Journal of Geriatric Oncology 9 (2018) 194–203

Contents lists available at ScienceDirect

Journal of Geriatric Oncology

# Healthcare experience among older cancer survivors: Analysis of the SEER-CAHPS dataset☆

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ARTICLE INFO

*Article history:*
Received 18 April 2017
Received in revised form 29 July 2017
Accepted 9 November 2017
Available online 15 December 2017

*Keywords:*
Cancer
SEER
Medicare
Survivors
Patient satisfaction
CAHPS

ABSTRACT

*Objective:* Little is known about factors affecting medical care experiences of cancer survivors. This study examined experience of care among cancer survivors and assessed associations of survivors' characteristics with their experience.

*Materials and Methods:* We used a newly-developed, unique data resource, SEER-CAHPS (NCI's Surveillance Epidemiology and End Results [SEER] data linked to Medicare Consumer Assessment of Healthcare Providers and Systems [CAHPS] survey responses), to examine experiences of care among breast, colorectal, lung, and prostate cancer survivors age >66 years who completed CAHPS >1 year after cancer diagnosis and survived ≥1 year after survey completion. Experience of care was assessed by survivor-provided scores for overall care, health plan, physicians, customer service, doctor communication, and aspects of care. Multivariable logistic regression models assessed associations of survivors' sociodemographic and clinical characteristics with care experience.

*Results:* Among 19,455 cancer survivors with SEER-CAHPS data, higher self-reported general-health status was significantly associated with better care experiences for breast, colorectal, and prostate cancer survivors. In contrast, better mental-health status was associated with better care experience for lung cancer survivors. College-educated and Asian survivors were less likely to indicate high scores for care experiences. Few differences in survivors' experiences were observed by sex or years since diagnosis.

*Conclusions:* The SEER-CAHPS data resources allows assessment of factors influencing experience of cancer among U.S. cancer survivors. Higher self-reported health status was associated with better experiences of care; other survivors' characteristics also predicted care experience. Interventions to improve cancer survivors' health status, such as increased access to supportive care services, may improve experience of care.



## 1. Introduction

As of January 2016, there were approximately 15.5 million cancer survivors in the United States; this will grow to 20 million by 2026 [1]. Approximately three-quarters of cancer survivors are age 60 or older, and almost one-half are age 70 or older [1]. Cancer survivors have unique post-treatment needs, including surveillance for tumor recurrence and development of other cancers; treatment of chronic/late-occurring effects due to cancer or cancer treatment; and increased needs for preventive care and health promotion [2]. Cancer survivors also frequently experience needs for a range of psychosocial services [3]. Symptoms experienced among cancer survivors and their effects vary based on cancer treatment, stage at diagnosis, sociodemographic characteristics, and health status [4].

There is limited data on factors affecting the experience of care among cancer survivors, particularly older survivors [5]. The experience of survivorship care may differ substantially in older versus younger survivors. Older survivors may demonstrate better psychosocial adaptation to cancer than do younger survivors [6]. However, older cancer survivors may also experience more rapid decline in functional status compared with younger survivors or with age-matched individuals in the general population [7], and older age may be a risk factor for cancer

☆ This research was funded by the National Cancer Institute, contract number HHSN261201000166U and HHSN261201500132U. All statements in this report, including its findings and conclusions, are solely those of the authors and do not necessarily represent the views of the Patient-Centered Outcomes Research Institute (PCORI), its Board of Governors or Methodology Committee, or the National Cancer Institute.

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https://doi.org/10.1016/j.jgo.2017.11.005
1879-4068/

treatment-related complications [8]. In addition, older survivors are more likely to have multiple chronic conditions, which may affect outcomes including quality of life and survival [9]. Almost 40% of older survivors have at least one on-going symptom due to cancer or cancer treatment [10]; older survivors with multiple chronic conditions are less resistant to decreases in physical functioning and are less likely to recover lost functional ability [11]. Overall, older survivors have unique needs, and their survivorship care should be tailored to these needs to enhance the experience of care [12].

SEER-CAHPS is a recently developed data resource linking patient-reported information from the Medicare Consumer Assessment of Healthcare Providers and Systems (M-CAHPS®) Survey with clinical information from NCI's Surveillance, Epidemiology, and End Results (SEER) Program [13,14]. This unique resource is the first dataset permitting examination of sociodemographic and clinical characteristics and experiences of care among large U.S. populations of individuals diagnosed with cancer, including cancer survivors. The objective of this study is to examine the experience of care for older cancer survivors—including experience with physicians, health plans, and other aspects of medical care—and assess associations of survivor characteristics with these experiences.

## 2. Materials and Methods

SEER-CAHPS contains information from Medicare beneficiaries who responded to the CAHPS survey and were diagnosed with their first recorded primary cancer while residing in SEER regions [13,14]. We used data from Medicare beneficiaries diagnosed with non-metastatic (stage I-III) breast, colorectal, lung, or prostate cancer in SEER regions who completed the CAHPS survey from 2000 to 2011. Males with breast cancer were excluded (N = 49). We included individuals who: (1) responded to an M-CAHPS survey at least once, at least one-year after cancer diagnosis (diagnosis dates 1988–2009); (2) survived for at least one-year after responding to the survey; and (3) were age 66 or older at survey completion (N = 19,455). Details regarding sample selection, administration, and response rates for the M-CAHPS are presented elsewhere [15–17].

Responses to four M-CAHPS global ratings were included in this study: overall care, health plan, primary physician, and specialist physician. Each measure was rated on a 0–10 scale, with zero representing the lowest rating. M-CAHPS responses also included patient reports on five composite, multi-item measures: *customer service, doctor communication, getting care quickly, getting needed care, and getting needed prescription drugs*. Each composite measure was scored 0–100. Appendix Table 1 presents descriptive statistics for each CAHPS measure.

Similar to previous CAHPS analysis [18], because global ratings were very negatively skewed, with most responses at the extreme upper end of scales, we classified global ratings (scored 0–10) as indicating "high" experiences of care if responses were 9 or 10. The multi-item composite scores (scored 0–100) exhibited ceiling effects and few respondents provided scores between 90 and 100; we classified survivors' reports on composite measures to indicate "high" care experiences for responses of 100. Previous studies have also dichotomized CAHPS ratings or reports, defining the upper scores as "high" [19–21]. Use of the term "high" to classify upper-end scores does not imply that M-CAHPS participants judged their experience of care as high compared with other experiences of care. Details regarding these measures are presented elsewhere [22,23]. Additional information on M-CAHPS is at https://cahps.ahrq.gov/surveys-guidance/hp/about/Medicares-CAHPS-HP-Survey.html.

We examined associations of survivor characteristics with high scores for experience of care using multivariable logistic regression analyses, with separate models for each of the four global and five composite measures. Dependent variables were specified as high/not high for each measure. Sociodemographic independent variables (with reference categories listed first) were: sex (female/male, for colorectal and lung cancer survivors only); race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Non-Hispanic Asian, Hispanic, or other); education (less than high school, high school, some college, or college graduate); Medicare plan type (managed-care vs. fee-for-service); and age at completion of CAHPS survey (66–74, 75–79, 80–84, or 85 +).

