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Health-Related Quality of Life in Ovarian Cancer Survivors: Results from the American Cancer Society's Study of Cancer Survivors-I

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Abstract

Objective—There are limited data on outcomes and predictors of health-related quality of life (HRQOL) of ovarian cancer survivors. Therefore, we examined the trajectory and predictors of HRQOL one- and two-years post-diagnosis in this population.

Methods—365 ovarian cancer survivors, a subset of participants in the longitudinal American Cancer Society's Study of Cancer Survivors-I, completed questionnaires at one-year post-diagnosis on sociodemographics, clinical factors, and HRQOL (SF-36). 284 women had HRQOL data at two-years post-diagnosis. In this secondary data analysis, we examined HRQOL at both time points, changes in HRQOL and predictors of HRQOL with univariate and multivariate linear regression.

Results—Mean mental and physical HRQOL scores one-year post-diagnosis were 49.37 (SD ± 11.59) and 45.96 (SD ± 10.89), respectively. Older age, lower income, higher disease stage, more comorbidities and greater symptom burden were associated with poorer physical functioning one year post-diagnosis. Younger age, higher stage, having an existing mental health issue, greater symptom burden, and not receiving chemotherapy were associated with poorer mental functioning. Disease recurrence between one- and two-years post-diagnosis and greater symptom burden were predictors of declining physical functioning from one- to two-years post-diagnosis. Mental functioning did not change significantly between assessments.

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CONFLICT OF INTEREST:

The authors declare that they have no conflicts of interest.

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Conclusions—Overall mental and physical functioning of these ovarian cancer survivors was similar to the general population. However, lower HRQOL was associated with a number of variables, including disease recurrence, treatment status, symptom burden, age, and number of comorbidities. These findings can help health care providers identify survivors who may benefit from relevant interventions.

Keywords

ovarian cancer; quality of life; survivors

INTRODUCTION

Ovarian cancer is the fifth leading cause of cancer death in US women and has the highest mortality rate of all gynecological cancers. An estimated 22,280 women will be diagnosed with ovarian cancer and 14,240 will die of this disease in 2016 [1]. Most cases of ovarian cancer are asymptomatic until the disease has progressed to an advanced stage, consequently, over 60% of women are diagnosed with metastatic disease. Despite this pattern of advanced stage presentation, the five-year survival rate has increased from 36% in 1975-1977 to 46% in 2005-2011 [1], thereby increasing the number of ovarian cancer survivors and heightening the importance of studying their post-treatment quality of life.

Health-related quality of life (HRQOL) is a multidimensional measure that is typically composed of an individual's physical functioning, emotional, social and psychological well-being and health perceptions. HRQOL is used to help capture the extent that these factors are affected by an individual's health and illness [2]. These patient-reported outcomes can provide clinicians with information regarding the impact of the cancer diagnosis and treatment. Patients at-risk for decreased HRQOL may require targeted supportive care and interventions [3].

In the past 15 years, over 20 studies have examined HRQOL of ovarian cancer survivors utilizing various instruments. The majority of the studies either had small sample sizes [4-14] or evaluated mixed samples of gynecologic cancer survivors [7, 15-23]. Most of the existing studies described HRQOL of long-term ovarian cancer survivors at least five years post-diagnosis [6, 9-11, 15-17, 20, 24-26] or solely examined HRQOL of women undergoing active treatment [5, 7, 13, 19, 27, 28]. There are limited data on HRQOL among short-term ovarian cancer survivors (one-to-two years post-diagnosis), with a handful of small studies that assessed HRQOL longitudinally including assessments one-year post-diagnosis [4, 13, 14, 18, 23, 29]. Therefore, our study focuses on the time period of one- to two- years post-diagnosis in a large sample of solely ovarian cancer survivors which will increase our understanding of how these women adjust to life following diagnosis and first line treatment. Challenges during this time include managing persistent side effects of treatment, coping with fears of disease recurrence, adopting new family and social roles, and making meaning of the cancer experience. Despite these issues, relatively little is known about this period of time.

Given the lack of research on HRQOL among short-term ovarian cancers survivors, our study may help inform clinicians about factors that women experience during this period

that may impact their HRQOL. Our aim was to determine the patterns and predictors of HRQOL among ovarian cancer survivors enrolled in the American Cancer Society (ACS) Study of Cancer Survivors-I (SCS-I) one-year post-diagnosis. Using one of the largest samples of ovarian cancer survivors to date and unique longitudinal data, we evaluated changes in HRQOL from one- to two-years post-diagnosis and identified factors associated with significant changes. We hypothesized that women one-year post-diagnosis would have lower HRQOL than that of the general population, that there would be improvements in HRQOL from one- to two- years post-diagnosis, and that factors such as disease stage, symptom burden, and age would be associated with changes in HRQOL. Identifying risk factors associated with poor HRQOL could be useful in targeting supportive care and aid in planning interventions with this population.

METHODS

Study Population

Our population of ovarian cancer survivors was drawn from the longitudinal SCS-I, which identified and surveyed cancer survivors of the ten most commonly diagnosed cancers in the US (prostate, breast, lung, colorectal, bladder, skin, kidney, ovarian, uterine and non-Hodgkin lymphoma) from cancer registries in 11 states; sampling and study design details have been previously described [30]. Briefly, participants were recruited between July 12, 2000 and November 9, 2005 at approximately one-year post-diagnosis and completed the baseline survey at this time. Survivors were surveyed a second time one year later and asked to complete the follow-up questionnaire. Eligibility criteria were: 1) diagnosis of one of the ten cancers of interest; 2) 18 years of age at time of diagnosis; 3) resident of the state from which they were sampled at the time of diagnosis; 4) diagnosed with a local, regional, or distant Surveillance, Epidemiology, and End Results Program (SEER) summary stage cancer; and 5) able to communicate in English or Spanish.

