Assessing frailty in urogynecology patients: a comparative analysis of the Edmonton frail scale and pelvic floor symptom severity

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Abstract

This study aimed to measure frailty using the Edmonton frail scale (EFS) and examine whether frailty is associated with presenting complaints or worse pelvic floor symptom severity in older urogynecology outpatients. We conducted a cross-sectional study of new urogynecology patients aged 50 and older at 2 urban academic centers between November 2018 and January 2020. Pelvic floor symptom severity was assessed using surveys [overactive bladder validated 8-question screener (OAB-V8), pelvic floor distress inventory, and 6-item female sexual function index]. Multivariable linear and logistic regression analyses were performed to compare chief complaint and questionnaire scores by EFS score, frailty status, and EFS component. A total of 138 women were recruited, with a mean age of 65 years (standard deviation 9.3). 11.6% met the criteria for frailty. Frail women had 6.2 greater adjusted odds of endorsing urinary incontinence symptoms as their presenting complaint, and women with higher EFS scores had worse OAB-V8 scores (adjusted ß=0.04, p=0.03). Depression/sadness were associated with worse urinary and prolapse symptoms. Frailty is common in older urogynecology outpatients, especially those presenting with urinary incontinence. Individual components of the EFS associated with symptomatic pelvic floor dysfunction included depressed mood, lack of reliable help, and incontinence.

Introduction

Frailty is a clinical state that is characterized by an increased vulnerability to external stressors and decreased physiologic reserve.[1] It has been associated with an increase in perioperative adverse outcomes for patients undergoing benign gynecologic surgery, such as non-home discharge and mortality.[2] Frailty measures can be challenging to implement in the clinic due to their length and complexity. Therefore, urogynecology researchers have often resorted to retrospectively applied indices, such as the modified frailty index, or sought to simplify prospective frailty assessment, such as with the use of the clinical frailty scale.[3,4] The Edmonton frail scale (EFS) is a well-validated, reliable, and easily implemented 11-prompt questionnaire assessing multi-dimensional domains of frailty.[5] Despite being one of the most commonly used frailty scales in the geriatric literature, there is a paucity of published research on the use of the EFS in the urogynecology outpatient setting. In addition, although frailty has been examined in a cross-sectional manner in the urogynecology clinic, few studies have looked at associations between pelvic floor symptom severity, presenting complaint, and frailty status.[6] This study aims to

measure frailty in a sample urogynecology population of older women in the outpatient clinic setting using the EFS and to examine the association of frailty with pelvic floor disorder severity and presenting chief complaint.

Materials and Methods

We conducted a dual-center, cross-sectional study of biologically female patients ≥50 years who presented to urogynecology clinics at 2 large urban academic institutions ("Hopkins" and "Einstein") in the United States between November 2018 and January 2020. The internal review board at both institutions approved the study. Women who were new patients presenting to urogynecology clinics were eligible for recruitment. Participants were recruited by a research team member. Consents and surveys were available both in English and Spanish. Women who were unable to consent in English, or Spanish, or due to significant cognitive impairment were excluded. Women who were wheelchair- or bed-bound were also excluded, as this study originally examined the utility of assessing frailty using a walking speed measure called the timed up and go test (TUGT), in addition to the EFS.

Validated pelvic floor symptom surveys were administered on paper. The overactive bladder validated 8-question screener (OAB-V8) was used to assess lower urinary tract symptoms and is scored 0-40 with a score of ≥8 associated with a high likelihood of overactive bladder (OAB).[7] The pelvic floor distress inventory (PFDI-20) is scored from 0-300 and has 3 components, each with a maximum score of 100 points [urogenital distress inventory (UDI-6); pelvic organ prolapse distress inventory (POPDI-6); colorectal-anal distress inventory (CRADI-8)].[8] Lastly, sexual dysfunction was assessed using the 6-item female sexual function index (FSFI-6) which is scored from 2-30 with lower scores (FSFI≤19) associated with worse sexual functioning.[9]