Survivors' health status was controlled for using self-reported general health status (GHS) and mental health status (MHS) on a 5-point scale (poor, fair, good, very good, or excellent). In regression analyses, excellent and very good health status were combined due to infrequent excellent ratings for GHS. Previous studies of factors associated with CAHPS ratings generally use self-rated health status (GHS and MHS) to control for patient comorbidities. Studies using other survey instruments to capture information from cancer survivors on self-rated quality of care have also found that health status is a more relevant measure than comorbidities for this population [24].

In addition, we controlled for years since cancer diagnosis (1–2, more than 2 to 5, more than 5 years from cancer diagnosis to completion of CAHPS survey); stage at cancer diagnosis (1 vs. 2 vs. 3); geographic location (state of residence at diagnosis); number of primary cancers at diagnosis (single vs. multiple); and survey year (2000–2011). Regression analysis results for years since cancer diagnosis and stage at diagnosis are presented in Appendix Tables 2 and 3. All analyses were performed on unweighted data using SAS 9.4 (SAS Institute, Cary NC). Statistical significance was assessed at $p < 0.05$. As this study focused on hypothesis generation (i.e., identifying factors associated with experience of care among older cancer survivors), statistical significance was not corrected for multiple comparisons [25]. This study was classified as exempt by the RTI Institutional Review Board.

## 3. Results

### 3.1. Characteristics of Study Population

Table 1 presents characteristics of the study population by cancer type. Colorectal cancer survivors were the oldest group; prostate cancer survivors were the youngest and included the highest proportions of college graduates and Black and Hispanic individuals. Medicare fee-for-service (vs. managed care) status was similar across all groups.

The distribution of general health status (GHS) and mental health status (MHS) category among the study population are also presented in Table 1. For all cancer types, the proportion of survivors reporting excellent/very good GHS was less than the proportion reporting excellent/very good MHS. This was particularly evident for lung cancer survivors; 21.5% of this groups reported excellent/very good GHS while 58.5% indicated excellent/very good MHS. Pearson correlations coefficients between GHS and MHS by cancer type were: breast, 0.45; colorectal, 0.49; lung, 0.44; and prostate, 0.49 (data not shown).

Table 1 also presents the proportion of individuals in each survivor group indicating high scores for each CAHPS measure. Few large differences were observed across cancer types for a specific measure. The measure with the lowest proportion of high scores was Customer Service (51.9%), while the measures with the greatest proportion indicating high scores were Getting Needed Prescription Drugs (77.2%), Specialist Physician (73.3%), and Primary Physician (72.9%).

### 3.2. Association of GHS With High Scores for Experience of Care

Fig. 1 presents results from multivariable regression analyses examining associations of very good/excellent GHS with high scores for survivor's experience. The top graph (Fig. 1a) presents associations for global ratings; the bottom graph (Fig. 1b) presents associations for composite measures. Among all four survivor groups, those with very good/excellent general health status were significantly more likely to provide high ratings for all four global measures, except for specialist physician ratings among lung cancer survivors (Fig. 1a). Breast, colorectal, and prostate cancer survivors with very good/excellent general health status

**Table 1**
Characteristics of study population by cancer site[a].

| Percent of population | Breast (n = 8,261) | Colorectal (n = 4,231) | Lung (n = 1,096) | Prostate (n = 5,867) | All (n = 19,455) |
|---|---|---|---|---|---|
| Male | 0.0% | 46.8% | 46.6% | 100.0% | 43.0% |
| Age: | | | | | |
| 66–74 | 49.2% | 38.1% | 48.8% | 53.6% | 48.1% |
| 75–79 | 22.0% | 23.9% | 26.4% | 25.1% | 23.6% |
| 80–84 | 16.7% | 20.2% | 16.3% | 14.5% | 16.8% |
| 85+ | 12.1% | 17.8% | 8.5% | 6.9% | 11.6% |
| Education: | | | | | |
| <High School | 16.2% | 24.3% | 23.2% | 17.2% | 18.7% |
| High School Grad | 34.9% | 33.0% | 36.0% | 25.2% | 31.6% |
| Some College | 27.1% | 22.7% | 24.3% | 23.5% | 24.9% |
| College Grad | 21.8% | 20.0% | 16.5% | 34.1% | 24.8% |
| Race/ethnicity: | | | | | |
| Non-Hispanic White | 78.5% | 76.9% | 81.8% | 74.4% | 77.1% |
| Non-Hispanic Black | 5.8% | 6.6% | 5.5% | 10.2% | 7.3% |
| Non-Hispanic Asian | 6.4% | 7.2% | 6.4% | 5.1% | 6.2% |
| Hispanic | 6.0% | 6.4% | 3.7% | 7.4% | 6.4% |
| Other | 3.2% | 2.8% | 2.6% | 2.9% | 3.0% |
| Fee-for-service Medicare | 45.6% | 46.8% | 50.5% | 46.5% | 46.4% |
| AJCC stage: | | | | | |
| 1 | 63.2% | 38.0% | 72.3% | 4.0% | 40.3% |
| 2 | 32.7% | 37.2% | 7.4% | 73.5% | 44.5% |
| 3 | 4.2% | 24.9% | 20.4% | 22.5% | 15.1% |
| Years since diagnosis: | | | | | |
| 0–2 | 10.6% | 13.9% | 23.4% | 16.2% | 13.7% |
| 2–5 | 28.3% | 31.1% | 36.8% | 41.0% | 33.2% |
| 5+ | 61.1% | 55.1% | 39.8% | 42.8% | 53.1% |
| Year of CAHPS completion:[b] | | | | | |
| 2000 | 1.4% | 1.8% | 1.9% | 1.1% | 1.4% |
| 2001 | 5.2% | 6.8% | 5.3% | 3.3% | 5.0% |
| 2002 | 5.5% | 7.4% | 5.7% | 3.2% | 5.2% |
| 2003 | 7.3% | 7.4% | 5.9% | 4.5% | 6.4% |
| 2004 | 7.4% | 7.9% | 8.1% | 4.0% | 6.5% |
| 2006 | 3.4% | 3.2% | 3.0% | 2.2% | 3.0% |
| 2007 | 11.3% | 11.1% | 11.3% | 10.1% | 10.9% |
| 2008 | 13.5% | 13.1% | 13.1% | 14.6% | 13.7% |
| 2009 | 16.4% | 14.7% | 15.5% | 18.9% | 16.7% |
| 2010 | 15.6% | 14.6% | 14.7% | 19.1% | 16.4% |
| 2011 | 13.0% | 11.9% | 15.4% | 19.0% | 14.7% |
| GHS: | | | | | |
| Poor | 4.24% | 5.55% | 10.31% | 3.70% | 4.70% |
| Fair | 21.87% | 23.97% | 32.94% | 18.24% | 21.86% |
| Good | 41.97% | 39.99% | 35.22% | 38.47% | 40.10% |
| Very good/excellent | 31.92% | 30.49% | 21.53% | 39.59% | 33.34% |
| MHS: | | | | | |
| Poor | 1.21% | 1.68% | 1.82% | 1.40% | 1.40% |
| Fair | 7.46% | 9.36% | 10.58% | 6.08% | 7.63% |
| Good | 26.44% | 26.78% | 29.11% | 23.71% | 25.84% |
| Very good/excellent | 64.90% | 62.18% | 58.49% | 68.81% | 65.12% |
| Proportion with high scores for each measure | | | | | |
| Overall care | 66.1% | 65.9% | 60.8% | 60.6% | 64.1% |
| Health plan | 61.2% | 62.8% | 60.6% | 58.4% | 60.7% |
| Primary physician | 74.3% | 71.7% | 72.9% | 71.8% | 72.9% |
| Specialist physician | 74.3% | 74.5% | 73.9% | 70.9% | 73.3% |
| Customer service | 52.2% | 53.9% | 50.0% | 50.4% | 51.9% |
| Doctor communications | 56.7% | 56.4% | 55.7% | 58.1% | 57.0% |
| Get care quickly | 60.3% | 61.5% | 61.3% | 59.9% | 60.5% |
| Get needed care | 64.7% | 68.5% | 65.2% | 65.4% | 65.8% |
| Get needed prescription drugs | 77.3% | 78.0% | 77.0% | 76.6% | 77.2% |