A total of 6,305 of the 18,558 survivors contacted were enrolled in SCS-I (34% response rate). Detailed information regarding recruitment, response rates, and patterns of non-response is provided elsewhere [30]. Among all the cancer types, ovarian cancer survivors (n=395) had the highest response rate (44.1%) [30]. Overall ethics approval for the study was obtained from the Institutional Review Board (IRB) of Emory University. Additional IRB approvals were obtained from each state's cancer registry, including the Connecticut Department of Public Health Human Investigation Committee and the individual hospital IRBs in Connecticut. Data used in this secondary data analysis were obtained from the state cancer registries and from surveys completed by the study participants approximately one-year and two-years post-diagnosis.

Measurement

Demographic and Medical information—Clinical characteristics, such as cancer stage and date of diagnosis, were obtained from the state cancer registries. Nearly all participants completed self-administered mailed questionnaires, with a small fraction completing surveys over the phone. The questionnaires asked about physical, social, physiological and spiritual functioning, and also collected information on basic demographics, cancer diagnosis and

treatment, comorbid conditions (e.g. Alzheimer's disease, arthritis, diabetes, high blood pressure and osteoporosis), mental health conditions (e.g. anxiety, depression), and access to healthcare and insurance [30].

Symptoms and Comorbid Conditions—The Modified Rotterdam Symptom Checklist (RSCL-M) was used to assess the burden caused by the presence of 30 physical symptoms during the past week on a four-point Likert Scale [31]. RSCL-M scores are a summation of the 30 items and range from 30 to 120, with higher scores indicating greater burden or impairment.

Information on comorbid conditions was self-reported via the mailed questionnaires using the question “Are you currently being treated for any medical conditions other than cancer?” The participants were asked to complete a checklist of sixteen conditions and additionally were able to write-in conditions not included in the list. This list included three mental health related conditions: “anxiety,” “depression” and “mental health problems (other than depression)”.

HRQOL—Our primary outcome of HRQOL was based on responses to Medical Outcomes Survey-Short Form-36 (SF-36) Health Survey Version 1. The survey consists of 36 questions with varying response options. Scores were calculated for the eight subscales (mental health, social, vitality, role-emotional, physical functioning, bodily pain, role-physical, and general), as well as for the physical component summary (PCS) score and the mental component summary (MCS) score [32]. All scores were normalized to the 1998 general US population, with a range of 0-100, mean of 50 and standard deviation (SD) of 10; a higher score denotes better HRQOL [32].

Statistical Analysis

Our analytic sample includes the 365 ovarian cancer survivors with complete SF-36 data at baseline (one-year post-diagnosis), 30 of the 395 women with ovarian cancer enrolled to the study had incomplete SF-36 data and were excluded from the analysis. Two-years post-diagnosis data were available for 310 of the 395 women enrolled; reasons for not completing the follow-up survey were refusal/non-response/unable to locate (n=51) and death (n=34). Of the 310 women with complete SF-36 data in our baseline data, 284 had complete SF-36 data at two-years post-diagnosis and were evaluated in the change analysis from one- to two-years post-diagnosis.

SF-36 subscales and component summary scores were computed for one-year and two-years post-diagnosis. Changes in PCS and MCS between these two time points were calculated and evaluated with paired t-tests. Potential predictors of HRQOL at one-year post-diagnosis based on the PCS and the MCS were examined using univariate linear regression (N=365). The predictors that were found to be statistically significant at the P 0.05 level in the univariate models were then tested in multivariate linear regression models using stepwise selection. Mean PCS and MCS values and beta coefficient estimates are calculated for categorical and continuous variables, respectively.

Additionally, among participants with SF-36 data at both time points (N=284), we evaluated predictors of statistically significant changes in component summary scores from one-year to two-years post-diagnosis in univariate and multivariate linear regression models. Significant univariate predictors at the P 0.05 level were tested in a backward stepwise multivariate linear regression model. All analyses were conducted using SAS, Version 9.3 (SAS, Cary, NC).

RESULTS

Baseline Demographics

At study enrollment, the 365 ovarian cancer survivors had a mean age of 56.9 years and on average were 1.3 years post-diagnosis. Over half of the women were diagnosed with distant ovarian cancer (52%) and almost all the women reported receiving surgery (94%) and chemotherapy (90%). The majority of the sample was non-Hispanic white (90%), well educated (having some college or graduate school education) (59%), and married or living as married (64%). Almost all of the women had health insurance (98%) and almost half had a household income of \$40,000 or more (49%). While more than half of the women reported having no comorbid conditions (57%), 24% reported having one comorbid condition and 19% had two or more comorbid conditions.

HRQOL at Baseline

At baseline, the mean normalized SF-36 MCS and PCS were 49.4 (SD=11.59) and 46.0 (SD=10.89), respectively (Table 1). Older age at diagnosis, lower household income, higher cancer stage, more comorbid conditions and greater symptom burden were significant independent predictors of poorer physical functioning at one-year post-diagnosis (lower PCS score) (Table 2). After multivariate adjustment, the following characteristics were predictors of poorer mental functioning at one-year post-diagnosis (lower MCS score): younger age at diagnosis, lower cancer stage, no chemotherapy treatment, existing mental health conditions, and greater symptom burden (Table 2). In a sensitivity analysis of predictors of the component summary scores at one-year post-diagnosis, among the 284 women who completed questionnaires at both one- and two-years post-diagnosis, the same characteristics were associated with PCS and MCS as in the full baseline sample (results not shown).

Change in HRQOL

Among the 284 participants who had complete SF-36 data for both one-year and two-years post-diagnosis, there was a significant decline in the PCS (1.4 decrease; SD=9.0; $P<0.05$), with significant declines in two of the component PCS subscale scores namely, bodily pain (1.3 point decrease; SD=9.8; $P<0.05$) and general health (1.8 decrease; SD=7.3; $P<0.0001$) (Table 1). No change was observed in the SF-36 MCS or any of the subscale scores that contribute the SF-36 MCS (Table 1).

SF-36 scores in this study were normalized to the 1998 general US population, with a range of 0-100, mean of 50 and SD of 10. According to Cohen's criteria regarding effect size indexes in research, for the SF-36 scores a small change is 0.2 SD (2 points) and a moderate change is 0.5 SD (5 points) [33]. Using this definition, among ovarian cancer survivors with

complete SF-36 data at two years post-diagnosis, 17.3% had a moderate increase and 25.4% had a moderate decrease in PSC score between one- and two-years post-diagnosis.

Since we observed a statistically significant change in physical functioning from one-to two-years post-diagnosis we evaluated predictors of change in PCS (see Table 3). In the multivariate model, only disease recurrence between one- and two-years post-diagnosis ($P=0.0003$), symptom burden at one year post-diagnosis ($P<0.0001$), and change in symptom burden ($P<0.0001$) were associated with changes in physical functioning over the one year time period

DISCUSSION

Our study examined HRQOL of ovarian cancer survivors one year after diagnosis, as well as changes from one- to two-years post-diagnosis. At one-year post-diagnosis, these ovarian cancer survivors had average normalized SF-36 scores similar to the general US population. Younger age at diagnosis, lower cancer stage, no chemotherapy treatment, existing mental health conditions and greater symptom burden predicted poorer mental functioning at one-year after diagnosis. Older age at diagnosis, lower household income, higher cancer stage, greater number of comorbid conditions and greater symptom burden predicted poorer physical functioning. We also observed a small, but statistically significant overall decline in physical functioning among these women from one- to two-years post-diagnosis. Disease recurrence between one- and two-years post-diagnosis, greater symptom burden at baseline, and an increase in symptom burden between one- and two-years post-diagnosis were associated with declines in physical functioning.

Given that ovarian cancer is often diagnosed at an advanced stage and entails aggressive treatment options, these survivors can experience high levels of distress, which may negatively impact their HRQOL [5, 34]. However, the ovarian cancer survivors in our study had mean MCS and PCS scores similar to age- and gender-matched general populations. Specifically, the MCS at one-year post-diagnosis for our study sample is comparable to the mean norm scores of 50.3 (SD=10.1) and 52.0 (SD=9.7) for general US population females ages 55-64 years and 65 years, respectively. The mean PCS in our sample is between the mean norm values for women ages 55-64 years 46.9 (SD=11.2) and 65 years 41.3 (SD=11.4) [32]. Several other studies of ovarian and other gynecologic cancer survivors have also noted comparatively good HRQOL. Three existing studies used the SF-36 as a measure of HRQOL among ovarian cancer survivors. Two of the studies surveyed women before their oncologic surgery and found the PCS and MCS to be comparable to that of the general population [5, 7]. The third study did not publish the sample's mean component summary scores, however, the authors stated that their sample of early stage ovarian cancer survivors who were at least five years post-diagnosis had good HRQOL that was comparable to other cancer survivors [10].

Results from studies examining HRQOL in breast cancer survivors appear to have similar findings [35]. In fact, the mental HRQOL in our study was better than the mean MCS scores of breast cancer survivors who were on average seven years post-diagnosis. The PCS values for the breast cancer survivors that had received chemotherapy were similar to the ovarian

cancer survivors in our study, while breast cancer survivors who received hormonal therapy only or no systemic therapy had higher PCS than our study population [35].

Three other studies evaluated HRQOL of ovarian cancer survivors approximately one- year post-diagnosis, with scales other than the SF-36 [18, 22, 29]. These scales encompassed domains similar to the SF-36 by using physical, functional, emotional, and social subscales, two studies used the Functional Assessment of Cancer Therapy (FACT) measures, while the third reported scores from the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire–Core 30 (EORTC QLQ-C30). These measures are specific to cancer populations and do not allow for comparisons to be made to the general US population.

Several other studies have examined demographic and clinical variables in relation to HRQOL in ovarian cancer survivors, with the majority using either the Functional Assessment of Cancer Treatment – Ovarian (FACT-O) or the EORTC QLQ-C30 [6, 7, 10, 11, 16, 18, 20-22, 26]. Similar to our study, older age at diagnosis was found to be associated with poorer functional well-being [18, 20], but better emotional well-being [20].

Older survivors may take longer to recover from surgery and chemotherapy and are perhaps unable to return to pre-diagnosis physical functioning levels. Younger survivors may be better able to physically deal with the diagnosis and treatment, but we found had lower mental HRQOL than their older counterparts. It is possible that younger survivors have what can be perceived as greater responsibilities outside of their cancer diagnosis. Younger women are more likely to have young children and the need to return to work that may produce greater mental burden compared to older survivors who are less likely to be caregivers of young children and may have already retired.

Disease stage and symptom burden were associated with HRQOL in our study [10]. Similarly, in two other studies the existence of symptoms, including fatigue, was also associated with lower HRQOL [10, 11]. A large body of evidence suggests that receiving chemotherapy treatment is associated with poorer physical HRQOL compared to those who do not receive chemotherapy treatment [5, 19, 36, 37]. Given that many of the ovarian cancer survivors were diagnosed with late stage disease, it is conceivable that at one-year after diagnosis, these women were still undergoing active treatment and were experiencing treatment related symptoms that adversely affected their HRQOL. Many chemotherapies cause toxicities (i.e. symptoms) that can diminish physical HRQOL in cancer survivors and the results from our study demonstrated that symptom burden and having comorbid conditions adversely affected ovarian cancer survivors a year after diagnosis.. Having an existing mental health condition was associated with lower MCS in our population. However, somewhat surprisingly, our study found that *not* having chemotherapy treatment was associated with poorer mental HRQOL. Only a small proportion of women reported not having chemotherapy (7.6%) and we have no knowledge of the reason for this treatment decision. Treatment information was collected using self-report and not through medical record abstraction, so it is also possible that there is some misclassification.

In our study sample, on average, physical functioning (SF-36 PCS) decreased significantly between one- and two- years post-diagnosis, while the average MCS score remained constant. A handful of small studies have longitudinal HRQOL data; two studies enrolled women with different gynecologic cancers [18, 22] and three solely included ovarian cancer survivors [4, 5, 14]. The exact timing of the HRQOL assessments varied for each study but most of the studies obtained HRQOL measures before treatment and conducted an assessment around one-year post-diagnosis [5, 18, 22]. One study included assessments at one- and two-years post-operatively, and in contrast to our study found no change in physical and functional well-being as assessed by the FACT-O. This may be due to the difference in measures used to assess quality of life [14]. As noted earlier, we were unable to compute SF-36 change scores who did not respond to the two-year post diagnosis follow up. Results indicated that these women had significantly lower MCS and PCS scores at the one-year post diagnosis time point, so it is possible that a healthy responder bias may have contributed to a smaller change in PCS and MCS between our two study time points.

The collective results of our study may aid in the identification of sub-groups of ovarian cancer survivors who may benefit from interventions to improve HRQOL. In addition, our findings support the recent mandate from the American College of Surgeons Commission for psychosocial distress screening to be a new patient care standard [38]. Women with higher symptom burden or existing mental health conditions have particularly low mental HRQOL and could benefit from screening for high emotional distress at diagnosis and during treatment. If women who are at risk for on-going mental health problems are identified early (i.e. at diagnosis or treatment) through distress screening, we may be able to stabilize or improve their mental HRQOL through their treatment and during follow-up via an already tested and efficacious nursing intervention targeting symptoms and mental health [3, 39]. Similarly, ovarian cancer survivors identified as being at risk for declining physical functioning, could receive an exercise/walking intervention which our group has recently reported increases HRQOL [40].

Our study was a population-based nationwide survey and provides longitudinal data for US ovarian cancer survivors from a wide geographic area and socioeconomic range. To our knowledge this is the largest study to examine predictors of HRQOL and change in HRQOL in ovarian cancer survivors over time. In spite of these strengths, our study has several potential limitations, including the low response rate. Our results may not be generalizable to all ovarian cancer survivors, as the survivors who enrolled in this study may have been generally healthier, including in relation to HRQOL, than those who did not participate, and 90% of the participants were non-Hispanic white and 98% had health insurance. In this study, follow-up is limited to two time points and we are therefore not able to examine varying patterns in HRQOL over time. Thus, subsequent studies with longer and more frequent follow-ups are warranted. Furthermore, although we evaluated an extensive set of characteristics as potential predictors, other variables that have been shown to be associated with HRQOL in other studies, such as weight and physical activity [7, 40] were not collected at baseline in our study. Additionally, we had limited ability to detect weak associations due to our sample size. Lastly, we may not have been able to capture ovarian cancer-specific HRQOL concerns because the SF-36 is not a disease specific instrument.

However, the SF-36 is widely used and facilitated the comparison of HRQOL in our study sample to other populations of cancer survivors and healthy adults.

Overall, this sample of ovarian cancer survivors one-year post-diagnosis had HRQOL similar to that of age-matched, female, general US population. We identified several characteristics associated with lower physical and mental functioning that could be used to identify individuals that are at risk for low or declining HRQOL. Symptom burden and disease recurrence emerged as important indicators in our population, as they were associated with not only baseline HRQOL, but also changes in physical HRQOL from one- to two-years post-diagnosis. Information on symptom burden and disease recurrence status would be available in clinical settings. These data could be used to identify individuals at risk for low or declining physical functioning for interventions to improve HRQOL. Despite the overall generally high HRQOL in this sample, our results suggest that interventions targeted to women undergoing treatment for recurrence or that address lingering symptoms, could be useful in addressing HRQOL disparities across these characteristics among ovarian cancer survivors at one-year after diagnosis and primary treatment.

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References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. *CA Cancer J Clin.* 2016; 66(1):7–30. [PubMed: 26742998]
2. Khanna D, Tsevat J. Health-related quality of life--an introduction. *Am J Manag Care.* 2007; 13(Suppl 9):S218–23. [PubMed: 18095785]
3. McCorkle R, et al. Effects of a nursing intervention on quality of life outcomes in post-surgical women with gynecological cancers. *Psychooncology.* 2009; 18(1):62–70. [PubMed: 18570223]
4. Greimel E, Daghofer F, Petru E. Prospective assessment of quality of life in long-term ovarian cancer survivors. *Int J Cancer.* 2011; 128(12):3005–11. [PubMed: 20824713]
5. von Gruenigen VE, et al. Longitudinal assessment of quality of life and lifestyle in newly diagnosed ovarian cancer patients: the roles of surgery and chemotherapy. *Gynecol Oncol.* 2006; 103(1):120–6. [PubMed: 16556458]
6. Holzner B, et al. Fatigue in ovarian carcinoma patients: a neglected issue? *Cancer.* 2003; 97(6): 1564–72. [PubMed: 12627522]
7. Gil KM, et al. Baseline characteristics influencing quality of life in women undergoing gynecologic oncology surgery. *Health Qual Life Outcomes.* 2007; 5:25. [PubMed: 17509145]
8. Schulman-Green D, et al. Quality of life among women after surgery for ovarian cancer. *Palliat Support Care.* 2008; 6(3):239–47. [PubMed: 18662417]
9. Matulonis UA, et al. Long-term adjustment of early-stage ovarian cancer survivors. *Int J Gynecol Cancer.* 2008; 18(6):1183–93. [PubMed: 18217977]

