The Impact of Multimorbidity on Quality of Life Among Midlife Women: Findings from a U.S. Nationally Representative Survey

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Abstract

Background: Little is known about the prevalence and cumulative burden of coexisting health conditions including chronic joint and muscular pain, urinary incontinence (UI), depression, osteoporosis risk, moderate/severe vasomotor symptoms, and vulvar/vaginal atrophy (VVA). We surveyed a nationally representative U.S. sample of midlife (age 40–64 years) women to ascertain the prevalence, general health-related quality of life (HRQoL), and health-seeking behaviors associated with these six conditions.

Methods: This cross-sectional, telephone survey collected data from a sample of English- and Spanish-speaking U.S. women. The survey contained demographic and menopausal status questions, and also five condition-specific symptom/disease risk-screening instruments. The EuroQol 5 dimensions (EQ-5D) questionnaire was used to measure HRQoL. Health-seeking behavior was measured based on clinician discussion of and recent treatment for each condition.

Results: Three thousand fifty eight women (mean age 53.4 years) completed the survey. The majority were white (75.6%), married (60.5%), employed full- or part-time (59.0%), and postmenopausal (69.8%; based on self-report). The prevalence [95% confidence interval] of 0, 1, 2, and ≥ 3 conditions was 35.2% [33.5–36.9], 34.2% [32.5–35.9], 17.9% [16.6–19.3], and 12.7% [11.5–13.9], respectively. Osteoporosis risk (30.6%) was most prevalent, followed by VVA (27.8%) and UI (26.6%). UI and VVA coexisted most frequently (11.3%), followed by osteoporosis risk and VVA (9.8%). EQ-5D scores decreased with increasing number of illnesses (0, 1, 2, and ≥ 3 conditions, means: 0.92, 0.87, 0.77, 0.61, respectively; $p < 0.01$). Health-seeking behavior varied by condition.

Conclusion: Over 25% of women surveyed had multiple coexisting conditions. Lower HRQoL was associated with multiple conditions and with each added condition.

Introduction

AMONG ADULT WOMEN, awareness of one's health often increases around the menopausal transition, as the female body undergoes a natural change accompanied by a variety of physiologic symptoms. The prevalence of many

common conditions such as osteoporosis, urinary incontinence (UI), and depression also increases at this time. For example, symptoms of UI are reported by a higher proportion of women between the ages of 40 to 59 years (17.2%) and 60 to 79 years (23.3%) in the United States (U.S.) compared with women aged 20 to 39 (6.9%).¹ The lifetime prevalence of

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major depressive disorder is approximately 7% higher for women than men, with the highest prevalence among those aged 45 to 59 years.² Similarly, the prevalence of osteoporosis in the U.S. is nearly 10% in women aged 50 years and older, compared with 2% in men.³ Fibromyalgia is seven times more common in women than men (3.4% vs. 0.5%), and prevalence also increases with age.⁴ Additional symptoms frequently experienced during the menopausal transition are also prevalent in midlife women, including vasomotor symptoms (VMS), which are experienced by approximately 40%–55% of all women aged 40 to 55 years, and vulvar/vaginal atrophy (VVA), which affects all women over time, and VVA symptoms are especially bothersome in approximately 43% of postmenopausal women in the U.S.^{5,6}

While the individual prevalence rates for these key health conditions among women have been studied, as summarized above, sparse data exist on their combined prevalence or impact, especially on health-related quality of life (HRQoL). A study by Wolfe et al. found that approximately 47.7% of patients with fibromyalgia experienced past or current depression; however, the study was published in 1995 and conducted among both females and males.⁴ A 2009 study found that approximately 67% of women with osteoporosis had evidence of urinary incontinence; however, the generalizability of results is limited given that the study population consisted of patients at a hospital-based specialist osteoporosis clinic.⁷

Past large-scale women's health studies, such as the Women's Health Initiative (WHI) and Nurses' Health Study, primarily focused on risk factors for individual diseases or general health characteristics of women, without focusing on the prevalence of coexisting conditions or the effect of coexisting conditions on HRQoL.^{8–11} The Observational Study of the WHI studied the primary causes of morbidity and mortality, and the Nurses' Health Study did not report on the coexistence of the conditions studied. Rather, publications have primarily focused on the incidence of a single condition (e.g., the incidence of urinary incontinence)¹² or risk factors for developing a select condition (e.g., relationship between diet and chronic kidney disease).¹³ Furthermore, the WHI sample included only post-menopausal women, and the Nurses' Health Study population included adult nurses as young as 30 years of age; neither focused exclusively on midlife (45–64 years of age) or perimenopausal women.