To measure frailty, the EFS includes an assessment of cognition (using a clock drawing test), general health status, functional independence, medication use, nutrition, mood, continence, and functional performance (using the mobility-associated measure, TUGT).[10] The evaluation requires less than 5 minutes to complete. EFS prompts were verbally reviewed with the participant to ensure completeness and accuracy. Well-established EFS score cut-offs placed patients into categories, with scores of ≤5 representing "not frail," 6-7 representing "vulnerable to frailty," and ≥8 representing "frail".[1] Baseline patient demographics were collected from the electronic medical record. Race/ethnicity was categorized as non-Hispanic black (black), Hispanic, non-Hispanic white (white), or Asian. We compared demographic and clinical characteristics between frail and non-frail patients using Student's *t*-test and chi-square tests for continuous and categorical variables, respectively. Participants with missing questionnaire data were excluded from analyses for that questionnaire only. All tests were 2-sided using a significance of $p<0.05$. Presenting complaint and survey results for OAB-V8, PFDI-20 (including UDI-6, CRADI-8, and POPDI-6), and FSFI-6 were compared using multivariable linear and logistic regression analyses, which considered EFS scores in both a continuous and categorical fashion (EFS categories: "not frail" *versus* "frail"). Multivariable regression analyses controlled for demographic and clinical variables with $p<0.20$ on bivariate analyses. The 11 components of the EFS were also compared with pelvic floor symptom survey scores using multivariable linear regression. All statistical analyses were carried out using Stata Statistical Software, version 17 (StataCorp LP, College Station, TX, USA).

Results

A total of 138 women were included in the analyses, with a mean age of 65 years old [standard deviation (SD) 9.3], a mean body mass index of 31.0 kg/m^2 (SD 7.8), and a mean parity of 2.4 (SD 1.6) (Table 1). The median EFS score was 4 (interquartile range 2-5), with 16 patients meeting the criteria for frailty (EFS≥8, 11.6%). Patients were racially diverse, with 47.1% being white, 31.9% being black, and 19.6% being Hispanic. Black and Hispanic patients were more likely to be frail ($p\leq0.05$). Most patients (83.9%) met the criteria for likely OAB (OABV8≥8, n=99) (Table 2). Frail patients endorsed having significantly more bother from

Table 1. Baseline demographics by frailty status.

	Not Frail (n=122)	Frail (n=16)	p value
Age, years, mean (SD)	65.9 (9.2)	63.1 (9.5)	0.10
BMI (kg/m^2), mean (SD)	30.5 (7.9)	32.1 (7.6)	0.25
Parity (SD)	2.3 (1.4)	2.7 (2.0)	0.13
% prior anti-incontinence/prolapse surgery (n)	12.1 (11)	10.6 (5)	0.80
% Prior/current tobacco use (n)	34.1 (31)	42.5 (20)	0.33
Site of recruitment (% Hopkins) (n)	69.7 (85)	37.5 (6)	0.01*
Race			
% Asian (n)	2.2 (2)	0 (0)	0.31
% Black (n)	26.4 (24)	42.5 (20)	0.05
% Hispanic (n)	1.1 (1)	55.3 (26)	<0.01*
% White (n)	70.3 (64)	2.1 (1)	<0.01*
Edmonton Frail Scale			
EFS score, median (IQR)	3 (2-5)	8.5 (8-9)	<0.01*
Primary Complaint			
Pelvic organ prolapse, n (%)	38 (31.1)	2 (12.5)	0.12
Stress urinary incontinence, n (%)	40 (32.8)	10 (62.5)	0.02*
Overactive bladder/Urge urinary incontinence, n (%)	66 (54.1)	15 (93.8)	<0.01*
Any urinary incontinence, n (%)	61 (50.0)	14 (87.5)	<0.01*

BMI, body mass index; n, number; EFS, Edmonton frail scale; SD, standard deviation; IQR, interquartile range; *significance defined as $p<0.05$.

OAB symptoms than non-frail patients on bivariate but not multivariate analyses (Tables 2 and 3). When comparing pelvic floor symptom severity by site of recruitment, patients recruited from Einstein had higher OABV8 scores (Table 4). When examining chief urogynecology complaints, frail patients had 6.22 greater adjusted odds of endorsing any urinary incontinence [95% confidence interval (CI) 1.28-29.89] symptoms on initial presentation compared to non-frail patients (Table 5). Frail patients had a 3.7 greater adjusted odds of endorsing stress urinary incontinence (95% CI 1.09-12.53) and a 9.40 greater adjusted odds of endorsing overactive bladder/urge urinary incontinence (95% CI 1.15-78.20). Women with a higher EFS score were also less likely to endorse

Table 2. Pelvic floor symptom survey scores by frailty status.