10. Wenzel LB, et al. Resilience, reflection, and residual stress in ovarian cancer survivorship: a gynecologic oncology group study. *Psychooncology*. 2002; 11(2):142–53. [PubMed: 11921330]
11. Kornblith AB, et al. Long-term adjustment of survivors of ovarian cancer treated for advanced-stage disease. *J Psychosoc Oncol*. 2010; 28(5):451–69. [PubMed: 20730659]
12. Sandadi S, et al. The effect of sleep disturbance on quality of life in women with ovarian cancer. *Gynecol Oncol*. 2011; 123(2):351–5. [PubMed: 21855973]
13. Gonzalez-Martin AJ, et al. Randomized phase II trial of carboplatin versus paclitaxel and carboplatin in platinum-sensitive recurrent advanced ovarian carcinoma: a GEICO (Grupo Espanol de Investigacion en Cancer de Ovario) study. *Ann Oncol*. 2005; 16(5):749–55. [PubMed: 15817604]
14. Frost MH, et al. Spiritual Well-Being and Quality of Life of Women with Ovarian Cancer and Their Spouses. *J Support Oncol*. 2011
15. Rannestad T, Skjeldestad FE. Pain and quality of life among long-term gynecological cancer survivors: a population-based case-control study. *Acta Obstet Gynecol Scand*. 2007; 86(12):1510–6. [PubMed: 18027118]
16. Awadalla AW, et al. Factors associated with quality of life of outpatients with breast cancer and gynecologic cancers and their family caregivers: a controlled study. *BMC Cancer*. 2007; 7:102. [PubMed: 17578579]
17. Hodgkinson K, et al. Long-term survival from gynecologic cancer: psychosocial outcomes, supportive care needs and positive outcomes. *Gynecol Oncol*. 2007; 104(2):381–9. [PubMed: 17027072]
18. Lutgendorf SK, et al. Quality of life and mood in women with gynecologic cancer: a one year prospective study. *Cancer*. 2002; 94(1):131–40. [PubMed: 11815969]
19. Lutgendorf SK, et al. Quality of life and mood in women receiving extensive chemotherapy for gynecologic cancer. *Cancer*. 2000; 89(6):1402–11. [PubMed: 11002237]
20. Bifulco G, et al. Quality of life, lifestyle behavior and employment experience: A comparison between young and midlife survivors of gynecology early stage cancers. *Gynecol Oncol*. 2012; 124(3):444–51. [PubMed: 22119994]
21. Robinson KM, et al. Diagnostic delay, quality of life and patient satisfaction among women diagnosed with endometrial or ovarian cancer: a nationwide Danish study. *Qual Life Res*. 2011
22. Greimel E, et al. Prospective assessment of quality of life of female cancer patients. *Gynecol Oncol*. 2002; 85(1):140–7. [PubMed: 11925134]
23. Sekse RJ, Hufthammer KO, Vika ME. Fatigue and quality of life in women treated for various types of gynaecological cancers: a cross-sectional study. *J Clin Nurs*. 2014
24. Mirabeau-Beale KL, et al. Comparison of the quality of life of early and advanced stage ovarian cancer survivors. *Gynecol Oncol*. 2009; 114(2):353–9. [PubMed: 19481244]
25. Stewart DE, et al. “What doesn’t kill you makes you stronger”: an ovarian cancer survivor survey. *Gynecol Oncol*. 2001; 83(3):537–42. [PubMed: 11733968]
26. Liavaag AH, et al. Morbidity associated with “self-rated health” in epithelial ovarian cancer survivors. *BMC Cancer*. 2009; 9:2. [PubMed: 19121203]
27. von Gruenigen VE, et al. Assessment of factors that contribute to decreased quality of life in Gynecologic Oncology Group ovarian cancer trials. *Cancer*. 2009; 115(20):4857–64. [PubMed: 19691091]
28. Bezjak A, et al. Quality of life in ovarian cancer patients: comparison of paclitaxel plus cisplatin, with cyclophosphamide plus cisplatin in a randomized study. *J Clin Oncol*. 2004; 22(22):4595–603. [PubMed: 15466785]
29. Clevenger L, et al. Sleep disturbance, distress, and quality of life in ovarian cancer patients during the first year after diagnosis. *Cancer*. 2013; 119(17):3234–41. [PubMed: 23797955]
30. Smith T, et al. The rationale, design, and implementation of the American Cancer Society’s studies of cancer survivors. *Cancer*. 2007; 109(1):1–12. [PubMed: 17146781]
31. Stein KD, et al. Validation of a modified Rotterdam Symptom Checklist for use with cancer patients in the United States. *J Pain Symptom Manage*. 2003; 26(5):975–89. [PubMed: 14585549]

