the Kruskal–Wallis test

**Table 3**

Impact of age on urinary and bowel dysfunction

Pelvic floor symptom	<50 years, <i>n</i> (%)	50 years, <i>n</i> (%)	<i>P</i> value
Abdominal pain <sup>a</sup>	11 (32.4)	16 (13.3)	0.01
Constipation <sup>a</sup>	8 (23.5)	14 (11.7)	0.01
Diarrhea <sup>a</sup>	1 (2.9)	6 (5.0)	0.78
Fecal incontinence <sup>a</sup>	2 (5.9)	4 (3.4)	0.62
Nocturia <sup>b</sup>	3 (20.0)	17 (17.0)	0.40
Enuresis <sup>b</sup>	1 (20.0)	4 (5.8)	0.09
Pain in bladder <sup>b</sup>	3 (20.0)	3 (3.0)	0.01
Leak before getting to toilet <sup>b</sup>	2 (13.4)	37 (37.0)	0.03
Leak with physical activity <sup>b</sup>	1 (20.0)	3 (4.3)	0.14

All data were analyzed using Fisher's exact test

<sup>a</sup>Based on the Rotterdam Symptom Checklist questionnaire

<sup>b</sup>Based on International Consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms