

**Employment Benefits and Job Retention:
Evidence among Patients with Colorectal Cancer**

Running Title: Employment Benefits in Colorectal Cancer

Christine M. Veenstra, MD, MSHP;^{1,2} Paul Abrahamse, MA;² Todd H. Wagner, PhD;³
Sarah T. Hawley, PhD;^{1,2} Mousumi Banerjee, PhD;^{1,2} Arden M. Morris, MD, MPH⁴

¹Institute for Healthcare Policy and Innovation, University of Michigan, Ann
Arbor, MI

²Center for Healthcare Outcomes and Policy, University of Michigan, Ann Arbor,
MI

³Health Economics Resource Center, Department of Veterans Affairs Palo Alto
Health Care System, Menlo Park, CA

⁴Stanford-Surgery Policy Improvement Research and Education Center,
Stanford University School of Medicine, Stanford CA

Corresponding author: Christine M. Veenstra, MD, MSHP, 300 North Ingalls, Rm 3A22,
Ann Arbor, MI 48109-5343; phone (734) 615-4762; fax (734) 936-4940;
cveenstr@med.umich.edu.

Text pages (including Title Page, References, and Tables): 23; Tables: 3; Figures: 0

Funding Sources: Dr. Morris, Dr. Hawley, and the study were supported by research scholar grant 11-097-01-CPHPS from the American Cancer Society. The American Cancer Society played no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1002/cam4.1371](https://doi.org/10.1002/cam4.1371)

This article is protected by copyright. All rights reserved

the manuscript; and decision to submit the manuscript for publication. Dr. Veenstra was supported by grant K07 CA196752-01 from the NCI/NIH.

Conflicts of Interest: None

Author Contributions:

Christine Veenstra: conceptualization, methodology, investigation, writing original draft, writing review and editing, and visualization

Paul Abrahamse: methodology, software, formal analysis, investigation, writing original draft, writing review and editing, and visualization

Todd Wagner: writing original draft, writing review and editing, and visualization

Sarah Hawley: writing original draft, writing review and editing, and visualization

Mousumi Banerjee: conceptualization, methodology, formal analysis, investigation, and writing review and editing

Arden Morris: conceptualization, methodology, investigation, writing original draft, writing review and editing, visualization, supervision, funding acquisition

Precis: Among employees who experienced a serious cancer diagnosis, access to specific health-related employment benefits was associated with higher likelihood of job retention. Employers and governmental agencies should consider the value in expanding access to such benefits.

Key Words: Employment; insurance, health; colorectal neoplasms; surveys and questionnaires; sick leave.

Article type : Original Research

ABSTRACT

Background: A “health shock,” that is, a large, unanticipated adverse health event, can have long-term financial implications for patients and their families. Colorectal cancer is the third most commonly diagnosed cancer among men and women and is an example of a specific health shock. We examined whether specific benefits (employer-based health insurance, paid sick leave, extended sick leave, unpaid time off, disability benefits) are associated with job retention after diagnosis and treatment of colorectal cancer.

Methods: In 2011-14, we surveyed patients with Stage III colorectal cancer from two representative SEER registries. The final sample was 1301 patients (68% survey response rate). For this paper, we excluded 735 respondents who were not employed and 20 with unknown employment status. The final analytic sample included 546 respondents. Job retention in the year following diagnosis was assessed and multivariable logistic regression was used to evaluate associations between job retention and access to specific employment benefits.

Results: Employer-based health insurance (OR=2.97; 95% CI=1.56-6.01; p=0.003) and paid sick leave (OR=2.93; 95% CI=1.23-6.98; p=0.015) were significantly associated with job retention, after adjusting for sociodemographic, clinical, geographic, and job characteristics.

Conclusions: After an unexpected major cancer diagnosis, employer-based health insurance and paid sick leave were associated with job retention.

Although implementation of the Patient Protection and Affordable Care Act (ACA) expanded access to preventive medical care among working Americans who were uninsured or under-insured,¹ serious illness still may cause considerable financial burden.²⁻⁴ For a substantial number of patients, bankruptcy due to serious illness or its treatment is a real risk.^{4,5} The risk of bankruptcy and attendant financial burden is exacerbated by illness- or treatment-related job loss.⁶ Employment benefits such as paid sick leave and disability benefits may help working patients retain their jobs during and after serious illness. Among workers who are eligible, the Family Medical Leave Act (FMLA) provides protection for short-term disability in the form of unpaid leave and has been shown to influence job retention among new mothers.⁷

The provision of paid medical leave, however, is not mandated under FMLA or the ACA, nor is it a part of standard health insurance coverage.² In fact, 40% of US workers do not have access to FMLA⁸ and up to 60% do not have access to paid sick leave.⁹ A substantial proportion of workers who experience a “health shock,” that is, a large, unanticipated adverse health event, may therefore lack the employment benefits needed to undergo treatment, recover, and return to work. Additionally, a robust literature has shown the effect of health shocks on labor outcomes.¹⁰⁻¹³ These studies frequently use broad proxies for the health shock, such as changes in self-reported health status or the presence of an inpatient stay. We addressed this issue in more granular detail by focusing on colorectal cancer, a specific health shock.

Colorectal cancer is a prevalent and serious illness frequently diagnosed among working adults without prior warning.^{14,15} Treatment for advanced but curable (Stage III) colorectal cancer typically requires both major surgery and chemotherapy, initiated within 4 months of diagnosis and lasting up to 9 months. Cancer treatment can disrupt a working person’s day-to-day life physically and economically for some or all of this time. Working age cancer survivors, who may be supporting young families or repaying educational debt and face a greater loss of potential earnings than older survivors, are more likely to report financial hardship.¹⁶ In previous work we reported that, as a result of diagnosis or treatment, over 50% of colorectal cancer patients reduce spending on general expenses, one-third use savings, one-third cut down on spending for food or clothing,^{3,17} and nearly 50% who are employed at the time of diagnosis are unable to

retain their jobs.⁶ In the present study, we used data from a population-based survey of patients with Stage III colorectal cancer to examine the association of employee benefits (employer-based health insurance, paid sick leave, extended sick leave, unpaid time off, disability benefits) with job retention.

METHODS

Study Population. We identified all patients ≥ 18 years of age with surgically resected, pathologic stage III colon or rectal cancer reported to the Surveillance, Epidemiology and End Results (SEER) cancer registries of metropolitan Detroit and the state of Georgia between August 1, 2011 and December 31, 2014. These sites were selected because of their demographically and racially diverse patient populations. Patients were eligible for study recruitment at 4 months following diagnosis, when all treatment should have been initiated, and returned surveys were accepted up to 12 months after diagnosis. Exclusion criteria included metastatic cancer (stage IV) at diagnosis, change in diagnosis based on final histology, death prior to survey deployment, or residence outside SEER catchment area. We also excluded respondents who reported no employment at the time of diagnosis.

Data Collection. We notified physicians of our intention to contact study subjects. After an opt-out period by physicians, patients were invited to participate using a modified multi-modal Dillman approach.¹⁸ Upon receipt of surveys, we performed extensive data checks for logic, errors and omissions. We re-contacted patients as necessary to obtain missing information and supplemented data with SEER registry-provided clinical data and census tract-level socioeconomic status (SES) data through a 2010 Census linkage.

The study protocol was approved by the institutional review boards of the University of Michigan, Wayne State University, Emory University, the State of Michigan, and the State of Georgia Department of Public Health.

Measures. The primary outcome was job retention at the time of survey. We asked respondents who were employed at the time of diagnosis if they were working at the time of survey completion (mean 8 months later). We validated responses with the additional

survey question: “Are you currently working for pay?” (yes/no response). We also asked patients how much work they had missed as a result of cancer or its treatment.

We also explored “job lock”—whether individuals remained in their jobs due to fear that they would otherwise lose health insurance coverage for themselves or their families.¹⁹ We assessed this by asking patients whether, as a result of their colorectal cancer diagnosis or treatment, they kept their job mainly to keep their health insurance (yes/no response).

The primary exposure, availability of employment benefits, was assessed by asking respondents whether any of the following were available to them through their employer during cancer treatment: employer-based health insurance, paid sick leave, extended sick leave, disability, unpaid leave, “other.” Respondents could select all that applied. 83 respondents left one or more of the benefit options blank. They were included in bivariate analyses but excluded from multivariable regression models. Additional covariates included self-reported patient-level sociodemographic characteristics: age at diagnosis, gender, race, marital status, level of educational attainment, annual household income, comorbid conditions before the cancer diagnosis, overall health status, availability and type of health insurance (none, Medicaid, Medicare, Private: employer-based, self-purchased, and through spouse); area-level characteristics: geographic region, area-level socioeconomic status (SES) index (principle component analysis of area-level high school degree, college degree, poverty level combined into a composite standardized measure of the economic environment); and job-related characteristics: type of occupation (white collar/blue collar derived from patient-reported categories of manual, clerical, management/professional, military, self-employed). The majority (>90%) of employed respondents received adjuvant chemotherapy. Thus, we did not include chemotherapy receipt as a covariate.

There were few missing values (<2%) for all variables except annual household income, for which 19% of patients did not respond or reported they did not know. Multiple imputation techniques were used to account for the missing annual household income data.

Statistical Analyses. Our analytic sample consisted of all survey respondents who were working for pay at the time of cancer diagnosis. We generated descriptive statistics of time away from work due to diagnosis and treatment. We evaluated the association of job retention with patient-level sociodemographic, area-level, and job-related covariates. We then examined the association of job retention with the availability of specified employment benefits. Chi square tests were used to assess bivariate associations. We conducted a sensitivity analysis by constructing a cumulative variable counting the total number of job support benefits available to each respondent (range 0-6). This was tested in each model and yielded similar results to the models that used individual employment benefits. The exclusion of working patients over age 65 did not significantly change any results. Thus, they are included in the study.