32. Ware, JEaKM, Jr. SF-36 Physical & Mental Health Summary Scales: A Manual for Users of Version 1. 2. Lincoln, RI: QualityMetric Incorporated; 2001.
33. Cohen J. A power primer. *Psychol Bull.* 1992; 112(1):155–9. [PubMed: 19565683]
34. Kornblith AB, et al. Quality of life of women with ovarian cancer. *Gynecol Oncol.* 1995; 59(2): 231–42. [PubMed: 7590479]
35. Casso D, Buist DS, Taplin S. Quality of life of 5-10 year breast cancer survivors diagnosed between age 40 and 49. *Health Qual Life Outcomes.* 2004; 2:25. [PubMed: 15149547]
36. Kim SI, et al. Quality of life and sexuality comparison between sexually active ovarian cancer survivors and healthy women. *J Gynecol Oncol.* 2015; 26(2):148–54. [PubMed: 25686396]
37. Monk BJ, et al. Patient reported outcomes of a randomized, placebo-controlled trial of bevacizumab in the front-line treatment of ovarian cancer: a Gynecologic Oncology Group Study. *Gynecol Oncol.* 2013; 128(3):573–8. [PubMed: 23219660]
38. Lazenby M, McCorkle R, Fitch M. Interdisciplinary programmatic approaches to comprehensive distress screening for implementing the quality care standard of whole-patient care. *Palliat Support Care.* 2014; 12(1):1–4. [PubMed: 23915975]
39. McCorkle R, et al. An Advanced Practice Nurse Coordinated Multidisciplinary Intervention for Patients with Late-Stage Cancer: A Cluster Randomized Trial. *J Palliat Med.* 2015; 18(11):962–9. [PubMed: 26305992]
40. Zhou, Y.; G, L.; Cartmel, B.; Li, F.; Ercolano, EA.; Harrigan, M.; McCorkle, R.; Ligibel, JA.; Von Gruenigen, VE.; Gogoi, R.; Schwartz, PE.; Risch, HA.; Irwin, ML. Randomized trial of exercise on quality of life and fatigue in women diagnosed with ovarian cancer: The Women's Activity and Lifestyle Study in Connecticut (WALC). American Society of Clinical Oncology Annual Meeting; Chicago, IL: Journal of Clinical Oncology; 2015.

Highlights

- Physical and Mental health related quality of life of ovarian cancer survivors 1 year post-diagnosis similar to general population
- Lower physical HRQOL is associated with several variables that could be useful to inform interventions to improve HRQOL

Table 1

SF-36 Scores at 1 year post-diagnosis, 2 years post-diagnosis and change in SF-36 scores from 1 to 2 years post-diagnosis of ovarian cancer survivors in the ACS Study of Cancer Survivors-I

	Baseline Sample		Change Analysis Sample	
	1 year post-diagnosis SF-36 Scores Mean ($\pm$ SD) N=365	1 year post-diagnosis SF-36 Scores Mean ($\pm$ SD) N=284	2 years post-diagnosis SF-36 Scores Mean ($\pm$ SD) N=284	Change in SF-36 Scores Mean ($\pm$ SD) N=284
SF-36 Summary Scores				
Mental Component	49.37 (11.59)	50.23 (10.83)	49.77 (10.93)	- 0.46 (8.30)
Physical Component	45.96 (10.89)	46.91 (10.45)	45.56 (11.04)	-1.35 (9.04) ^a
SF-36 Subscales				
Mental Health	49.53 (10.40)	50.01 (9.96)	50.11 (9.97)	0.09 (7.36)
Social	48.21 (10.55)	49.34 (9.73)	48.29 (10.28)	-1.05 (9.08)
Vitality	48.60 (11.15)	49.75 (10.78)	48.98 (11.12)	-0.77 (7.98)
Roles (emotional)	46.47 (12.51)	47.68 (11.70)	46.51 (12.44)	-1.17 (11.00)
Physical	44.82 (10.81)	46.05 (10.15)	45.26 (10.43)	-0.80 (8.09)
Bodily Pain	50.21 (10.54)	50.78 (10.52)	49.54 (10.81)	-1.25 (9.77) ^a
Roles (physical)	44.09 (11.87)	45.01 (11.72)	43.97 (12.27)	-1.05 (11.33)
General	47.65 (9.78)	48.58 (9.60)	46.83 (10.78)	-1.75 (7.30) ^b

Abbreviations: ACS: American Cancer Society; SD, Standard Deviation

^a Change significantly different from 0 (T-test, P<0.05)

^b Change significantly different from 0 (T-test, P<0.0001)

Table 2
Unadjusted and adjusted associations between demographic and clinical characteristics and SF-36 PCS and MCS at 1 year post-