The Study of Women's Health Across the Nation (SWAN) is a prospective and ongoing study evaluating midlife women across the menopausal transition. Included in the study objectives are the evaluation of menopause-related symptoms as well as the development of chronic diseases associated with aging, such as osteoporosis. Though the SWAN study has yielded publications estimating the prevalence of VMS, VVA, UI, osteoporosis, and depression, research objectives have predominantly included demographic and temporal trends, without attention to co-occurrence of conditions.^{5,14–16}

Research on multiple comorbidities or “multimorbidity” among midlife women is important and warranted for several reasons. First, multimorbidity has consistently been found to be associated with poorer HRQoL and increased healthcare resource utilization.^{17–21} Second, the midlife female population has been steadily increasing in the U.S., rising from 10.8% of the total U.S. population in 2000 to 13.5% in 2010.²² Therefore, it was the aim of our analysis to estimate

the individual and combined prevalence rates of conditions relevant to midlife women and associated HRQoL using a U.S. nationally representative sample.

A secondary objective was to explore health-seeking behaviors for each condition, including clinician discussion and treatment of the conditions, and whether frequencies vary by condition. Underdiagnosis and undertreatment of several of these conditions has been studied and discussed in more general populations.^{23–25} However, a comprehensive evaluation of both diagnosis and treatment of these selected conditions exclusively among midlife women has not been found in the literature. Increased attention to underdiagnosis and undertreatment is warranted among midlife women, especially in the context of multimorbidity, in order to identify healthcare system inefficiencies as well as opportunities for improving health outcomes through improvements in diagnosis and treatment rates.

Methods

Overview of study design

A cross-sectional prospective telephone survey was administered to a nationally representative sample of midlife women aged 40 to 64 years in the U.S. This study's survey was included as a customized questionnaire within an ongoing omnibus survey carried out by a large survey research company. The omnibus survey is a national telephone survey conducted weekly, comprised of standard demographic questions as well as a series of customized questionnaires provided by independent research clients. This study's customized set of questionnaires included both validated and standalone questions. The order of the questionnaires provided by research clients is randomized for each respondent to reduce bias by distributing potential priming effects of previous questionnaires across respondents. Furthermore, respondent interest and willingness to answer questions may fade with each additional questionnaire and some may elect to discontinue after completing only the first few questionnaires.

The omnibus survey population is comprised of both landline and cellular random-digit-dialing samples from all geographic areas of the U.S. (excluding Alaska and Hawaii). Each week, the samples are chosen by an equal probability selection method from a database containing all residential landlines and cellular-dedicated seven-digit numbers in the U.S. Special screening processes are employed to remove listed businesses and nonproductive (i.e., “nonworking”) numbers from the sample. Area-code specific quotas are also set to ensure adequate geographic representation, and interviews are conducted in both English and Spanish to ensure representation of the Spanish-speaking population of the U.S. Each weekly wave of the survey consists of 1,000 interviews. To maximize response rates, interviews are conducted on both weekdays and weekends (specifically, the 5-day period from Wednesday through Sunday of each week). Furthermore, previously unanswered or busy telephone numbers are automatically rescheduled for up to five additional dialing attempts.

Survey responses were collected from October 2012 through January 2013. The study protocol, including the survey content, was reviewed and approved by New England Institutional Review Board. Study respondents were female, age 40–64 years at the time of survey administration, and

English or Spanish speaking. All respondents provided evidence of verbal informed consent indicating that the respondent had been informed of and understood all pertinent aspects of the study. Interviewers asked permission to continue after explaining the purpose of the interview and that it may be recorded for quality purposes. Respondents were also informed that the survey was anonymous and confidential and were permitted to discontinue the survey at any time. Study respondents deemed to be physically (e.g., difficulty speaking or hearing) or mentally (e.g., evident noncomprehension of survey questions) unable to participate were excluded from the study. Respondents who did not complete or provide valid answers to certain portions of the survey were excluded from analyses pertaining to that portion of the survey.

To ensure adequate representation of the less common health conditions and potential combinations of conditions, a necessary sample size of 2,300 respondents was calculated based on a 1.0% margin of error for an expected small cell size. In light of this estimate, a larger sample size of 3,000 was targeted.

Study measures

Demographic characteristics included race/ethnicity, age, interview language, metropolitan status, and region. Socioeconomic characteristics included education level, marital status, employment status, and annual household income. Clinical characteristics related to menopause were also assessed, including completion of the menopause transition (i.e., postmenopausal); time since the most recent episode of menstrual bleeding, use of hormonal contraception and/or estrogen (with or without progesterone) products; and undergoing a hysterectomy and/or an oophorectomy. Specific questions used in the survey were obtained from the National Institutes of Health Women's Health Initiative: Clinical Trial and Observational Study.^{26,27}

Individual and combined (up to three concomitant conditions) prevalence rates were assessed for the following six conditions: UI, depression, osteoporosis risk, chronic joint/muscular pain, VMS, and VVA. Prevalence by number of conditions was also evaluated (i.e., the proportion of respondents with 0, 1, 2, and 3 or more conditions).

Osteoporosis risk was measured using the validated Osteoporosis Risk Assessment Instrument²⁸ (ORAI). The ORAI assigns a risk score from 0 to 26 based on three questions related to age, weight, and estrogen use. Higher scores indicate a greater risk of osteoporosis, and screening for osteoporosis is indicated for total scores of 9 and above. Older age, lower weight, and lack of estrogen use are assigned more points.

Chronic joint and muscular pain was measured using the validated London Fibromyalgia Epidemiology Study Screening Questionnaire²⁹ (LFESSQ). The LFESSQ consists of four pain questions and two fatigue questions. Respondents were assigned an overall "positive" or "negative" score for both pain and fatigue based on the amount of pain or fatigue reported, with a positive score representing greater symptoms. Chronic joint and muscular pain was defined based on a positive score for either the pain criteria alone or a positive score for both the pain and fatigue criteria.

UI was measured using the validated 3 Incontinence Questions Assessment Tool.³⁰ The tool contains three ques-

tions, with the first inquiring about general urinary incontinence (i.e., any urine leakage in the previous 3 months), and the remaining two questions focused on identifying the specific type of urinary incontinence (stress, urgency, other). We defined UI as an affirmative response to the first question.

Depression was measured using the validated Patient Health Questionnaire Depression Scale³¹ (PHQ-9) which assigns a score from 0 to 27 based on nine symptom-based questions. Higher scores indicate a greater severity of depression. Depression in this survey was defined as a score of 10 or above, which has been shown to have 88% specificity and sensitivity to major depressive disorder.³¹

VMS and VVA were assessed using severity indices derived from FDA recommendations for the clinical evaluation of treatments for VMS and VVA.³² Women with VMS must have reported one or more hot flashes or night sweats per day that are moderate or higher severity and at least somewhat bothersome. Women with VVA must have reported moderate or higher severity for at least one of the following symptoms: vaginal dryness, burning in and around the vagina, itching in and around the vagina, or painful sexual intercourse. VVA was only assessed among women who self-reported having completed menopause through a screener question preceding the VVA-specific questions in the survey.

General HRQoL was assessed using the EuroQol five dimensions questionnaire (EQ-5D),³³⁻³⁵ which has been used to measure HRQoL across a multitude of disease areas and conditions across the world. The validity and reliability of the EQ-5D have been documented previously, including patient populations in multiple countries and with multiple conditions.^{36,37} The EQ-5D is a descriptive system that measures five dimensions related to health status: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has three possible levels: no problems, some problems, or unable/extreme. A scoring algorithm can be used to transform answers to the five dimensions into a preference-based utility score with possible scores ranging from -0.11 to 1.0, on a scale where 0.0 represents death, 1.0 represents perfect health and negative scores represent states deemed to be worse than death. This research employed the scoring algorithm by Shaw et al., which was developed using a nationally representative U.S. sample.³⁵

To assess health-seeking behavior, each respondent was asked whether she had actively discussed each of the six conditions with her doctor or clinician, her satisfaction with each discussion (if applicable), and whether or not she used prescription treatment for any of the six conditions in the past month.

Data analysis

Frequency statistics were used to describe respondent sociodemographic and clinical characteristics. Descriptive analyses were conducted for both continuous measures (e.g., HRQoL) and categorical/binary measures (e.g., race). Analyses of continuous variables entailed summaries including mean, standard deviation, median, range, and interquartile range. Analyses of categorical and binary variables entailed counts and percentages of respondents. For each prevalence rate estimate, 95% confidence intervals were calculated.

HRQoL (including mean EQ-5D utility scores and dimension-specific responses) was evaluated overall and

stratified by (1) the presence and absence of each condition and (2) number of conditions. Pairwise comparisons of HRQoL between respondents with and without each condition were performed using the Mann-Whitney-Wilcoxon test (also called the Wilcoxon rank-sum test). Testing of the mean differences in HRQoL scores by number of conditions was performed using the Kruskal-Wallis test. All statistical tests were two-sided with a global type 1 error $\alpha=5\%$. No alternative hypotheses were assumed, as all tests were exploratory in nature and simply tested the null hypothesis that no differences exist. Condition-specific health-seeking behavior was evaluated by the presence of the condition. For example, doctor/clinician discussion of depression and treatment for depression were evaluated only among those respondents who screened positive for depression.

In the case of missing data, the associated survey respondent was excluded from analyses pertaining to the measure associated with the specific missing data value. For example, if a respondent had valid answers for the entire survey with the exception of one of the PHQ-9 questions, the respondent was excluded from all analyses pertaining to depression and included in all other analyses. Therefore, the denominator for each prevalence rate represented the number of survey respondents with complete data for the survey questions required to establish presence/absence of the condition. The same methodology was applied for combinations of conditions.

All analyses were performed using Statistical Analysis System software package, version 9.3 (Cary, North Carolina).

Results

Sociodemographic and clinical characteristics

A total of 3,058 women completed the survey, with a mean age of 53.4 years (Table 1). Most women were white (82%), followed by black (12%), and Hispanic (8%); 6% of women were of other races (e.g., Asian, Native American) or chose not to provide their race. Women were from all regions of the United States, with slightly more women from the south. The majority of women surveyed had completed at least some college (64%), and a majority were employed either full-time (44%) or part-time (15%). Most women were married (61%), with household incomes ranging from less than \$15,000 (12%) to over \$100,000 (18%).

More than half of the women surveyed (56%) reported at least a year since their most recent episode of menstruation (Table 2). Use of hormonal contraception and/or use of an estrogen (with or without progesterone) product to manage menopause-related symptoms were uncommon, reported by only 4% and 8% of women, respectively. The majority of women had not experienced a hysterectomy (72%) or an oophorectomy (76%). Based on clinical criteria for postmenopause (either ≥ 12 months since last episode of menstrual bleeding, or reporting both a hysterectomy and both ovaries removed), 58% of women surveyed had reached postmenopause; however 70% of women self-reported being postmenopause based on a screening question in the VVA portion of the survey.

Prevalence rates

Just over one-third of respondents did not report any condition (35%), followed by 34% of respondents reporting a

TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS

<i>Characteristic</i>	<i>Overall</i>
<i>N</i>	3058
Age of respondent	
Mean (SD)	53.4 (6.9)
40–44, <i>n</i> (%)	410 (13.4%)
45–49, <i>n</i> (%)	476 (15.6%)
50–54, <i>n</i> (%)	664 (21.7%)
55–59, <i>n</i> (%)	671 (21.9%)
60–64, <i>n</i> (%)	742 (24.3%)
Missing	95 (3.1%)
Race/ethnicity, <i>n</i> (%)	
White non-Hispanic	2313 (75.6%)
Black non-Hispanic	345 (11.3%)
Hispanic	232 (7.6%)
Other/refused	168 (5.5%)
Language of interview, <i>n</i> (%)	
English	2964 (96.9%)
Spanish	94 (3.1%)
Metropolitan status, <i>n</i> (%)	
Center city	894 (29.2%)
Center city county	578 (18.9%)
Suburban	727 (23.8%)
Non-center city	116 (3.8%)
Non-metropolitan	743 (24.3%)
Region, <i>n</i> (%)	
Northeast	599 (19.6%)
North central	704 (23%)
South	1142 (37.3%)
West	613 (20%)
Education level, <i>n</i> (%)	
High school or less	1025 (33.5%)
Some college (including Associate's degree)	766 (25%)
Graduated college (4-year/Bachelor's degree)	702 (23%)
Graduate school or more	493 (16.1%)
Other/refused	72 (2.3%)
Marital status, <i>n</i> (%)	
Single	452 (14.7%)
Married	1851 (60.5%)
Separated/divorced	541 (17.7%)
Widowed	185 (6%)
Refused	29 (0.9%)
Employment status, <i>n</i> (%)	
Full-time	1345 (44%)
Part-time	460 (15%)
Not employed	1245 (40.7%)
Refused	8 (0.3%)
Total annual household income, <i>n</i> (%)	
$\leq$ \$24,999	657 (21.5%)
\$25,000–\$49,999	701 (22.9%)
\$50,000–\$74,999	422 (13.8%)
\$75,000–\$99,999	336 (11%)
\$100,000 and over	558 (18.2%)
Don't know/refused	384 (12.5%)

SD, standard deviation.

single condition, 18% reporting two conditions, and 13% reporting three or more conditions. Among the six conditions included in the survey, osteoporosis risk was most prevalent (31%), followed by VVA (28%), UI (27%), chronic joint/muscular pain (17%), VMS (14%), and depression (13%).

TABLE 2. BASELINE CLINICAL CHARACTERISTICS

Characteristic	Overall
N	3,058
≥ 12 months since most recent episode of menstrual bleeding, <i>n</i> (%)	1700 (55.6%)
Using hormonal contraception, <i>n</i> (%)	128 (4.2%)
Using estrogen (+/– progesterone) product for menopause-related symptoms, <i>n</i> (%)	253 (8.3%)
Hysterectomy, <i>n</i> (%)	774 (25.3%)
Ovaries removed, <i>n</i> (%)	
Yes, one removed	151 (4.9%)
Yes, both removed	442 (14.5%)
Yes, one or both partially removed	49 (1.6%)
No	2311 (75.6%)
Don't know/refused	105 (3.4%)
Clinically post-menopause, ^a <i>n</i> (%)	
Yes	1761 (57.6%)
No	1297 (42.4%)
Don't know or refused	0 (0%)
Self-reported post-menopause, ^b <i>n</i> (%)	
Yes	2136 (69.8%)
No	824 (26.9%)
Don't Know or Refused	98 (3.2%)

^aDefined as those participants with ≥ 12 months since last episode of menstrual bleeding, or those with both a hysterectomy and both ovaries removed (surgical menopause).

^bBased on response patterns to the vulvar/vaginal atrophy (VVA) questions.

The most prevalent two-condition combinations were UI and VVA (11%), osteoporosis risk and VVA (10%), UI and chronic joint/muscular pain (8%), and VMS and VVA (7%) (Table 3). Few women screened positive for three or more conditions, with each observed combination of three conditions prevalent in less than 4% of respondents.

Health-related quality of life

Half of the women scored between 0.8 and 1.0 on the EQ-5D, and both mean and median EQ-5D scores were 0.83. HRQoL declined significantly with each added condition (Fig. 1; pairwise $p < 0.01$). Mean EQ-5D scores were 0.92, 0.87, 0.77, and 0.61 for 0, 1, 2, and 3 or more conditions, respectively. Furthermore, most incremental differences were important as they met or exceeded the criteria for minimal importance for the EQ-5D (0.011–0.140), suggesting clinical relevance.³⁸

The proportion of women reporting “unable or extreme problems” for each EQ-5D dimension was highest among women with ≥ 3 conditions (Fig. 2). Among these women, 3% reported “unable or extreme problems” in mobility, 2% in self-care, 10% in usual activities, 32% in pain/discomfort, and 21% in anxiety/depression. In contrast, among women without any of the conditions, this level of difficulty was reported by less than 2% of women for each dimension.

HRQoL also differed significantly between respondents with and without each of the six conditions (Fig. 3; $p < 0.001$); with the exception of osteoporosis risk, the presence of any of the six conditions was associated with lower perceived HRQoL as compared to the absence of the condi-

TABLE 3. SINGLE AND COMBINED PREVALENCE RATES

Condition(s)	Prevalence
Single condition, % (95% CI)	
Osteoporosis risk	30.6% (28.8–32.4)
VVA	27.8% (25.9–29.8)
UI	26.6% (25.1–28.2)
Pain	17.0% (15.6–18.3)
VMS	13.7% (12.4–14.9)
Depression	12.6% (11.4–13.8)
Two-condition combinations, % (95% CI)	
UI and VVA	11.3% (9.9–12.7)
Osteoporosis risk and VVA	9.8% (8.5–11.2)
UI and pain	7.6% (6.6–8.5)
VMS and VVA	7.4% (6.2–8.5)
Pain and VVA	7% (5.8–8.1)
Depression and VVA	6.7% (5.6–7.8)
UI and depression	6.2% (5.3–7)
UI and osteoporosis risk	6.2% (5.3–7.1)
Depression and pain	6.1% (5.2–6.9)
UI and VMS	5.9% (5–6.7)
Depression and VMS	4.9% (4.1–5.7)
Pain and VMS	4.7% (3.9–5.5)
Pain and osteoporosis risk	3.9% (3.2–4.6)
Osteoporosis Risk and VMS	3.7% (3–4.4)
Depression and osteoporosis risk	3.2% (2.5–3.9)
Three-condition combinations, % (95% CI)	
UI, pain, and VVA	3.8% (2.9–4.6)
UI, depression, and pain	3.2% (2.6–3.9)
UI, osteoporosis risk, and VVA	3.1% (2.3–3.9)
Depression, pain, and VMS	2.6% (2–3.2)
UI, depression, and VMS	2.6% (2–3.2)
UI, pain, and VMS	2.6% (2–3.2)

Prevalence estimates are not mutually exclusive; all estimates are unconditional.

CI, confidence interval; Pain, chronic joint/muscular pain; UI, urinary incontinence; VMS, vasomotor symptoms.

FIG. 1. Health-related quality of life by number of selected health conditions. The Kruskal-Wallis test was used to test overall mean differences across the number of conditions; results were significant at $p < 0.0001$. EQ-5D, EuroQol five dimensions questionnaire.

FIG. 2. Relationship between number of selected health conditions and “extreme problems” with EQ-5D dimensions. The Kruskal-Wallis test was used to test overall differences across the number of conditions within each dimension; all results were significant at $p < 0.0001$.

tion; this difference was largest between patients with and without depression (mean EQ-5D score 0.55 vs. 0.88), followed by chronic joint/muscular pain (0.62 vs. 0.88).

Health-seeking behavior

Health-seeking behaviors varied by condition (Table 4). Among women who screened positive for a condition, the proportion who discussed it with their clinician varied from 40% (VVA) to 90% (depression), while the percent reporting treatment for the condition in the past month varied from 13% (osteoporosis risk) to 69% (chronic joint/muscular pain).

FIG. 3. Health-related quality of life by presence or absence of each selected health condition. Pairwise comparisons between respondents with and without each condition were performed using the Mann-Whitney-Wilcoxon test; results for each condition were significant at $p < 0.0001$. Pain, chronic joint/muscular pain; UI, urinary incontinence; VMS, vasomotor symptoms; VVA, vulvar/vaginal atrophy.

Discussion

Summary

This cross-sectional prospective telephone survey assessed the prevalence of selected health conditions, health-related quality of life, and health-seeking behaviors among midlife women aged 40–64 years. Estimated single prevalence rates for selected conditions ranged from 13% to 31% and two-condition prevalence rates for selected condition pairs were as high as 11%. More than 60% of women surveyed had at least one condition, and over 25% had at least two conditions. The presence of multiple conditions was associated with significantly poorer HRQoL. Health-seeking behaviors varied considerably by condition, suggesting that women may not always discuss all of their health symptoms and concerns with their clinician. Discussion may not be needed in cases where low frequency or low severity means minimal to no risk or bother to the patient. However, for those cases where communication would be warranted, it may be important for the clinician to proactively ask about various conditions and symptoms.

Comparison with the literature

Findings from the survey are generally consistent with previous estimates in the literature. Slight variations in study design resulted in minor differences in prevalence rates; however, results with regard to HRQoL echo previous findings.

The impact of multimorbidity has been studied more generally across sex and age groups, with results consistently pointing towards higher resource use, costs, and as in our study, lower perceived quality of life.^{17–21} For instance, Machado and colleagues conducted a cross-sectional, population-based survey to assess the presence of multimorbidity and its impact on self-perception of health.²¹ Despite focusing on different conditions (i.e., depression, hypertension, diabetes mellitus, UI, insomnia), the authors found a prevalence rate of multimorbidity (39.3%, defined as two or more comorbid

TABLE 4. HEALTH SEEKING BEHAVIOR, STRATIFIED BY CONDITION

<i>Characteristic</i>	<i>UI</i>	<i>Depression</i>	<i>Pain</i>	<i>Osteoporosis</i>	<i>VMS</i>	<i>VVA</i>
<i>N</i>	799	363	507	809	409	563
Discussion of condition with clinician						
Yes	412 (51.6%)	278 (76.6%)	455 (89.7%)	375 (46.4%)	303 (74.1%)	227 (40.3%)
No	379 (47.4%)	85 (23.4%)	51 (10.1%)	431 (53.3%)	101 (24.7%)	333 (59.1%)
Don't know/refused	8 (1.0%)	0 (0%)	1 (0.2%)	3 (0.3%)	5 (1.2%)	3 (0.6%)
Prescription treatment for condition in past month						
Yes	114 (14.3%)	233 (64.2%)	351 (69.2%)	106 (13.1%)	92 (22.5%)	82 (14.6%)
No	677 (84.7%)	130 (35.8%)	154 (30.4%)	702 (86.8%)	315 (77%)	478 (84.9%)
Don't know/refused	8 (1.0%)	0 (0%)	2 (0.4%)	1 (0.1%)	2 (0.5%)	3 (0.6%)

conditions) similar to ours (31% for two or more conditions). Additionally, the authors found that multimorbidity was significantly associated with bad/fair self-perception of health. While the findings from Machado and colleagues shed important light on the impact of multimorbidity on HRQoL, it is important to note that the survey was administered to Brazilian women 40–65 years of age who had ≥ 11 years of school education, limiting the generalizability to a U.S. population of midlife women. Moreover, contrary to our study, the authors did not use validated questionnaires to evaluate the presence of conditions, multimorbidity, and/or HRQoL.

Fried and colleagues evaluated the relationship between chronic disease pairs on disability in older women as part of the Women's Health and Aging Study.³⁹ Their results showed that the type of disability associated with a given disease varied and was dependent on the other disease that was present. While the conditions included in their study differ from those in ours, their results reflect the interactive effect of comorbidities on quality of life. A 2004 review article of multimorbidity and quality of life in primary care found thirty studies supporting an inverse relationship between the two.¹⁹ A recent Canadian study further explored this relationship and found that it was strengthened when the severity of disease was considered rather than a simple count of conditions.¹⁷

It is also noteworthy that the average HRQoL score among the women surveyed in this study (0.83) is similar to other U.S. national estimates of HRQoL (as measured by the EQ-5D) among midlife women (0.79).⁴⁰ Our estimates of HRQoL associated with multimorbidity (0.77 for two conditions; 0.61 for three or more conditions) also compare reasonably well to HRQoL estimates associated with single serious diseases such as diabetes (0.75), acute myocardial infarction (0.70), and heart failure (0.64).⁴¹ This shows that multimorbidity of relatively less serious health conditions can impact quality of life similarly to single, more serious, and chronic conditions or conditions that require greater daily effort to manage.

Few women who completed the survey reported use of hormonal contraception (4.2%) and/or estrogen (with or without progesterone) products to manage menopause-related symptoms (8.3%). The former is lower than a previous estimate of 9.8% of U.S. women aged 40 to 44 reported using hormonal contraception (i.e., the pill);⁴² however, our sample included many women over age 44, and a majority were postmenopausal. Studies of contraceptive rates typically focus on the "at-risk" population (e.g., women of childbearing age,

namely ages 15 to 44 years), restricting us from making a true comparison based on the full age range of our sample. Our estimate of estrogen (with or without progesterone) therapy use is higher than a recent estimate of 4.7% among women aged 40 years and above.⁴³ However, estimates by age group in the same study are closer to ours [6.7% (age 50–59); 7.1% (age 60–69)].