To examine the relative impact of sociodemographic, area-level, and job-related factors (including employment benefits), on job retention, we used multivariable logistic regression to predict job retention, accounting only for patient-level sociodemographic and area-level covariates in the first model. We then added job-related covariates including employment supports in a second model. Finally, as a sensitivity analysis, we fitted multivariable logistic regression to model job retention as a function of patient-level sociodemographic and area-level covariates as well as employment benefits, stratified by type of occupation (blue collar vs. white collar). The results of the stratified analyses were similar to those of the unstratified analysis and are therefore not described in more detail.

To address potential confounding by worker selection into “good jobs” (those more likely to offer employment benefits) and “bad jobs” (those less likely to offer employment benefits), we employed propensity scores-based analysis. We selected the availability of paid sick leave as the indicator variable in our propensity score analysis because it is policy-relevant and the most tangible of the employment benefits investigated in our studies. Availability of paid sick leave was analyzed as a patient-reported dichotomous variable (paid sick leave yes/no). In the first step of the analyses, propensity scores were estimated based on a logit model of the paid sick leave indicator variable, given the observed covariates age, race, education, gender, marital status, income, number of comorbid conditions, job category, SEER site, and composite census-

level SES. The propensity score for an individual, defined as the conditional probability of having paid sick leave given the individual's covariates, has been shown to serve as a balancing score and can be used to reduce bias due to any covariate imbalance.²⁰ Once estimated, the propensity scores were grouped into quintiles. Logistic regression was used in the second step analysis to model job retention as a function of availability of paid sick leave and sociodemographic, area-level, and job related factors, including other employment benefits, and propensity score quintiles from the first step model. Additional information demonstrating the adequacy of the propensity score analysis is presented in the Statistical Appendix.

We evaluated bivariate associations between the exploratory outcome of job lock and covariates using chi-square tests. Wald F tests were used to assess associations and multivariable logistic regression for adjusted analyses. All statistical tests were two-sided. P value < 0.05 was considered statistically significant. Multi-collinearity between covariates was tested using the variance inflation factor, and all pairwise interactions were tested for significance. All analyses were conducted using SAS 9.4 software (Cary, NC).

RESULTS

Study sample and response rate. We identified 2,168 patients with Stage III colorectal cancer reported to the SEER registries of Georgia and Detroit using Rapid Case Ascertainment. Among these, 259 (12%) were later determined ineligible (metastatic disease, non-colorectal primary, prior cancer diagnosis, residing outside the registry catchment area). Among 1909 eligible patients included in the final sample, 608 could not be located or did not return the survey, leaving 1301 patients (68% survey response rate). For the current study, patients who were not working at the time of diagnosis (n=735) and those missing employment information (n=20) were excluded, leaving a final analytic cohort of 546 respondents.

Overall respondent characteristics and job impact. Among 546 employed respondents, 57% were male, 69% were white, 67% were married, 28% reported high school education or less, 38% reported annual household income less than \$50,000, and

33% reported two or more comorbid conditions (**Table 1**). Eighteen percent of employed respondents were age 65 or older, reflective of broader trends in the US labor force: In 2010, 17.4% of US workers were over age 65.²¹ As a result of colorectal cancer diagnosis and treatment, 17% of respondents missed < 1 month of work, 29% missed 1-3 months, 20% missed 3-6 months, and 17% missed 6-12 months of work.

Fifty-five percent of working respondents retained their jobs. In unadjusted analyses, those who retained their jobs were significantly more likely to be male, white, married, and to report a higher level of educational attainment, higher annual household income, 0 or 1 comorbid conditions, and excellent health (all $p < 0.01$). Those residing in the upper tertile of area-level SES were also significantly more likely to retain their jobs ($p < 0.01$).

Employment benefits and job retention. Among working respondents, 70% reported availability of employer-based health insurance (**Table 2**). Fifty-one percent reported availability of paid sick leave, 52% extended sick leave, 46% unpaid time off, and 57% disability benefits. Thirteen percent of respondents reported no health-related employment benefits. These respondents were more likely to be older, black, self-employed, and report lower annual household income (all $p < 0.01$; data not shown). Respondents age 65 and older were significantly less likely to have each of the employment benefits compared with younger respondents.

In unadjusted analyses, those who retained their jobs were significantly more likely to have each of the individual employment benefits (employer-based health insurance, paid sick leave, extended sick leave, unpaid time off, disability benefits) available. Additionally, in a count of employment benefits, we noted a linear association between number of available benefits and odds of job retention ($p < 0.01$; data not shown).

Relative impact of patient-level sociodemographic, area-level, and job-related characteristics on job retention. In the fully adjusted model including individual- and area-level variables (age, education, income, race, gender, marital status, comorbid conditions, overall health, SEER site and area-level socioeconomic status) as well as job characteristics, availability of employer-based health insurance (OR=2.97; 95% CI=1.56-6.01; $p=0.003$) and availability of paid sick leave (OR=2.93; 95% CI=1.23-6.98;

$p=0.015$) were significantly associated with job retention. Patients with poor health were less likely than those with good health to retain their jobs (OR=0.07; 95% CI=0.03-0.16; $p<0.01$). While income was significantly associated with job retention in the first model controlling for only sociodemographic and area-level characteristics, it was no longer significant in the second model that additionally accounted for job-related characteristics (Table 3). In addition, blue collar workers were significantly more likely than white collar workers to report “job lock,” that is, that they kept their jobs in order to maintain health insurance (25% vs. 16%; $p=0.02$). There were no significant differences in job lock by age of respondent.

In the propensity score analysis, paid sick leave remained independently significantly predictive of job retention after adjusting for all other covariates as well as propensity quintile ($p=0.02$). We did not find significant differences in job retention by gender nor did we find significant two-way interactions with gender.

DISCUSSION

Stage III colorectal cancer is a major unexpected illness that can have long-term financial implications for patients and their families. Among employees diagnosed with stage III colon cancer, employment benefits designed to ameliorate health shock related to job loss worked as expected. Even after controlling for patient-level sociodemographic, area-level, and job-related characteristics, the availability of employer-based health insurance and paid sick leave were significantly associated with job retention. Our specific investigation of paid sick leave was robust to multiple sensitivity analyses including adjusting for propensity score quintiles and stratifying the multivariable logistic regression model by type of occupation, supporting a causal relationship irrespective of individual, area-level, and job characteristics.

While job retention did not vary significantly between blue collar and white collar workers, blue collar workers were significantly more likely to endorse “job lock” phenomenon; 25% reported that they kept their jobs in order to keep their health insurance. These findings highlight the vulnerability of some patients based on occupation, the complexity of employment impacts of health shocks, and the nuanced

role health insurance plays in patients' employment decisions and financial well-being. While insurance coverage concerns may have been partially alleviated by the Affordable Care Act, as insurance options in the United States continue to evolve it will become even more important to understand the role of insurance and employment in the face of a health shock and for clinicians and policy makers to recognize not only who is at risk for job loss, but the complex reasons that patients may continue to work.

We also noted inherent socioeconomic disparities in access to employment benefits. Thirteen percent of our study sample reported a complete lack of employment benefits. These respondents were more likely to be older, black, self-employed, and to report lower annual household income. Our results align with data from the Bureau of Labor Statistics that high wage-earners and those in professional and managerial occupations are more than twice as likely as low wage-earners and those with jobs in the service industry to have access to paid sick leave.²² Even among desirable jobs that offer benefits like health insurance and paid sick leave, cancer and its treatment may compound serious illness with personal financial burden.¹⁷ For those patients who are at a competitive disadvantage in the marketplace and simultaneously less likely to work for employers who offer benefits, a curable but serious illness such as cancer may be financially devastating. While those patients who are unable to retain their jobs may be eligible to collect unemployment or social security benefits, many are not eligible and those who are receive only a fraction of their previous earnings.

As noted, federal legislation to protect the jobs and health insurance of workers during illness exists as FMLA. Unfortunately, FMLA guarantees only unpaid time off and not all employees are eligible for coverage, even if their employers offer it.⁸ There have been several attempts to fill the gaps left by FMLA. Statewide paid sick day legislation is in place in four states as well as in the District of Columbia and 18 other municipalities across the US.²³ In September 2015, President Obama issued an Executive Order requiring federal contractors to offer paid sick days to their employees, though this does not extend to Americans working in the private sector²⁴ and, as an Executive Order, is reversible. Nevertheless, only an estimated one in three workers in the bottom quarter of the pay scale and one in four part-time workers nationwide have access to paid sick leave.²⁰

Making policy recommendations regarding employer practices and benefits is difficult. Benefit programs that work well for large employers may be problematic for smaller organizations, especially given the complex state and federal regulations already in place. The costs of workforce turnover or other resources consumed by disruption of organizational stability due to loss of experienced workers are real but complex. In addition, societal costs and benefits associated with such policies have only been preliminarily reported. For example, workers who are able to maintain employment during health shocks rely less on public assistance and contribute more money to their local economies.^{8,25}

Our study was subject to several limitations intrinsic to survey research. Analyses were limited by the sample of respondents. We note, however, that the population-based sampling achieved broad demographic representation and the 68% response rate is higher than any previous published cohort of patients with colorectal cancer.²⁶ The survey relied on respondent report and was thus subject to recall bias, but our reliance on patient reporting permitted individual insights that could not otherwise be obtained. We mitigated recall bias by accepting returned surveys only up until one year after diagnosis. Given this relatively short follow up period it is possible that respondents who did not retain their jobs during cancer treatment may have later returned to work. However, previous literature indicates that job loss during cancer treatment, particularly among low-income patients, predicts long-term departure from the workforce.^{27,28} On the other hand, previous work has found that some cancer patients who temporarily stop working during treatment but then return to work in the first year after diagnosis, as well as some patients who continue to work through treatment and the first year afterwards, subsequently quit their jobs for cancer-related reasons in years 2-5 following diagnosis.²⁹ Therefore, it is also possible that some respondents who retained their jobs may have later departed from the workforce. Because our data were patient-reported, we did not have access to employer-level data such as employer size, FMLA availability, or employer-level benefits. Although we used job retention, defined as working for pay at the time of survey completion, as our primary outcome measure, we acknowledge that there are other measures of employment impacts (decreasing work hours, changing jobs, etc.) among working patients with cancer. We note, however, that job retention reflects

the ability to continue to work and earn an income and therefore represents an important element of working patients' financial wellbeing. We did not ask patients who did not retain their jobs whether the work loss was desired or undesired. However, any departure from the labor force reduces a patient's income and may therefore exacerbate the personal financial burden of cancer diagnosis and treatment. There may be unobserved selection bias as we excluded those patients who were not employed at diagnosis from our analyses. Some of these patients could have been previously employed but subsequently chose unemployment based on poor employment benefits or a lack of employment benefits. Finally, although our sample includes patients from rural to urban areas as well as Southern and Midwestern parts of the United States, our data may not be representative of the entire U.S.

CONCLUSION

Employment benefits, specifically employer-based health insurance and paid sick leave, were associated with a greater likelihood of job retention during serious illness. Although insurance coverage is on the rise with implementation of the Affordable Care Act, FMLA is more than 20 years old and leaves millions of working Americans potentially unsupported in times of serious illness. Based on our findings, it is plausible that provision of specific employment benefits by employers and government could facilitate job retention and reduce associated financial burden, especially among young working patients.

References

1. Sommers BD, Gunja MZ, Finegold K, Musco T. Changes in Self-reported Insurance Coverage, Access to Care, and Health Under the Affordable Care Act. *JAMA*. 2015;314(4):366-374.
2. Langa KM, Fendrick AM, Chernew ME, Kabeto MU, Paisley KL, Hayman JA. Out-of-pocket health-care expenditures among older Americans with cancer. *Value in health : the journal of the International Society for Pharmacoeconomics and Outcomes Research*. 2004;7(2):186-194.

3. Regenbogen SE, Veenstra CM, Hawley ST, et al. The personal financial burden of complications after colorectal cancer surgery. *Cancer*. 2014;120(19):3074-3081.
4. Banegas MP, Guy GP, Jr., de Moor JS, et al. For Working-Age Cancer Survivors, Medical Debt And Bankruptcy Create Financial Hardships. *Health Aff (Millwood)*. 2016;35(1):54-61.
5. Ramsey S, Blough D, Kirchhoff A, et al. Washington State cancer patients found to be at greater risk for bankruptcy than people without a cancer diagnosis. *Health Aff (Millwood)*. 2013;32(6):1143-1152.
6. Veenstra CM, Regenbogen SE, Hawley ST, Abrahamse P, Banerjee M, Morris AM. Association of Paid Sick Leave With Job Retention and Financial Burden Among Working Patients With Colorectal Cancer. *JAMA*. 2015;314(24):2688-2690.
7. Waldfogel J, Higuchi Y, Abe M. Family leave policies and women's retention after childbirth: Evidence from the United States, Britain, and Japan. *J Popul Econ*. 1999;12(4):523-545.
8. United States Department of Labor. Family and Medical Leave in 2012: Technical Report. <https://www.dol.gov/asp/evaluation/fmla/FMLA-2012-Technical-Report.pdf>. Accessed May 3, 2017.
9. National Partnership for Women & Families. Paid sick days: Attitudes and experiences. <http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-attitudes-and-experiences-presentation.pdf>. Accessed May 3, 2017.
10. Bradley CJ, Neumark D, Barkowski S. Does employer-provided health insurance constrain labor supply adjustments to health shocks? New evidence on women diagnosed with breast cancer. *J Health Econ*. 2013;32(5):833-849.
11. Garcia-Gomez P, van Kippersluis H, O'Donnell O, van Doorslaer E. Long Term and Spillover Effects of Health Shocks on Employment and Income. *J Hum Resour*. 2013;48(4):873-909.
12. Bradley CJ, Neumark D, Motika MI, National Bureau of Economic Research. The Effects of Health Shocks on Employment and Health Insurance The Role of

- Employer-Provided Health Insurance. Cambridge, Mass.: National Bureau of Economic Research; 2011: <http://www.nber.org/papers/w17223>.
13. Ihbe-Heffinger A, Ehlken B, Bernard R, et al. The impact of delayed chemotherapy-induced nausea and vomiting on patients, health resource utilization and costs in German cancer centers. *Ann Oncol.* 2004;15(3):526-536.
 14. Siegel RL, Miller KD, Fedewa SA, et al. Colorectal cancer statistics, 2017. *CA Cancer J Clin.* 2017.
 15. Bailey CE, Hu CY, You YN, et al. Increasing disparities in the age-related incidences of colon and rectal cancers in the United States, 1975-2010. *JAMA surgery.* 2015;150(1):17-22.
 16. Yabroff KR, Dowling EC, Guy GP, Jr., et al. Financial Hardship Associated With Cancer in the United States: Findings From a Population-Based Sample of Adult Cancer Survivors. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology.* 2016;34(3):259-267.
 17. Veenstra CM, Regenbogen SE, Hawley ST, et al. A composite measure of personal financial burden among patients with stage III colorectal cancer. *Medical care.* 2014;52(11):957-962.
 18. Dillman DA, Smyth JD, Christian LM, Dillman DA. Internet, mail, and mixed-mode surveys : the tailored design method. 3rd ed. Hoboken, N.J.: Wiley & Sons; 2009.
 19. Chatterji P, Brandon P, Markowitz S. Job mobility among parents of children with chronic health conditions: Early effects of the 2010 Affordable Care Act. *J Health Econ.* 2016;48:26-43.
 20. D'Agostino RB, Jr. Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. *Stat Med.* 1998;17(19):2265-2281.
 21. Pryor F. "Occupational choices of the elderly," *Monthly Labor Review*, U.S. Bureau of Labor Statistics, February 2017, <https://doi.org/10.21916/mlr.2017.4>. Accessed online November 2, 2017.
 22. United States Department of Labor Bureau of Labor Statistics. Employee Benefits Survey 2016.

- <https://www.bls.gov/ncs/ebs/benefits/2016/ownership/civilian/table32a.htm>.
Accessed May 3, 2017.
23. National Partnership for Women & Families. Paid Sick Days--State, District and County Statutes. <http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-statutes.pdf>. Accessed May 3, 2017.
 24. United States Department of Labor Wage and Hour Division (WHD). Final Rule: Executive Order 13706, Establishing Paid Sick Leave for Federal Contractors. <https://www.dol.gov/whd/govcontracts/eo13706/>. Accessed May 3, 2017.
 25. Houser L, Vartanian TP. Pay Matters: The Positive Economic Impacts of Paid Family Leave for Families, Businesses and the Public. New Brunswick, NJ: Rutgers Center for Women and Work; 2012.
 26. Catalano PJ, Ayanian JZ, Weeks JC, et al. Representativeness of participants in the cancer care outcomes research and surveillance consortium relative to the surveillance, epidemiology, and end results program. *Medical care*. 2013;51(2):e9-15.
 27. Blinder V, Patil S, Eberle C, Griggs J, Maly RC. Early predictors of not returning to work in low-income breast cancer survivors: a 5-year longitudinal study. *Breast cancer research and treatment*. 2013;140(2):407-416.
 28. Blinder VS, Patil S, Thind A, et al. Return to work in low-income Latina and non-Latina white breast cancer survivors: a 3-year longitudinal study. *Cancer*. 2012;118(6):1664-1674.
 29. Short PF, Vasey JJ, Tunceli K. Employment pathways in a large cohort of adult cancer survivors. *Cancer*. 2005;103(6):1292-1301.

Author Manuscript

Table 1. Patient sociodemographic and area-level characteristics and job retention among working respondents.

Patient Characteristic	N=546	% Retained Job	p-value
Sociodemographic			
Age			0.759
<50	164	54%	
50-64	285	57%	
≥65	96	54%	
Gender			0.001
Male	309	62%	
Female	233	48%	
Race			<0.001
White	371	62%	
Black	138	43%	
Other	32	38%	
Marital Status			0.005
Not married/partnered	181	50%	
Married/partnered	363	60%	
Education			<0.001
<High School	48	23%	
High School	104	41%	
Some college	194	52%	
College graduate	192	74%	
Household Income*			<0.001
<\$20,000	48	13%	
\$20,000-\$49,000	136	44%	
\$50,000-\$89,000	161	60%	
≥\$90,000	139	78%	

Comorbid Conditions			0.001
0	182	64%	
1	182	58%	
2 or more	180	44%	
Overall Health			<0.001
Excellent	164	75%	
Good	285	64%	
Poor	96	20%	
Area-level			
SEER site			0.458
Detroit	162	53%	
Georgia	382	57%	
Area-level SES, tertile			<0.001
High	165	71%	
Medium	206	53%	
Low	171	44%	

*Information about household income was missing for 19% of respondents and was imputed in subsequent multivariate models.

Table 2. Job-related characteristics and job retention.