Variable	N ^a	SF-36 Physical Component Summary Score			SF-36 Mental Component Summary Score		
		Univariate Mean/ β -estimate $\pm$ SE	P-value/P for trend	Multivariate Mean/ β -estimate $\pm$ SE	P-value/P for trend	Multivariate Mean/ β -estimate $\pm$ SE	P-value/P for trend
Age at Diagnosis			<0.0001		0.0126		<0.0001
Less than 55 years	186	48.77 $\pm$ 0.77		46.40 $\pm$ 0.81		45.81 $\pm$ 0.81	39.47 $\pm$ 1.18
55 years or greater	179	43.05 $\pm$ 0.79		43.71 $\pm$ 0.80		53.07 $\pm$ 0.82	45.84 $\pm$ 1.32
Time Since Diagnosis, months	365	0.098 $\pm$ 0.14 ^b	0.4971	-		-0.15 $\pm$ 0.15 ^b	-
Race/Ethnicity			0.0153				0.3368
Non-Hispanic White	330	46.41 $\pm$ 0.60		-		49.17 $\pm$ 0.64	0.3290
Other	35	41.73 $\pm$ 1.83		-		51.19 $\pm$ 1.96	-
Education			0.0009				0.9338
Some High School (Grade 9-12)	32	41.45 $\pm$ 1.90		-		48.36 $\pm$ 2.04	-
High School Diploma or GED	111	44.64 $\pm$ 1.02		-		51.17 $\pm$ 1.09	-
Vocational School or Some College	153	46.66 $\pm$ 0.87		-		48.44 $\pm$ 0.93	-
Professional or Graduate School Experience	64	48.73 $\pm$ 1.34		-		49.48 $\pm$ 1.44	-
Marital Status			0.0034				0.6534
Married or Living as Married	235	47.21 $\pm$ 0.70		-		49.22 $\pm$ 0.75	-
Single/Divorced/Separated or Widowed	129	43.73 $\pm$ 0.95		-		49.79 $\pm$ 1.02	-
Health Insurance			0.9715				0.1024
Have Insurance	356	46.00 $\pm$ 0.58		-		49.45 $\pm$ 0.61	-
Do not have Insurance	7	46.15 $\pm$ 4.11		-		42.22 $\pm$ 4.37	-
Household Income			<0.0001				0.9656
\$19,999 or Less	48	40.71 $\pm$ 1.52		43.11 $\pm$ 1.32	0.0031	48.65 $\pm$ 1.70	-
\$20,000-\$39,999	84	43.41 $\pm$ 1.15		44.09 $\pm$ 0.98		49.44 $\pm$ 1.28	-
\$40,000-\$74,999	104	45.88 $\pm$ 1.03		45.11 $\pm$ 0.93		48.34 $\pm$ 1.15	-
\$75,000 or More	75	50.55 $\pm$ 1.21		47.91 $\pm$ 1.07		49.12 $\pm$ 1.36	-
Employment Status							
Paid Employment	172	49.83 $\pm$ 0.77		-		48.80 $\pm$ 0.88	-

Variable	N ^a	SF-36 Physical Component Summary Score			SF-36 Mental Component Summary Score		
		Univariate Mean/ β -estimate $\pm$ SE	P-value/P for trend	Multivariate Mean/ β -estimate $\pm$ SE	P-value/P for trend	Multivariate Mean/ β -estimate $\pm$ SE	P-value/P for trend
No Paid Employment	21	49.59 $\pm$ 2.18	0.9157 ^c	-	45.07 $\pm$ 2.52	0.1647 ^c	-
On leave or Unemployed because of Disability	34	36.53 $\pm$ 1.71	<0.0001 ^c	-	46.10 $\pm$ 1.98	0.2158 ^c	-
Retired or Homemaker	114	43.07 $\pm$ 0.93	<0.0001 ^c	-	51.92 $\pm$ 1.08	0.0262 ^c	-
Cancer Stage (SEER Stage)							0.0324
Localized	100	49.95 $\pm$ 1.05	<0.0001	46.51 $\pm$ 0.99	0.0038	40.26 $\pm$ 1.37	
Regional	73	47.53 $\pm$ 1.23		45.84 $\pm$ 1.14		44.63 $\pm$ 1.54	
Distant	184	42.99 $\pm$ 0.78		42.82 $\pm$ 0.76		43.08 $\pm$ 1.23	
Initial Chemotherapy			0.0075				0.0012
Did not receive Chemotherapy	27	51.42 $\pm$ 2.09		-	42.13 $\pm$ 2.19	39.37 $\pm$ 1.96	
Received Chemotherapy	330	45.57 $\pm$ 0.60		-	50.13 $\pm$ 0.63	45.94 $\pm$ 0.86	
Initial Radiation			0.0718				0.1727
Did not receive Radiation	282	46.55 $\pm$ 0.65		-	49.10 $\pm$ 0.69		
Received Radiation	75	43.98 $\pm$ 1.26		-	51.15 $\pm$ 1.33		
Comorbid Conditions			<0.0001				0.4838
None	208	48.74 $\pm$ 0.71		47.36 $\pm$ 0.74	0.0002	49.60 $\pm$ 0.81	
One	88	44.90 $\pm$ 1.09		45.71 $\pm$ 1.02		49.41 $\pm$ 1.24	
Two or more	68	38.74 $\pm$ 1.24		42.10 $\pm$ 1.18		48.46 $\pm$ 1.41	
Mental Health Conditions			0.4702				<0.0001
Depression/Anxiety/Other Mental Health Issue	44	44.93 $\pm$ 1.64		-	37.97 $\pm$ 1.63	37.31 $\pm$ 1.65	
None	317	46.20 $\pm$ 0.61		-	51.04 $\pm$ 0.61	48.00 $\pm$ 1.05	
RSCL-M Score			<0.0001				<0.0001
30 < Score 37	92	54.90 $\pm$ 0.93		52.15 $\pm$ 1.12	<0.0001	48.91 $\pm$ 1.38	
37 < Score 43	85	48.10 $\pm$ 0.97		46.78 $\pm$ 1.05		44.07 $\pm$ 1.48	
43 < Score 51	92	43.48 $\pm$ 0.93		43.65 $\pm$ 1.04		40.04 $\pm$ 1.43	
51 < Score 88	80	37.30 $\pm$ 1.00		37.64 $\pm$ 1.04		37.59 $\pm$ 1.50	

Abbreviations: SE: Standard Error; RSCL-M: Modified Rotterdam Symptom Checklist

^aMay not sum to 365 due to missing covariate data

β estimate for time from diagnosis to completion of the baseline survey (approximately 1-year post-diagnosis)
 η
 P -value for the category compared to Paid employment