The estimated prevalence of UI in this survey (26.6%) is slightly higher than previous estimates among women of similar age [17.2% (age 40 to 59); 23.3% (age 60 to 79)],¹ which is likely due to different criteria employed to determine presence of UI. Previous estimates were based on moderate to severe incontinence (determined by frequency and amount of leakage), while our study's definition included women with any self-reported urinary leakage in the prior 3 months, regardless of frequency or severity.

Our estimated prevalence of depression (12.6%) is within the range of 10.6%–19.8% reported by Kessler and colleagues for women ages 30 and above [18.9 (age 30 to 44); 19.8% (age 45 to 59); 10.6% (age ≥ 60)];² however, their estimates were based on lifetime prevalence as opposed to point prevalence. We found the prevalence of chronic joint/muscular pain to be 17%. A recent survey study of chronic pain among men and women in the U.S. found that approximately 39% of midlife women experience chronic pain, defined as pain for at least 6 months.⁴⁴ One potential explanation for our lower estimate is that our criteria required widespread pain across the body in four locations, while the survey study defined chronic pain based on pain in any location (single or multiple).

Approximately 7% of women aged 50 to 59 and 10% of women aged 60 to 69 are estimated to have osteoporosis based on bone mineral density (BMD) at the femur neck or lumbar spine.⁴⁵ As our study only assessed risk of osteoporosis, it is not possible to make a direct comparison; however, it is likely that a subset of the 30% of women we found to be at risk would qualify clinically as having osteoporosis based on BMD tests.

We estimated that approximately 14% and 28% of women aged 40 to 64 experience VMS and VVA, respectively. In SWAN,⁵ 40.2% of women reported VMS for 1 day or more over a 2-week baseline period, which is substantially higher than our estimate (13.7%). This is likely because at baseline women in the SWAN study were required to have had a menstrual period in the past 3 months, suggesting perimenopause, a time when women are more likely to have VMS.⁴⁶ The majority of our sample, however, was postmenopausal.

Our lower estimate may also reflect our more stringent definition of VMS.

The prevalence of VVA has been shown previously to increase with age, from 4% in early postmenopause to 47% in later years following menopause.⁴⁷ As our study sample included women at various stages of the transition to postmenopause, our result of 27.8% appears reasonable. Previous studies have also found similar results with regard to clinician discussion of VVA and VVA's effect on HRQoL.^{6,48}

Limitations

The study focused on self-reported symptomology rather than formal diagnoses, potentially causing results to be influenced by recall bias, where answers are dependent on a respondent's memory of the presence or severity of symptoms and conditions. Only point prevalence of studied conditions was obtained, as opposed to lifetime prevalence. Moreover, two of the studied conditions (depression, pain) are components of the EQ-5D instrument and may have had an impact on EQ-5D subscale scores for anxiety/depression and pain/discomfort. Despite this, we elected to use the EQ-5D as the survey's measure for health-related quality of life due to its wide acceptance in the research community. Furthermore, the items related to pain and depression in the EQ-5D are more general and less clinically and detail-oriented than the condition-specific screeners in our survey. Additional limitations include lack of generalizability of some or all results outside of the U.S. as well as the exclusion of (1) women in the U.S. residing in Hawaii and Alaska, and (2) women who do not have access to a landline or cellular telephone.

Conclusions

Over 25% of women aged 40 to 64 years in the survey reported symptoms indicative of multiple coexisting conditions, indicating a substantial amount of multimorbidity among midlife women in the U.S.. The presence of multiple conditions had a significant effect on general HRQoL, which declined with each added condition. The magnitudes of incremental declines suggest that increased clinical attention to the interaction and effects of multiple conditions is warranted. The variability observed in health-seeking behavior further highlights this point, as many women with each of the conditions included in the survey reported a lack of treatment for the condition and/or a lack of discussion of the condition with their clinician. Future research assessing the prevalence of symptoms in post-menopausal women (vs. those who are not post-menopausal), the impact of multimorbidity on women's quality of life with a greater scope of conditions, and alternate measures of quality of life would be valuable.

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