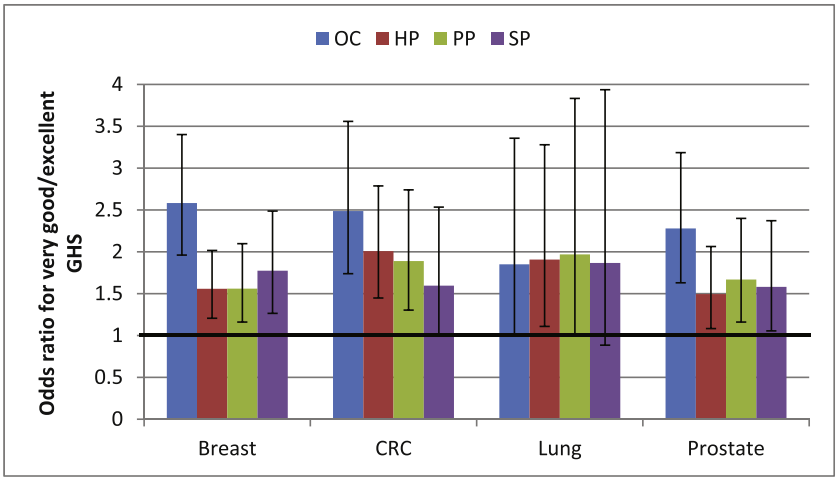
[a] AJCC: American Joint Committee on Cancer; GHS: general health status; MHS: mental health status.
[b] The Medicare CAHPS survey was not administered in 2005.

were also significantly more likely to indicate high scores for experience with almost all composite measures (Fig. 1b). However, among lung cancer survivors, very good/excellent GHS was significantly associated with high scores for only one composite measure (getting needed care).

### 3.3. Association of MHS With High Scores for Experience of Care

Fig. 2 presents results from multivariable regression analyses examining associations of very good/excellent MHS with high scores for experience of care. The top graph (Fig. 2a) presents associations for global ratings, while the bottom graph (Fig. 2b) presents associations for composite measures. Significant associations of MHS with the global ratings (Fig. 2a) were inconsistent for breast, colorectal, and prostate cancer survivors. However, among lung cancer survivors, all global ratings except health plan were significantly associated with very good/excellent MHS. Lung cancer survivors with very good/excellent MHS were six to seven times more likely to provide high ratings for overall care, primary physician, and specialist physician than were

(a) Global Ratings




(b) Composite Measures

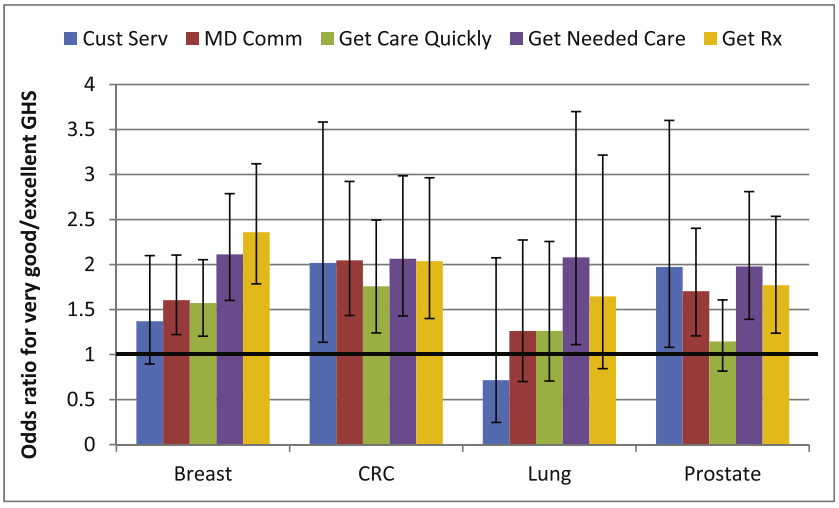



**Fig. 1.** Mean odds ratio and 95% confidence intervals of associations of very good/excellent general health status (GHS) with high scores for global ratings (2a) and composite measures (2b). Odds ratios determined by multivariable logistic regressions controlling for all variables listed in Table 1 as well as MHS, state of SEER registry, year of CAHPS survey, and presence of multiple cancers. OC = overall care, HP = health plan, PP = primary physician, SP = specialist physician, Cust Serv = customer service, MD Comm = doctor communications, Get Rx = get needed prescription drugs.

those with poor MHS. The magnitudes of the associations between lung cancer survivors' MHS and likelihood of high CAHPS ratings were larger than any other odds ratios in this study.

While very good/excellent GHS was associated with high composite measure scores among breast, colorectal, and prostate cancer survivors (Fig. 1b), there were no significant associations between very good/excellent MHS and high composite scores for colorectal and prostate cancer survivors (Fig. 2b). Very good/excellent MHS was significantly associated with high experience of care for two composite measures among breast cancer survivors and three measures among lung cancer survivors. As with the global measures (Fig. 2a), odds ratios for associations of very good/excellent MHS among lung cancer survivors with high CAHPS composite measure scores were notably large.

### 3.4. Association of Age With High Scores for Experience of Care

Table 2 presents results from multivariable regression analyses examining the association of survivor characteristics with provision of high scores for the global ratings, while Table 3 presents similar regression analysis results for the composite measures. Separate results are present by cancer site. Among breast, colorectal, and prostate cancer survivors, older age was associated with increased likelihood of high health plan rating (Table 2); older colorectal survivors were also more likely to indicated high ratings for specialist physician. In contrast, among prostate cancer survivors, older age was associated with decreased likelihood of high ratings for customer service and doctor communications (Table 3). There were no significant associations between age and high ratings among lung cancer survivors.

### 3.5. Association of Education and Sex With High Scores for Experience of Care

College graduate breast cancer survivors were significantly less likely to provide high ratings for all global measures and for doctor communications and getting needed care. Highly educated colorectal and prostate cancer survivors were also less likely to provide high ratings for health plan. Education was not significantly associated with high scores among lung cancer survivors.

Sex was included as a covariate in models of colorectal and lung cancer survivors. Among both these groups, men (vs. women) were

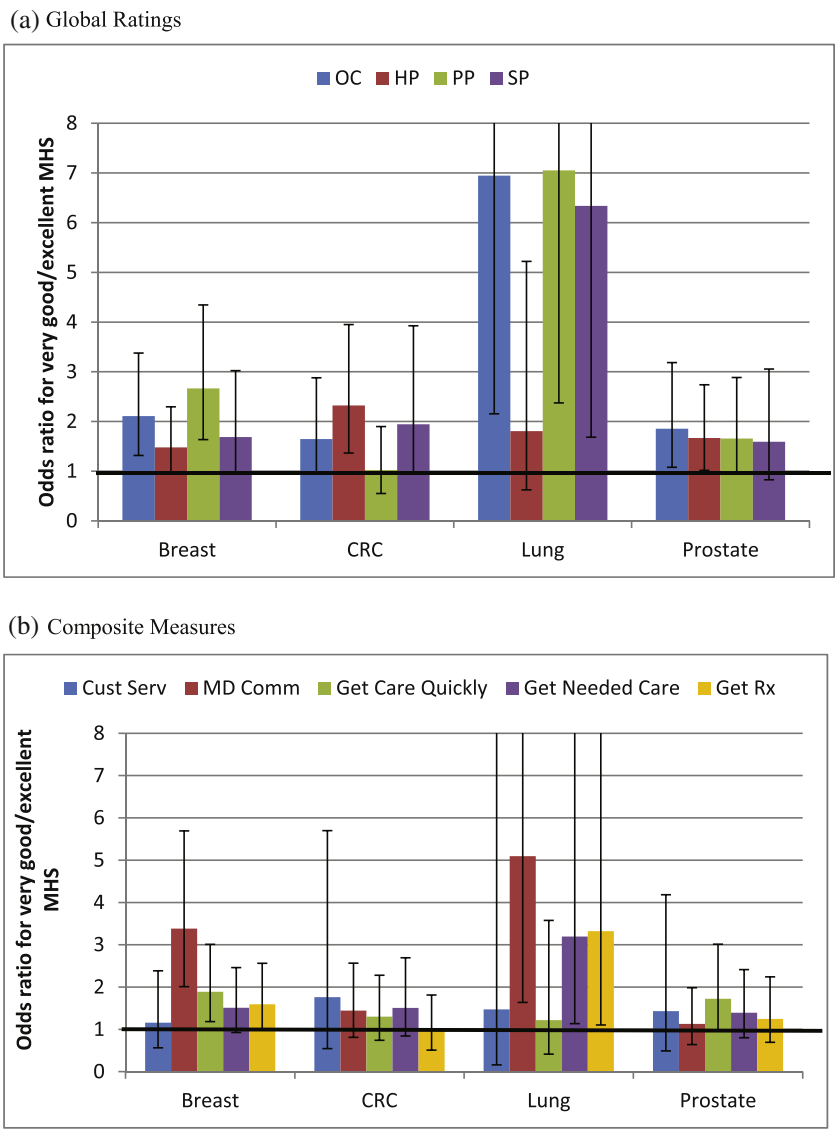



**Fig. 2.** Mean odds ratio and 95% confidence intervals of associations of very good/excellent mental health status (MHS) with high scores for global ratings (3a) and composite measures (3b). Odds ratios determined by multivariable logistic regressions controlling for all variables listed in Table 1 as well as GHS, state of SEER registry, year of CAHPS survey, and presence of multiple cancers. OC = overall care, HP = health plan, PP = primary physician, SP = specialist physician, Cust Serv = customer service, MD Comm = doctor communications, Get Rx = get needed prescription drugs.

significantly less likely to provide high ratings for two of the nine measures, health plan or primary physician.

### *3.6. Association of Race/ethnicity With High Scores for Experience of Care*

Asian survivors (compared with non-Hispanic White survivors) were less likely to indicate high scores for most composite measures among breast, colorectal, and prostate cancer survivors (Table 3); for two composite measures (getting care quickly and getting needed prescription drugs) among lung cancer survivors (Table 3); and for two global measures (overall care and specialist physician) among breast cancer survivors (Table 2). Compared to non-Hispanic Whites, Black breast cancer survivors were more likely to indicate high scores for experience with health plan and customer service, while Black colorectal cancer survivors were more likely to provide high ratings for their primary physician and Black prostate cancer survivors were more likely to provide high scores for health plan, customer service, and getting needed care. Results among Hispanic survivors were mixed. Hispanic breast cancer survivors were more likely to provide high ratings for health plan and getting needed care. Hispanic colorectal cancer survivors were more likely to provide high ratings for overall care and health plan. However, Hispanic colorectal cancer survivors (and Hispanic prostate cancer survivors) were less likely to provide high scores for getting care quickly and getting needed drugs (Table 3).

### *3.7. Association of Medicare Plan Type With High Scores for Experience of Care*

Among breast and prostate cancer survivors, having fee-for-service Medicare (vs. managed care) was associated with decreased likelihood of scoring customer service highly, but increased likelihood of high scores for getting needed prescription drugs. Breast cancer survivors with fee-for-service Medicare were also more likely to indicate high scores for access to care, getting care quickly and getting needed care.

## 4. Discussion

This is the first study to use data from SEER-CAHPS, a newly developed data resource, to examine associations of experience with health plans, physicians, and medical care with characteristics of older cancer

**Table 2**
Odds ratios (95% CI) from multivariable logistic regression analyses for associations with high global ratings.[a]

| | High rating for health plan | High rating overall | High rating for primary physician | High rating for specialist physician |
|---|---|---|---|---|
| Breast cancer survivors | | | | |
| N included in regression | 7,896 | 7,011 | 6,883 | 5,071 |
| Age (reference: 66–74) | | | | |
| 75–79 | **1.421 (1.26–1.603)** | **1.16 (1.015–1.325)** | 1.144 (0.991–1.321) | 1.139 (0.964–1.346) |
| 80–84 | **1.588 (1.386–1.819)** | **1.218 (1.049–1.414)** | **1.188 (1.013–1.394)** | 1.197 (0.986–1.453) |
| 85-up | **1.485 (1.273–1.733)** | 1.152 (0.973–1.364) | 1.18 (0.982–1.418) | 0.828 (0.665–1.029) |
| Education (reference: <High School Grad) | | | | |
| High School Grad | **0.515 (0.436–0.608)** | **0.742 (0.619–0.89)** | **0.622 (0.51–0.759)** | **0.603 (0.475–0.765)** |
| Some College | **0.808 (0.696–0.938)** | 0.997 (0.847–1.174) | **0.763 (0.639–0.911)** | 0.869 (0.695–1.086) |
| College Grad | **0.627 (0.536–0.734)** | **0.829 (0.698–0.984)** | **0.699 (0.58–0.844)** | **0.78 (0.62–0.982)** |
| Race (reference: non-Hispanic White) | | | | |
| Non-Hispanic Asian | 0.9 (0.722–1.124) | **0.491 (0.384–0.629)** | 0.781 (0.6–1.016) | **0.595 (0.438–0.807)** |
| Non-Hispanic Black | **1.262 (1.022–1.559)** | 0.919 (0.733–1.152) | 1.016 (0.792–1.303) | 0.993 (0.726–1.359) |
| Hispanic | **1.333 (1.072–1.657)** | 0.945 (0.746–1.197) | 1.037 (0.803–1.34) | 1.233 (0.892–1.705) |
| Other | 1.089 (0.824–1.439) | 0.858 (0.627–1.175) | 0.93 (0.665–1.3) | 0.981 (0.651–1.476) |
| Insurance (reference: Managed Care) | | | | |
| Fee-For-Service | 1.03 (0.932–1.137) | 1.084 (0.972–1.208) | 1.026 (0.91–1.155) | 1.096 (0.955–1.258) |
| Colorectal cancer survivors | | | | |
| N included in regression | 4,060 | 3,450 | 3,432 | 2,352 |
| Age (reference: 66–74) | | | | |
| 75–79 | 1.137 (0.959–1.348) | 1.093 (0.901–1.326) | 0.948 (0.777–1.157) | 0.998 (0.78–1.277) |
| 80–84 | **1.339 (1.113–1.61)** | 1.033 (0.841–1.27) | 0.978 (0.789–1.212) | 1.066 (0.815–1.393) |
| 85-up | **1.417 (1.164–1.725)** | 1.024 (0.823–1.274) | 1.021 (0.814–1.281) | 1.417 (1.044–1.923) |
| Education (reference: <High School Grad) | | | | |
| High School Grad | **0.621 (0.501–0.77)** | 0.845 (0.667–1.072) | 0.783 (0.611–1.004) | **0.699 (0.51–0.958)** |
| Some College | 0.927 (0.769–1.117) | 1.156 (0.939–1.424) | 1.041 (0.84–1.288) | 0.82 (0.617–1.09) |
| College Grad | **0.751 (0.612–0.922)** | 1.212 (0.963–1.525) | 1.016 (0.801–1.288) | 0.975 (0.713–1.334) |
| Race (reference: non-Hispanic White) | | | | |
| Non-Hispanic Asian | 0.863 (0.632–1.178) | 0.82 (0.58–1.161) | 0.825 (0.579–1.173) | 0.664 (0.427–1.034) |
| Non-Hispanic Black | 1.197 (0.902–1.589) | 0.864 (0.634–1.177) | **1.64 (1.14–2.36)** | 0.857 (0.545–1.349) |
| Hispanic | **1.742 (1.283–2.366)** | **1.495 (1.056–2.116)** | 1.358 (0.962–1.918) | 1.134 (0.734–1.754) |
| Other | 1.03 (0.678–1.564) | 1.172 (0.745–1.844) | 1.224 (0.746–2.008) | 0.907 (0.491–1.674) |
| Insurance (reference: Managed Care) | | | | |
| Fee-For-Service | 1.077 (0.936–1.239) | 1.112 (0.951–1.3) | 1.036 (0.879–1.221) | 1.123 (0.915–1.379) |
| Gender (reference: female) | | | | |
| Male | **0.825 (0.721–0.943)** | 0.864 (0.743–1.004) | **0.823 (0.704–0.963)** | 0.987 (0.81–1.201) |
| Lung cancer survivors | | | | |
| N included in regression | 1055 | 935 | 943 | 709 |
| Age (reference: 66–74) | | | | |
| 75–79 | 1.371 (0.99–1.898) | **1.483 (1.045–2.106)** | **1.685 (1.141–2.489)** | 0.98 (0.631–1.522) |
| 80–84 | 1.13 (0.769–1.661) | 1.155 (0.766–1.742) | **1.733 (1.095–2.743)** | 0.691 (0.407–1.173) |
| 85-up | 0.956 (0.581–1.574) | 1.242 (0.722–2.137) | 1.751 (0.96–3.192) | 0.713 (0.376–1.354) |
| Education (reference: <High School Grad) | | | | |
| High School Grad | **0.505 (0.323–0.79)** | 1.028 (0.634–1.665) | 1.15 (0.684–1.931) | 1.1 (0.601–2.015) |
| Some College | 1.025 (0.709–1.482) | 1.391 (0.935–2.07) | 1.396 (0.915–2.128) | 1.018 (0.603–1.718) |
| College Grad | 0.724 (0.486–1.08) | 1.004 (0.654–1.54) | 1.187 (0.749–1.881) | 0.742 (0.429–1.286) |
| Race (reference: non-Hispanic White) | | | | |
| Non-Hispanic Asian | 1.458 (0.765–2.779) | 0.709 (0.364–1.382) | 0.872 (0.436–1.743) | 0.638 (0.289–1.405) |
| Non-Hispanic Black | 0.97 (0.54–1.744) | 1.377 (0.709–2.677) | 1.513 (0.715–3.202) | 1.873 (0.696–5.04) |
| Hispanic | 0.822 (0.41–1.649) | 0.617 (0.286–1.33) | 1.536 (0.614–3.842) | 0.85 (0.315–2.296) |
| Other | 0.834 (0.358–1.939) | 1.649 (0.582–4.675) | 1.049 (0.371–2.962) | 0.829 (0.244–2.812) |
| Insurance (reference: Managed Care) | | | | |
| Fee-For-Service | 1.331 (0.996–1.778) | 1.242 (0.913–1.689) | 1.175 (0.834–1.654) | 1.102 (0.743–1.634) |
| Gender (reference: female) | | | | |
| Male | **0.722 (0.551–0.947)** | 0.778 (0.582–1.041) | **0.656 (0.476–0.904)** | 0.798 (0.549–1.16) |
| Prostate cancer survivors | | | | |
| N included in regression | 5642 | 5001 | 4807 | 3680 |
| Age (reference: 66–74) | | | | |
| 75–79 | **1.269 (1.112–1.448)** | 1.054 (0.914–1.217) | 1.059 (0.904–1.24) | 0.964 (0.808–1.152) |
| 80–84 | **1.627 (1.377–1.923)** | 1.061 (0.888–1.267) | 0.974 (0.805–1.179) | 0.959 (0.77–1.194) |
| 85-up | **1.453 (1.157–1.823)** | 1.003 (0.789–1.274) | 1.09 (0.837–1.419) | 0.945 (0.707–1.264) |
| Education (reference: <High School Grad) | | | | |
| High School Grad | **0.618 (0.516–0.74)** | 0.913 (0.752–1.11) | 0.876 (0.709–1.082) | 0.797 (0.618–1.027) |
| Some College | 0.963 (0.805–1.151) | 1.129 (0.929–1.372) | 0.949 (0.77–1.17) | 1.187 (0.909–1.548) |
| College Grad | **0.794 (0.66–0.956)** | 1.013 (0.829–1.238) | 0.895 (0.721–1.113) | 0.795 (0.612–1.033) |
| Race (reference: non-Hispanic White) | | | | |
| Non-Hispanic Asian | 0.88 (0.661–1.172) | 0.826 (0.606–1.126) | 0.917 (0.658–1.277) | 0.718 (0.497–1.038) |
| Non-Hispanic Black | **1.314 (1.077–1.601)** | **0.769 (0.622–0.95)** | 0.913 (0.724–1.151) | 0.934 (0.689–1.267) |
| Hispanic | 1.103 (0.873–1.392) | 0.938 (0.728–1.209) | 0.903 (0.691–1.179) | 1.194 (0.856–1.665) |
| Other | 1.298 (0.918–1.837) | 1.078 (0.746–1.556) | 1.219 (0.802–1.852) | 1.225 (0.762–1.968) |
| Insurance (reference: Managed Care) | | | | |
| Fee-For-Service | 1.008 (0.9–1.128) | 1.032 (0.914–1.165) | 0.972 (0.849–1.112) | 1.062 (0.912–1.237) |