Patient Characteristic	N=546	Retained Job	p-value
Job category			<0.001
Blue Collar	188	35%	
White Collar	322	66%	
Unclassified/Unknown	12	58%	
Employer-based health insurance			<0.001
No	163	34%	
Yes	381	65%	
Paid sick leave			<0.001

No	241	45%	
Yes	253	67%	
Extended sick leave			0.038
No	233	51%	
Yes	255	60%	
Unpaid time off			0.004
No	271	49%	
Yes	231	62%	
Disability Benefits			<0.001
No	206	30%	
Yes	278	76%	

Table 3. Multivariable logistic regression of job retention.

	Model 1: Hazard Ratio (HR) of job retention by sociodemographic and area-level characteristics		Model 2: HR of job retention (Model 1+ job-related characteristics)	
	HR (95% CI)	p-value	HR (95% CI)	p-value
Age				
<50	1.0 (ref)	0.611	1.0 (ref)	0.265
50-64	1.34 (0.74-2.42)		1.18 (0.64-2.16)	
>65	1.34 (0.58-3.10)		2.12 (1.85-5.28)	
Education				
<High School	1.0 (ref)	0.122	1.0 (ref)	0.386
High School	1.80 (0.55-5.87)		1.61 (0.48-5.34)	
Some college	1.70 (0.52-5.55)		1.10 (0.33-3.67)	
College grad	3.20 (0.93-10.98)		1.86 (0.52-6.60)	
Income				
<\$20K	1.0 (ref)	0.002	1.0 (ref)	0.404
\$20-\$49K	2.85 (1.22-6.68)		1.20 (0.48-3.00)	
\$50-\$89K	3.81 (1.49-9.75)		1.37 (0.50-3.73)	
≥\$90K	7.65 (2.68-21.87)		2.31 (0.72-7.38)	
Overall Health				
Excellent	1.0 (ref)	<0.001	1.0 (ref)	<0.001
Good	0.68 (0.35-1.30)		0.61 (0.28-1.31)	
Poor	0.07 (0.03-0.16)		0.06 (0.03-0.14)	
Job Category				
White collar			1.0 (ref)	0.247
Blue Collar			0.56 (0.28-1.11)	
Unclassified			0.68 (0.13-3.73)	

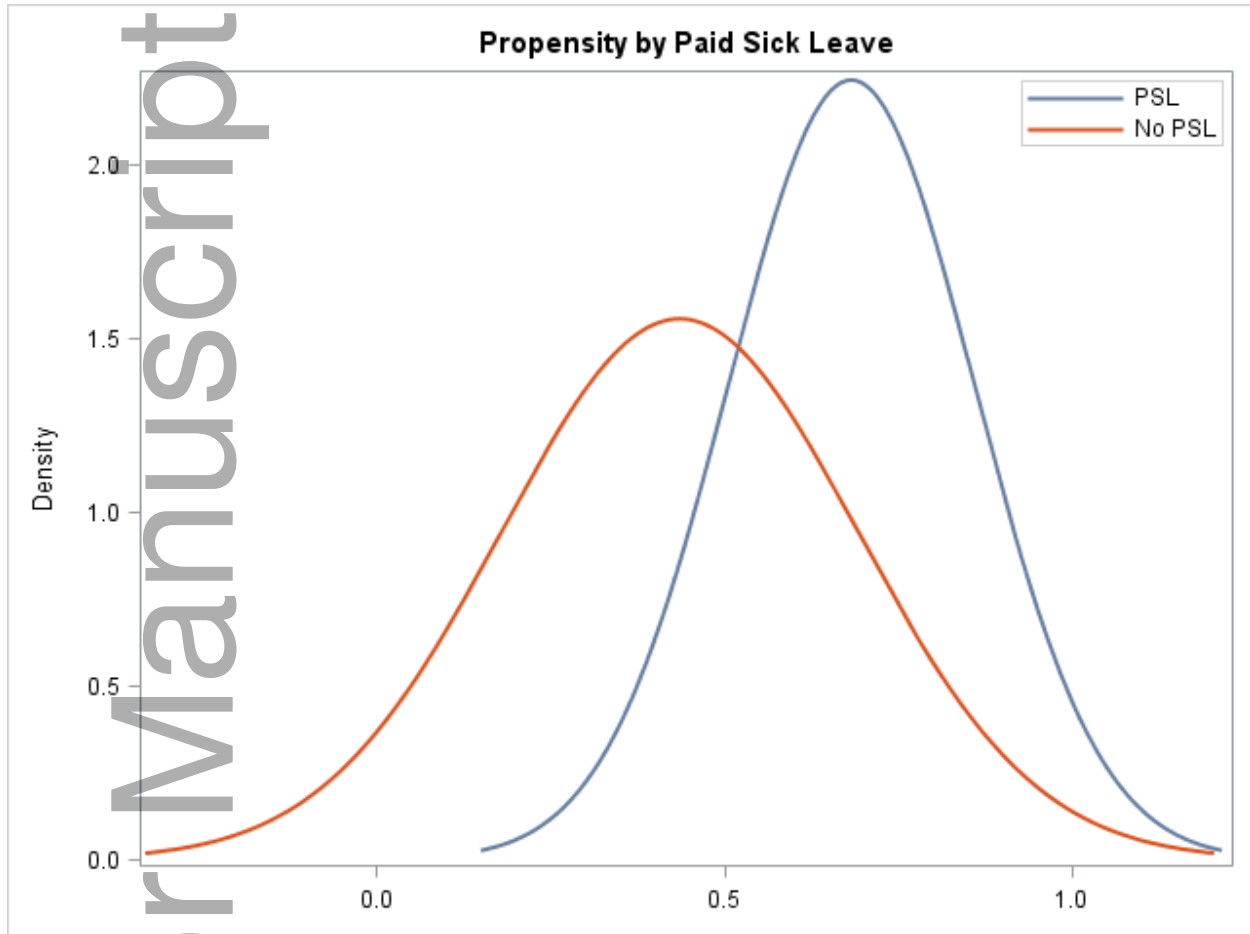
Employer Based Health Insurance			
No		1.0 (ref)	0.003
Yes		2.97 (1.56-6.01)	
Paid Sick Leave			
No		1.0 (ref)	0.015
Yes		2.93 (1.23-6.98)	
Extended Sick Leave			
No		1.0 (ref)	0.335
Yes		1.41 (0.61-2.12)	
Unpaid Time Off			
No		1.0 (ref)	0.411
Yes		0.79 (0.44-1.40)	
Disability Benefits			
No		1.0 (ref)	0.109
Yes		0.55 (0.27-1.14)	