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Table 3

Unadjusted and adjusted correlations between demographic and clinical characteristics and Change in SF-36 Physical Component Summary scores from 1 year to 2 years post-diagnosis (N=284)

Variable	N ^a	Change in SF-36 Physical Component Summary Score		
		Univariate Mean/ β -estimate/ SE	P-value/ <i>P</i> for trend	Multivariate ^b Mean/ β -estimate/ $\pm$ SE
Age at Diagnosis				
Less than 55 years	150	-1.86 $\pm$ 0.74	0.3090	-
55 years or greater	134	-0.77 $\pm$ 0.78		-
Race/Ethnicity			0.0701	
Non-Hispanic White	261	-1.64 $\pm$ 0.56		-
Other	23	1.93 $\pm$ 1.88		-
Education			0.9406	
Some High School (Grade9-12)	20	-1.71 $\pm$ 2.04		-
High School Diploma or GED	86	-0.65 $\pm$ 0.98		-
Vocational School or Some College	119	-1.84 $\pm$ 0.84		-
Professional or Graduate School Experience	55	-1.14 $\pm$ 1.23		-
Marital Status			0.0014	
Married or Living as Married	191	-2.55 $\pm$ 0.65		-
Single/Divorced/Separated or Widowed	92	1.10 $\pm$ 0.93		-
Health Insurance			0.8965	
Have Insurance	276	-1.43 $\pm$ 0.54		-
Do not have Insurance	6	-1.92 $\pm$ 3.68		-
Household Income			0.0843	
\$19,999 or Less	31	1.33 $\pm$ 1.67		-
\$20,000-\$39,999	65	-1.27 $\pm$ 1.15		-
\$40,000-\$74,999	81	-1.77 $\pm$ 1.03		-
\$75,000 or More	63	-2.15 $\pm$ 1.17		-
Employment Status				
Paid Employment	143	-0.85 $\pm$ 0.74		-
No Paid Employment	19	-4.91 $\pm$ 2.03	0.0619 ^c	-

Variable	N ^a	Change in SF-36 Physical Component Summary Score			P-value/P for trend	Multivariate ^b Mean β -estimate $\pm$ SE	P-value/P for trend
		Univariate Mean β -estimate, $\pm$ SE					
On leave or Unemployed because of Disability	25	0.56 $\pm$ 1.78		0.4618 ^c		-	
Retired or Homemaker	82	-1.46 $\pm$ 0.98		0.6197 ^c		-	
Cancer Stage (SEER Stage)				0.4172			
Localised	84	-0.93 $\pm$ 1.00				-	
Regional	62	-0.83 $\pm$ 1.16				-	
Distant	131	-1.97 $\pm$ 0.80				-	
Disease Recurrence between 1 and 2 years post-diagnosis				<0.0001			0.0003
Recurred	74	-6.19 $\pm$ 1.04				-4.33 $\pm$ 0.86	
Did not recur	167	0.50 $\pm$ 0.68				-0.46 $\pm$ 0.57	
Received chemotherapy between diagnosis and 1 year post-diagnosis				0.9944			
Did not receive	18	-1.42 $\pm$ 2.14				-	
Received	260	-1.40 $\pm$ 0.56				-	
Received radiation between diagnosis and 1 year post-diagnosis				0.5773			
Did not receive	220	-1.56 $\pm$ 0.61				-	
Received	58	-0.81 $\pm$ 1.19				-	
Received treatment between 1 to 2 years post-diagnosis				<0.0001			
Did not receive	166	0.66 $\pm$ 0.68				-	
Received	118	-4.17 $\pm$ 0.81				-	
Comorbid Conditions				0.0911			
None	169	-1.55 $\pm$ 0.69				-	
One	66	-2.53 $\pm$ 1.11				-	
Two or more	48	0.95 $\pm$ 1.30				-	
Change in Comorbid conditions from 1 to 2 years post-diagnosis				0.5620		-	
	283	-0.44 $\pm$ 0.76 ^d				-	
Mental Health Conditions				0.4758			
Depression/Anxiety/Other Mental Health Issue	25	-2.58 $\pm$ 1.81				-	
None	258	-1.22 $\pm$ 0.56				-	
RSCL-M at 1 year Post-Diagnosis				0.0062			<0.0001
30 Score	81	-2.97 $\pm$ 0.99				0.27 $\pm$ 0.99	
37 < Score	66	-1.71 $\pm$ 1.10				-0.85 $\pm$ 0.96	

Variable	N ^a	Change in SF-36 Physical Component Summary Score		
		Univariate Mean/ β -estimate SE	P-value/P for trend	Multivariate ^b Mean/ β -estimate $\pm$ SE
43 < Score	51	-1.22 $\pm$ 1.04		-4.26 $\pm$ 0.91
51 < Score	88	1.41 $\pm$ 1.21		-4.77 $\pm$ 1.20
Change in RSCL-M from 1 to 2 years post-diagnosis	275	-0.55 $\pm$ 0.06 ^e	<0.0001	-0.54 $\pm$ 0.06 ^d

Abbreviations: RSCL-M, Modified Rotterdam Symptom Checklist; SE, Standard Error

^aMay not sum to 284 due to missing covariate data

^bMultivariate model includes: recurrence between 1 to 2 years post-diagnosis, RSCL-M at 1 year post-diagnosis, change in RSCL-M between 1 to 2 years post-diagnosis and SF-36 physical component score at 1 year post-diagnosis

^cP-value for the category compared to Paid employment

^d β Estimate for change in number of comorbid conditions reported from 1 to 2 years post-diagnosis

^e β Estimate for change in symptom burden from 1 to 2 years post-diagnosis