[a] In addition to independent variables listed in this Table, regressions controlled for GHS, MHS, years from diagnosis to survey completion, AJCC stage at diagnosis, state of SEER registry, year of CAHPS survey, and presence of multiple cancers. Bold indicates significance at $p < 0.05$.

**Table 3**
Odds ratios (95% CI) from multivariable logistic regression analyses for association with high composite scores.[a]

| | High scores for customer service | High scores for doctor communications | High scores for getting care quickly | High scores for getting needed care | High scores for getting needed prescription drugs |
|---|---|---|---|---|---|
| Breast cancer survivors | | | | | |
| N included in regression | 2,410 | 6,692 | 6,703 | 6,783 | 7,452 |
| Age (reference: 66–74) | | | | | |
| 75–79 | 1.166 (0.944–1.439) | 0.964 (0.848–1.097) | 0.962 (0.846–1.094) | 1.098 (0.961–1.254) | 1.095 (0.948–1.264) |
| 80–84 | 1.169 (0.922–1.482) | 0.872 (0.757–1.005) | 1.017 (0.88–1.176) | **1.166 (1.003–1.356)** | **1.299 (1.101–1.533)** |
| 85-up | 1.152 (0.852–1.557) | 0.859 (0.729–1.012) | 0.924 (0.783–1.09) | 1.003 (0.842–1.195) | 1.106 (0.923–1.325) |
| Education (reference: <High School Grad) | | | | | |
| High School Grad | 0.725 (0.539–0.975) | **0.645 (0.54–0.77)** | **0.768 (0.642–0.918)** | **0.664 (0.552–0.799)** | 0.857 (0.709–1.036) |
| Some College | 1.042 (0.794–1.368) | **0.827 (0.707–0.968)** | 1.001 (0.852–1.176) | 1.05 (0.886–1.244) | **1.275 (1.074–1.513)** |
| College Grad | 0.87 (0.656–1.155) | **0.774 (0.655–0.914)** | 0.87 (0.735–1.031) | **0.749 (0.628–0.893)** | 0.961 (0.803–1.149) |
| Race (reference: non-Hispanic White) | | | | | |
| Non-Hispanic Asian | 0.884 (0.596–1.311) | **0.725 (0.566–0.927)** | **0.518 (0.404–0.665)** | **0.77 (0.602–0.984)** | **0.594 (0.46–0.768)** |
| Non-Hispanic Black | **1.73 (1.191–2.512)** | 1.069 (0.858–1.332) | 0.85 (0.68–1.063) | 1.236 (0.971–1.574) | 1.028 (0.81–1.304) |
| Hispanic | 0.963 (0.681–1.364) | 1.233 (0.978–1.555) | 1.007 (0.795–1.275) | **1.334 (1.039–1.711)** | 0.947 (0.742–1.208) |
| Other | 1.509 (0.905–2.515) | 0.874 (0.646–1.183) | **0.633 (0.468–0.856)** | 0.888 (0.649–1.215) | 0.758 (0.552–1.042) |
| Insurance (reference: Managed Care) | | | | | |
| Fee-For-Service | **0.799 (0.655–0.974)** | 1.05 (0.943–1.168) | **1.111 (1–1.235)** | **1.234 (1.106–1.378)** | **1.149 (1.022–1.293)** |
| Colorectal cancer survivors | | | | | |
| N included in regression | 1131 | 3333 | 3266 | 3373 | 3643 |
| Age (reference: 66–74) | | | | | |
| 75–79 | 0.986 (0.709–1.37) | 0.963 (0.8–1.159) | 0.992 (0.82–1.199) | 0.985 (0.808–1.202) | 0.959 (0.775–1.186) |
| 80–84 | 0.82 (0.581–1.159) | 0.908 (0.743–1.109) | 0.916 (0.749–1.12) | 0.988 (0.799–1.223) | 0.937 (0.748–1.173) |
| 85-up | 1.096 (0.746–1.61) | 0.98 (0.792–1.212) | 1.181 (0.947–1.472) | 1.024 (0.815–1.287) | 1.158 (0.907–1.479) |
| Education (reference: <High School Grad) | | | | | |
| High School Grad | 0.721 (0.475–1.094) | **0.778 (0.616–0.983)** | 0.797 (0.629–1.011) | **0.667 (0.522–0.854)** | 0.819 (0.634–1.058) |
| Some College | 1.389 (0.958–2.015) | 1.058 (0.867–1.292) | 0.945 (0.766–1.165) | 0.994 (0.797–1.239) | **1.389 (1.107–1.743)** |
| College Grad | 1.073 (0.721–1.596) | 0.996 (0.799–1.243) | 1.091 (0.865–1.375) | 0.814 (0.641–1.034) | 0.94 (0.736–1.202) |
| Race (reference: non-Hispanic White) | | | | | |
| Non-Hispanic Asian | **0.534 (0.311–0.917)** | **0.57 (0.405–0.801)** | **0.504 (0.356–0.714)** | **0.372 (0.263–0.528)** | **0.364 (0.259–0.512)** |
| Non-Hispanic Black | 1.244 (0.735–2.107) | 1.304 (0.958–1.775) | 0.755 (0.549–1.037) | 1.036 (0.74–1.45) | 0.914 (0.655–1.277) |
| Hispanic | 0.92 (0.553–1.531) | 1.095 (0.798–1.501) | **0.693 (0.505–0.951)** | 1.088 (0.774–1.529) | **0.689 (0.493–0.961)** |
| Other | **0.482 (0.236–0.981)** | 1.11 (0.712–1.73) | 0.721 (0.467–1.113) | 0.754 (0.473–1.203) | **0.615 (0.384–0.985)** |
| Insurance (reference: Managed Care) | | | | | |
| Fee-For-Service | 0.745 (0.552–1.006) | 1.068 (0.917–1.244) | 1.022 (0.876–1.192) | 1.104 (0.938–1.299) | 1.085 (0.913–1.289) |
| Gender (reference: female) | | | | | |
| Male | 1.025 (0.793–1.326) | 0.894 (0.773–1.035) | 0.899 (0.775–1.043) | 0.934 (0.8–1.092) | 1.132 (0.958–1.337) |
| Lung cancer survivors | | | | | |
| N included in regression | 312 | 910 | 907 | 918 | 987 |
| Age (reference: 66–74) | | | | | |
| 75–79 | 1.237 (0.66–2.319) | 1.165 (0.824–1.648) | 1.34 (0.951–1.888) | 1.237 (0.867–1.764) | 1.078 (0.726–1.6) |
| 80–84 | 1.555 (0.672–3.597) | 1.006 (0.668–1.514) | 1.177 (0.782–1.773) | 1.358 (0.868–2.124) | 1.421 (0.872–2.317) |
| 85-up | 0.567 (0.211–1.523) | 1.198 (0.712–2.017) | 1.576 (0.908–2.737) | 0.88 (0.516–1.499) | 1.296 (0.702–2.392) |
| Education (reference: <High School Grad) | | | | | |
| High School Grad | 0.456 (0.186–1.117) | 0.975 (0.604–1.574) | 0.738 (0.46–1.182) | 0.788 (0.483–1.284) | 0.944 (0.554–1.611) |
| Some College | 0.567 (0.27–1.192) | 1.016 (0.688–1.499) | 1.074 (0.724–1.592) | 0.945 (0.625–1.43) | 1.473 (0.952–2.279) |
| College Grad | 0.885 (0.399–1.96) | 0.859 (0.563–1.311) | 1.046 (0.685–1.598) | 0.739 (0.475–1.149) | 1.266 (0.786–2.04) |
| Race (reference: non-Hispanic White) | | | | | |
| Non-Hispanic Asian | 0.453 (0.115–1.783) | 0.563 (0.289–1.096) | **0.511 (0.261–0.999)** | 0.599 (0.315–1.139) | **0.31 (0.156–0.616)** |
| Non-Hispanic Black | 0.731 (0.268–1.995) | 1.381 (0.701–2.719) | 0.719 (0.371–1.393) | 1.05 (0.505–2.183) | 1.176 (0.563–2.458) |
| Hispanic | **0.196 (0.05–0.758)** | 0.959 (0.452–2.033) | 0.906 (0.424–1.934) | **0.457 (0.213–0.982)** | 0.796 (0.336–1.883) |
| Other | 4.154 (0.569–30.333) | 0.928 (0.369–2.336) | 1.668 (0.566–4.919) | 0.621 (0.227–1.695) | 1.064 (0.359–3.151) |
| Insurance (reference: Managed Care) | | | | | |
| Fee-For-Service | 0.793 (0.423–1.487) | 0.959 (0.705–1.303) | 0.902 (0.662–1.228) | 1.086 (0.791–1.49) | 1.357 (0.953–1.934) |
| Gender (reference: female) | | | | | |
| Male | 0.703 (0.414–1.193) | 0.851 (0.637–1.137) | 0.972 (0.727–1.301) | 1.007 (0.747–1.358) | 0.971 (0.696–1.353) |
| Prostate cancer survivors | | | | | |
| N included in regression | 1,583 | 4,684 | 4,771 | 4,756 | 5,137 |
| Age (reference: 66–74) | | | | | |
| 75–79 | **0.679 (0.529–0.872)** | **0.844 (0.73–0.976)** | 0.954 (0.826–1.102) | 0.941 (0.809–1.094) | 1.035 (0.881–1.217) |
| 80–84 | 0.847 (0.611–1.175) | **0.777 (0.651–0.928)** | 0.865 (0.725–1.032) | 1.016 (0.844–1.222) | 1.025 (0.84–1.251) |
| 85-up | **0.599 (0.391–0.918)** | **0.73 (0.573–0.93)** | 0.797 (0.624–1.016) | 0.888 (0.693–1.137) | 1.079 (0.821–1.419) |
| Education (reference: <High School Grad) | | | | | |
| High School Grad | **0.669 (0.48–0.933)** | 0.854 (0.702–1.04) | 1.059 (0.867–1.293) | 0.926 (0.749–1.145) | 0.9 (0.726–1.115) |
| Some College | 0.782 (0.557–1.099) | 0.864 (0.71–1.052) | 1.01 (0.827–1.234) | **1.246 (1.003–1.547)** | 1.037 (0.837–1.285) |
| College Grad | 0.785 (0.553–1.115) | 0.827 (0.675–1.013) | 0.988 (0.805–1.213) | 0.97 (0.78–1.206) | 1.011 (0.81–1.263) |
| Race (reference: non-Hispanic White) | | | | | |
| Non-Hispanic Asian | 0.868 (0.503–1.497) | **0.584 (0.424–0.803)** | **0.631 (0.457–0.872)** | **0.676 (0.487–0.939)** | **0.608 (0.435–0.848)** |
| Non-Hispanic Black | **1.584 (1.072–2.34)** | 1.066 (0.857–1.326) | 0.983 (0.786–1.228) | **1.283 (1.001–1.645)** | 0.998 (0.789–1.261) |
| Hispanic | 1.174 (0.789–1.746) | **0.775 (0.602–0.998)** | **0.72 (0.561–0.926)** | 0.937 (0.72–1.219) | **0.741 (0.57–0.963)** |

**Table 3** (*continued*)

| | High scores for customer service | High scores for doctor communications | High scores for getting care quickly | High scores for getting needed care | High scores for getting needed prescription drugs |
|---|---|---|---|---|---|
| Other | 0.999 (0.513–1.943) | 0.823 (0.57–1.188) | 0.737 (0.513–1.058) | 1.121 (0.763–1.648) | 0.949 (0.638–1.412) |
| Insurance (reference: Managed Care) | | | | | |
| Fee-For-Service | **0.665 (0.519–0.853)** | 1.02 (0.901–1.155) | 1.066 (0.943–1.204) | 1.125 (0.989–1.28) | **1.17 (1.02–1.342)** |

[a] In addition to independent variables listed in this Table, regressions controlled for GHS, MHS, years from diagnosis to survey completion, AJCC stage at diagnosis, state of SEER registry, year of CAHPS survey, and presence of multiple cancers. Bold indicates significance at $p < 0.05$.

survivors. In this population, self-reported health status is strongly associated with experience of care. Overall, we found that more than 50% of older cancer survivors provided high scores for each CAHPS measure. However, breast, colorectal, lung, and prostate cancer survivors with very good/excellent GHS were significantly more likely to provide high scores for the majority of global rating measures included in the study; breast, colorectal, and prostate cancer survivors with very good/excellent GHS were also more likely to indicate high scores for most composite measures. In contrast, higher MHS among breast, colorectal, and prostate cancer survivors had few significant associations with higher scores, while lung cancer survivors with very good/excellent MHS were significantly more likely to indicate high scores for the majority of their global and composite measures. The cause of the difference between lung cancer survivors and the other survivor groups is uncertain. Only 20% of lung cancer survivors reported very good/excellent GHS versus approximately 30% of breast and colorectal cancer survivors and 38% of prostate cancer survivors (Table 1). As health status is a subjective measure, it is possible that even those lung cancer survivors reporting very good/excellent GHS experienced greater health limitations than did survivors of other types of cancer. Among survivors with lower GHS, MHS may assume more importance in their experience of medical care. In addition, lung cancer survivors may experience a greater decline over time in GHS, which has been associated with decreased satisfaction [26]. Due to the cross-sectional nature of the CAHPS data, we are unable to assess changes in survivors' experience or health status over time.