Pelvic floor symptom questionnaires	Not frail (n=122)	Frail (n=16)	p value
OAB-V8 (SD)	19.1 (11.4)	25.3 (11.1)	0.049*
% OAB-V8 ≥8 (n)	83.9% (99)	93.8% (15)	0.30
PFDI-20 (SD)	85.7 (55.8)	107.9 (64.9)	0.17
POPDI-6 (SD)	26.6 (22.4)	28.9 (25.9)	0.73
CRADI-8 (SD)	19.5 (19.6)	29.0 (24.0)	0.10
UDI-6 (SD)	39.2 (25.8)	50.0 (26.0)	0.17
FSFI-6 (SD)	11.6 (7.8)	11.0 (8.0)	0.77
% FSFI-6 <19 (n)	80.5% (91)	81.3% (13)	0.95

SD, standard deviation; n, number; OAB-V8, overactive bladder validated 8-question screener (n=134); PFDI-20, pelvic floor disability index (n=125); POPDI-6, pelvic organ prolapse distress inventory (n=125); CRADI-8, colorectal-anal distress inventory (n=125); UDI-6, urogenital distress inventory (n=125); FSFI-6, 6-item female sexual function index (n=129); *significance defined as p<0.05.

Table 3. Pelvic floor surveys and frailty.

A. Survey name	EFS score unadjusted coefficient [95% CI]	p value	EFS score adjusted coefficient [95% CI]†	p value
OAB-V8	0.83 (0.02-0.09)	<0.01*	0.04 (0.003-0.08)	0.03*
PFDI-20	0.003 (-0.004-0.01)	0.42	0.003 (-0.004-0.01)	0.42
POPDI-6	-0.005 (-0.02-0.01)	0.62	-0.002 (-0.02-0.02)	0.81
CRADI-8	0.01 (-0.01-0.03)	0.22	0.01 (-0.01-0.04)	0.17
UDI-6	0.01 (-0.01-0.03)	0.19	0.01 (-0.01-0.03)	0.33
FSFI-6	-0.02 (-0.07-0.04)	0.58	0.01 (-0.05-0.07)	0.69
B. Survey name	**Frail by EFS unadjusted OR [95% CI]**	**p value**	**Frail by EFS adjusted OR [95% CI]†**	**p value**
OAB-V8	1.05 (1.0002-1.10)	0.049*	1.03 (0.97-1.08)	0.36
PFDI-20	1.01 (1.0-1.02)	0.17	1.0 (0.99-1.01)	0.43
POPDI-6	1.0 (0.98-1.03)	0.73	1.0 (0.97-1.03)	0.98
CRADI-8	1.02 (1.0-1.05)	0.10	1.02 (0.99-1.05)	0.15
UDI-6	1.02 (0.99-1.04)	0.17	1.01 (0.98-1.03)	0.58
FSFI-6	0.99 (0.92-1.06)	0.77	1.0 (0.92-1.08)	0.91

A, β-coefficients are estimated using linear regression; B, β-coefficients are estimated using logistic regression; EFS, Edmonton frail scale; OR, odds ratio; CI, confidence interval; OAB-V8, overactive bladder validated 8-question screener; PFDI-20, pelvic floor disability index; POPDI-6, pelvic organ prolapse distress inventory; CRADI-8, colorectal-anal distress inventory; UDI-6, urogenital distress inventory; FSFI-6, 6-item female sexual function index; *significance defined as p<0.05; †controlling for age, parity, white race, Hispanic ethnicity, site of recruitment.

Table 4. Pelvic floor symptom survey scores by site of recruitment.

Pelvic floor symptom questionnaires	Hopkins (n=91)	Einstein (n=47)	p value
OAB-V8 (SD)	16.8 (10.2)	25.7 (11.6)	<0.01*
% OAB-V8 ≥ 8	80.7% (71)	93.5% (43)	0.048*
PFDI-20 (SD)	85.7 (57.2)	92.6 (57.2)	0.52
POPDI-6 (SD)	27.4 (23.5)	25.9 (21.7)	0.72
CRADI-8 (SD)	20.9 (20.3)	19.9 (20.4)	0.80
UDI-6 (SD)	37.7 (25.4)	46.8 (26.2)	0.06
FSFI-6 (SD)	12.0 (8.2)	10.7 (7.1)	0.39
% FSFI-6 < 19 (n)	79.3% (69)	83.3% (35)	0.59

SD, standard deviation; n, number; OAB-V8, overactive bladder validated 8-question screener (n=134); PFDI-20, pelvic floor disability index (n=125); POPDI-6, Pelvic Organ Prolapse Distress Inventory (n=125); CRADI-8, Colorectal-Anal Distress Inventory (n=125); UDI-6, urogenital distress inventory (n=125); FSFI-6, 6-item female sexual function index (n=129); *significance defined as p<0.05.

pelvic organ prolapse symptoms (adjusted β coefficient -0.95, 95% CI -1.87—0.03) (Table 5).