95% CI: 95% Confidence Interval. SEER: Surveillance Epidemiology End Results cancer registry; Area-level SES: Geographic socioeconomic status based upon census income and education data aggregated at the zip-code level.

In the preliminary adjusted model that included individual- and area-level variables, only annual household income and overall health were significantly associated with job retention. In the fully adjusted model including job characteristics, income was no longer statistically significant. Both models were also adjusted for race, gender, marital status, comorbid conditions, SEER site and area-level socioeconomic status (SES). These covariates were not statistically significant and are therefore omitted from the table.

Statistical Appendix: Propensity Score Model

Figure: Distribution of Propensity Scores by Availability of Paid Sick Leave



Distribution of propensity scores for patients with and without paid sick leave (PSL)

Table 1: Propensity Quintile Bivariates

Covariate	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Age					
<50	11%	16%	19%	27%	27%
50-64	10%	20%	24%	23%	23%
65+	65%	27%	8%	0%	0%
Race					
White	19%	21%	19%	23%	19%
Black	23%	18%	22%	11%	26%
Other	31%	8%	38%	23%	0%
Education					
< High School	56%	31%	7%	7%	0%
High School Grad	28%	31%	23%	7%	11%
Some College	17%	21%	22%	18%	21%
College Grad	10%	10%	19%	32%	28%
Gender					
Male	19%	25%	21%	22%	14%
Female	21%	13%	19%	18%	28%
Marital					
Not Married	27%	18%	21%	13%	21%
Married	17%	21%	19%	24%	20%
Income					
<\$20K	85%	15%	0%	0%	0%
\$20-\$49K	21%	33%	28%	12%	6%
\$50-\$89K	8%	20%	25%	21%	25%
>\$90K	7%	9%	13%	35%	36%
Geographic Site					
Detroit	28%	25%	22%	20%	5%
Georgia	17%	18%	19%	20%	26%
SES					
Comorbid Conditions					
0	15%	18%	24%	32%	12%
1	18%	13%	19%	16%	34%
2+	27%	29%	17%	13%	14%
Job Category					
White Collar	9%	12%	16%	31%	32%
Blue Collar	35%	36%	27%	3%	0%
Other	100%	0%	0%	0%	0%
Employer Based Health Insurance					
No	39%	26%	19%	8%	8%

Yes	13%	18%	20%	25%	25%
Paid Sick Leave					
No	5%	18%	19%	28%	30%
Yes	37%	25%	21%	9%	8%
Extended Sick Leave					
No	7%	15%	21%	28%	28%
Yes	31%	25%	19%	11%	13%
Unpaid Time Off					
No	12%	19%	21%	24%	24%
Yes	25%	23%	20%	15%	17%
Disability Benefits					
No	5%	19%	21%	30%	24%
Yes	30%	22%	20%	11%	17%

Bivariate distribution (row percentages) of model covariates and propensity quintiles.

Table 2: Sociodemographic Variables and Paid Sick Leave in the Propensity-Adjusted Model

Covariate	Before Adjustment	After Adjustment
Age	<.0001	0.7730
Race	0.8527	0.8209
Education	0.0002	0.9790
Gender	0.3302	0.7861
Marital Status	0.4004	0.6806
Income	<.0001	0.9124
Geographic Site	0.0319	0.9971
SES	0.0145	0.9010
Comorbid Conditions	0.1300	0.8609
Job Category	<.0001	0.8929

Differences in the individual covariates between those with paid sick leave and those without paid sick leave after adjusting for propensity score quintiles.