Previous studies have also reported links between self-rated health status and outcomes among individuals with cancer. High health status was associated with increased satisfaction and increased survival among cancer survivors [24,27–29], while being off work due to health reasons, anxiety and depression, and perceived stress were associated with decreased satisfaction [30,31]. Among overweight or obese older cancer survivors, increased general health status or mental health status was associated with increased resistance to declines in physical functioning [11]. While older survivors are more likely to have multiple chronic conditions, older survivors are less likely to report being in excellent or very good health compared with age-matched individuals without cancer even after controlling for comorbidities [32].

Our findings and those of earlier studies highlight the importance of supportive care services in survivorship care. These services can improve physical/mental health, quality of life, and satisfaction among individuals with cancer [33–36]. For example, eliminating surgical side effects and comorbidities among breast cancer survivors helped to prevent reductions in self-rated health [37]. In addition, supportive care services can assist with comorbidities experienced by survivors; these comorbidities may be predictive of functional declines among older survivors [38]. Older adults with cancer are interested in supportive care services to improve their health-related quality of life [39], and recent recommendations advocate earlier integration of supportive/palliative care into standard oncology care, which may improve survivors' experience of care [35,40,41]. Inclusion of health promotion activities, a key component of survivorship care, may also be particularly important for older survivors. Improvements in modifiable risk factors including obesity, physical activity, and diet are associated with increased functional status and quality of life among older cancer survivors, which may improve experience of care [7,42]. For example, older female survivors who are physically-active have similar general health, physical functioning, and other quality of life domains compared with age-matched women who never had cancer, while physically-inactive survivors have significantly decreased quality of life [42]. Exercise interventions in older survivors can decrease symptoms and may increase survival [6].

The significant associations between self-rated health status and experience of care also highlights the importance of assessing and managing long-term and late effects of cancer and cancer treatment among survivors [43]. Systematic review have documented that survivors may experience cancer-related symptoms for multiple years following diagnosis [44–46]. Therefore, interventions to improve the health status of older survivors may have long-term impacts on the experience of care.

In the present study, associations of older survivors' characteristics with experience of care varied substantially by cancer type and category of experience being assessed. Previous studies examining associations of survivors' experience of or satisfaction with care have also shown varied results. Several studies have reported that satisfaction among survivors is not significantly associated with age, sex, ethnicity, or education [24,30,31], although others have reported that more highly educated and African American survivors have lower satisfaction [47]. Studies have also found that female and older survivors and those with better health status had more positive assessments of the quality of their care, and satisfaction varied substantially by cancer type [24, 47–49].

Similar to previous CAHPS analyses from broader populations [50,51], our study found that Asian survivors were less likely to indicate high scores for experience of care, particularly for the composite measures, than were non-Hispanic Whites; this difference is not likely due to lack of measurement equivalence [50]. In contrast, Hispanic colorectal cancer survivors were significantly more likely to provide high ratings for health plan and overall care, but significantly less likely to report high scores for getting care quickly and getting needed prescription drugs. It is unclear why Hispanic colorectal cancer survivors would be more likely to rate their health plan and overall care highly but less likely to report high scores for other aspect of care. These responses appear contradictory, as the ability to get care quickly and get needed prescription drugs would presumably influence survivors' experience of overall care and health plan. While these findings are limited by the accuracy of the SEER and Medicare race/ethnicity variables, they suggest that cancer survivorship care programs need to consider and address potential distinctions in experience based on cultural differences and patient preferences.

Among breast cancer survivors, those with fee-for-service Medicare were more likely to indicate high scores for three composites (getting care quickly, getting needed care, and getting needed prescription drugs) but less likely for customer service. The decreased likelihood of high scores for customer service among fee-for-service Medicare survivors may reflect the lack of a unified health care plan; that is, in contrast to Medicare Advantage, fee-for-service does not have a single entity or organization responsible for overall care for a beneficiary. Despite the increased likelihood of high scores for customer services among survivors with Medicare Advantage, the significantly lower likelihood of high scores for three other composites suggest that these managed care plans need to improve access to and delivery of survivorship services.

To our knowledge, no published study has compared CAHPS responses between Medicare beneficiaries diagnosed with cancer and those not diagnosed with cancer. Thiels et al. examined the impact of a cancer diagnosis on CAHPS scores for individuals (Medicare beneficiaries and those with other insurance) who were hospitalized [52]. In this population, patients with a cancer diagnosis were significantly more likely to have high Hospital CAHPS (HCAHPS) scores in pain management and communication with physician.

Limitations to our study stem primarily from the cross-sectional study design of the CAHPS survey that does not allow us to explore changes in survivors' experience for individual respondents over time. The study population was limited to individuals living in states that participate in the SEER program who completed the CAHPS survey; results may not be generalizable to all cancer survivors. A strong ceiling effect was observed, with more than 50% of survivors indicating high ratings for each CAHPS measure. Although validations of CAHPS ratings are not available, CAHPS surveys have been widely used for almost 20 years to assess patient-reported perceptions of care and associations of patient demographic, clinical, and insurance-related factors with these ratings [53,54]. In addition, while GHS and MHS are not able to be compared or validated with other measures of survivors' health status, self-reported GHS and MHS are widely recognized as appropriate predictors of morbidity and mortality [55–57]. Furthermore, completion of CAHPS is not uniform across the SEER-Medicare population; for example, individuals in Medicare Advantage plans are more likely to have the opportunity to complete this survey. Therefore, the study population may not be representative of the overall SEER-Medicare population. Also, while information on cancer recurrence would be useful for this study, SEER does not include this information and use of Medicare claims would miss a majority of individuals experiencing recurrence [58].

Despite these limitations, this study provides important information about experiences of care for older cancer survivors using a new resource, SEER-CAHPS. Among these individuals, experience with health plans, physicians, and aspects of medical care are associated with sociodemographic, insurance, and clinical characteristics. These findings provide guidance for developing patient-centered programs to improve experience with care among older cancer survivors. Survivorship care for older individuals is affected by factors including functional and cognitive impairments, multiple comorbidities, distinct goals of care, and increased needs for social support [59]. Subsequent research is needed to examine programs addressing potentially modifiable factors, including obesity, physical activity, diet, GHS and MHS, on older survivors' experience with care and to enhance the tailoring of survivorship programs to individuals' characteristics. In particular, evaluations of tailored, patient-centered programs and policies addressing older survivors' health status concerns, risk factors, and unmet needs are needed to assess the importance of and potential for supportive care and lifestyle interventions to improve health and experiences of care.

## Author Contribution and Conflict of Interest

Concept and design: Halpern, Urato, Lines, Cohen, Arora, Kent; Data collection: not applicable; Analysis and interpretation of data: Halpern, Urato, Lines, Cohen, Arora, Kent; and Manuscript writing and approval: Halpern, Urato, Lines, Cohen, Arora, Kent. The authors declare no conflicts of interest.

## Appendix A. Supplementary Data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jgo.2017.11.005.

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