On multivariable linear regression, higher OAB-V8 scores were significantly associated with a higher EFS score [adjusted ß 0.04, 95% CI (0.003-0.08)] (Table 3). The remaining pelvic floor symptom questionnaire scores did not differ significantly between frail and non-frail patients and were not associated with the EFS score. When comparing survey scores by each of the 11 EFS components, depressed mood was associated with greater points on the POPDI-6 and UDI-6 (Table 6). Incontinence was associated with higher scores on the OAB-V8 and all components of the PFDI-20. The unavailability of reliable help was associated with 21.52 greater points on PFDI-20 (95% CI 1.2-41.9).

Discussion

In this study, we found that frailty is relatively common in older urogynecologic outpatients and is associated with presenting complaints of urinary incontinence. Individual components of the EFS associated with symptomatic pelvic floor dysfunction included depressed mood, lack of reliable help, and incontinence. In addition, the EFS was relatively easy to integrate into the outpatient clinic setting. Physician research team members administered the clock drawing test, and medical assistants administered the TUGT. Patients were able to fill out portions of the measure on their own. This added about 3 minutes per visit. To our knowledge, the EFS has been poorly studied in the urogynecology population, despite being one of the most commonly used frailty scales in the geriatric literature. It has a superior ability to predict all-cause mortality in individuals aged 50 and older and detect perioperative complications.[11,12] Much of the existing literature on frailty in urogynecology is limited to people aged 65 and older. Given the increased frequency of pelvic floor disorders after menopause, we purposely chose to sample women aged 50 and older. Notably, the prevalence of frailty in our study cohort is 11.6%, which is closer to the national prevalence of frailty in American inpatients rather than community-dwelling adults of this age range.[13,14] This relatively elevated prevalence of frailty may be due to a significant percentage of racial/ethnic minorities, obese subjects, and prior/current smokers in our US-based study cohort.[15] Alternatively, patients presenting for urogynecology subspecialty care may be more likely to be frail than those without bothersome pelvic floor symptoms.

Table 5. Presenting complaint and frailty.

A. Presenting complaint	EFS score unadjusted coefficient [95% CI]	p value	EFS score adjusted coefficient [95% CI]†	p value
Pelvic organ prolapse	-1.10 (-1.98 - -0.21)	0.02*	-0.95 (-1.87 - -0.03)	0.04*
Stress urinary incontinence	0.86 (0.02-1.70)	0.045*	0.97 (0.13-1.81)	0.02*
Overactive bladder/Urge urinary incontinence	1.51 (0.71-2.30)	<0.01*	1.38 (0.55-2.21)	<0.01*
Any urinary incontinence	1.47 (0.68-2.25)	<0.01*	1.44 (0.66-2.23)	<0.01*
B. Presenting complaint	**Frail by EFS unadjusted OR [95% CI]**	**p value**	**Frail by EFS adjusted OR [95% CI]†**	**p value**
Pelvic organ prolapse	0.32 (0.07-1.46)	0.14	0.41 (0.80-2.12)	0.29
Stress urinary incontinence	3.42 (1.16-10.07)	0.03*	3.70 (1.09-12.53)	0.04*
Overactive bladder/Urge urinary incontinence	12.73 (1.63-99.39)	0.02*	9.40 (1.15-78.20)	0.04*
Any urinary incontinence	7.0 (1.53-32.12)	0.01*	6.22 (1.29-29.89)	0.02*

A, β-coefficients are estimated using linear regression; B, β-coefficients are estimated using logistic regression; EFS, Edmonton frail scale; OR, odds ratio; CI, confidence interval; *significance defined as p<0.05; †controlling for age, parity, white race, Hispanic ethnicity, site of recruitment.

Table 6. Components of Edmonton frail scale and pelvic floor symptom severity [presented as adjusted coefficient (controlling for age, parity, white race, Hispanic ethnicity, site of recruitment) and 95% confidence interval, bolded values are significant with p<0.05].

	OAB-V8	PFDI-20	POPDI-6	CRADI-8	UDI-6	FSFI-6
Cognition: clock drawing test	-1.32 (-5.6-2.9)	-5.74 (-31.2-19.8)	0.69 (-10.1-11.5)	-2.86 (-11.9-6.2)	-1.83 (-12.5-8.9)	0.23 (-2.9-3.4)
General health status: hospital admissions over the past year	-1.79 (-5.9-2.3)	-12.69 (-37.9-12.5)	-7.75 (-18.6-3.1)	2.76 (-6.2-11.7)	-7.69 (-18.2-2.8)	0.72 (-2.3-3.8)
General health status: description of health	2.0 (-1.1-5.1)	14.45 (-3.6-32.5)	4.65 (-3.1-12.4)	5.24 (-1.1-11.6)	4.72 (-2.8-12.3)	-0.59 (-2.9-1.7)
Functional independence: help with activities	-1.08 (-4.5-2.3)	2.63 (-17.2-22.5)	-2.32 (-10.8-6.2)	2.44 (-4.6-9.5)	2.39 (-5.9-10.7)	-0.48 (-3.0-2.0)
Social support: unavailability of reliable help	2.02 (-1.5-5.6)	**21.52 (1.2-41.9)**	8.67 (-0.2-17.5)	5.03 (-2.3-12.3)	8.17 (-0.4-16.7)	0.40 (-3.1-2.3)
Medication use: number of medications	2.23 (-1.3-5.7)	-2.36 (-23.5-18.8)	-3.31 (-12.4-5.8)	1.32 (-6.2-8.8)	-0.13 (-9.0-8.7)	-0.51 (-3.2-2.1)
Medication use: forgetting to take	2.81 (-0.8-6.4)	14.96 (-6.0-35.9)	5.06 (-3.9-14.1)	6.41 (-1.0-13.8)	2.73 (-6.1-11.6)	-2.49 (-5.2-0.2)
Nutrition: weight loss	-0.08 (-5.0-4.9)	-1.59 (-31.4-28.2)	-3.37 (-16.4-9.6)	-1.88 (-12.5-8.7)	4.26 (-8.2-16.7)	-1.04 (-4.7-2.6)
Mood: depression	2.62 (-1.0-6.2)	**25.47 (4.3-46.6)**	**9.34 (0.2-18.5)**	5.26 (-2.4-12.9)	**10.41 (1.5-19.3)**	-2.39 (-5.0-0.3)
Continence: loss of control of urine	**8.34 (5.1-11.6)**	**37.01 (16.8-57.2)**	**9.45 (0.5-18.4)**	**10.88 (3.6-18.2)**	**17.97 (9.7-26.3)**	-1.29 (-4.0-1.4)
Functional performance: timed up and go test	1.42 (-2.6-5.5)	-8.37 (-32.7-16.0)	-4.56 (-15.0 – 5.9)	-2.92 (-11.6-5.7)	-1.43 (-11.7-8.8)	-0.59 (-3.6-2.4)

OAB-V8, overactive bladder validated 8-question screener; PFDI-20, pelvic floor disability index; POPDI-6, pelvic organ prolapse distress inventory; CRADI-8, colorectal-anal distress inventory; UDI-6, urogenital distress inventory; FSFI-6, 6-item female sexual function index.

Few studies have examined presenting symptom complaints in relation to patient frailty. We found that frailty was associated with urinary symptoms, including stress and urge urinary incontinence and any urinary incontinence, as the primary concern when presenting to a urogynecology specialist in this older patient population. Surprisingly, a primary concern for prolapse was not associated with frailty. This contrasts with previous research by Davidson *et al*. that describes a higher prevalence of prolapse symptoms in patients over the age of 65 compared to younger patients.[16] Although age is not an adequate proxy for frailty, no similar studies exist for frailty. Our study also included younger patients with a lower percentage endorsing prolapse symptoms, which may contribute to our disparate findings. Additionally, sexual dysfunction was not significantly associated, but we notably did not assess and control for sexual activity in this patient cohort.

The strengths of our study are that it includes a racially and ethnically diverse patient population, and it also includes a novel application of the EFS to the urogynecology patient population. Our findings are limited by sample size, inclusion of only English- and Spanish-speaking patients, and limitations of the original study criteria, which excluded non-ambulatory patients. We had a low absolute number of patients meeting the criteria for frailty, which may mean our model is underpowered to detect other statistically significant findings. Lastly, the data presented in Table 6 should be considered hypothesis-driven rather than conclusive given that the analyses were not adjusted for multiple comparisons.

Conclusions

We recommend that the EFS be considered for further study in the field of urogynecology, given its ease of implementation and multi-dimensional nature. Mood, availability of reliable help, and continence are key aspects of frailty that are associated with worse pelvic floor symptom severity. The significance of these components of frailty should be investigated further in older adults with pelvic floor disorders. Future research should explore whether the EFS is associated with pelvic floor disorder treatment outcomes.

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