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Economic Impact of Cancer Diagnosis on Employment, Wages and Intent to Return to Work

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Abstract

Objective: To assess the work hours and income of patients who have been diagnosed with cancer, treatable with curative intent. The study evaluated the impact of lost wages on patients and their families in the population that is served by Bayhealth Medical Center. Methods: This study was conducted between 2016 and 2020. The curative cancer focus included breast, lung, prostate, colorectal, testicular, uterine, cervical, bladder, esophageal, head and neck, and stomach. Patients were identified on their survivorship visit with Medical Oncology or Radiation Oncology. Two surveys were used to collect information specific to employment status, leave of absence/change in hours, and monthly income. Results: Survey one had 142 participants. Survey two had 134 participants. In survey one, 99.3% of participants reported being employed at least half time at the time of diagnosis. On the Survivorship visit, 95% reported being currently employed at least half time. Only 87% were employed in the same job and title. When reporting income, 64% of participants had the same income, and 25.4% reported a reduction in income since being diagnosed and completing cancer treatment. In survey two, completed one-year post-survivorship visit, 83.6% of participants reported being employed at least half time. Of those, 76.9% were working for the same employer as they were at time of diagnosis. To that end, 26.1% of participants reported their income as lower than it was at time of diagnosis. Conclusion: A cancer diagnosis with treatment can and does have an impact on a person's ability to remain employed at least half time and sustain the same level of income.

Introduction

With the development of new treatments and earlier diagnoses, the number of Americans living with cancer is growing. A 2014 report issued by the American Cancer Society estimated the number of individuals in the United States living with cancer to be 14.5 million. This growth was projected to be 19 million by 2024. In 2022, the National Cancer Institute estimated there will be over 22.5 million survivors by 2032.[1] With continued advancements in early detection and screening, the number of people living with cancer comes with economic and employment concerns.

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The National Cancer Institute reported in 2019 the economic burden of cancer cost nationally to be over $21 billion.[2] The annual report went on to estimate the out of pocket expense for patients and families to exceed $16 billion with more than $4 billion in time cost.[2] Considering the amount of time traveling to and from appointments, waiting for care to be delivered, and receiving care, this number may be drastically under estimated. The American Cancer Society confirmed a higher level of attention needs to be paid to patients' medical financial hardship and financial distress due to the cost of treatment and the implications it has on patient's ability to live and function in a pre-diagnosis state.[3]

Background

Research around employment, cancer diagnosis cost, and survivorship has been conducted in specific populations and in geographical areas. In 2001, Fesko conducted exploratory research with the use of patient interviews to compare workplace challenges faced by HIV positive patients and those with cancer.[4] Another study specifically addressed breast cancer survivors and a look at how employment status impacted quality of life.[5] Telephone interviews have been conducted to assess the long term effects of cancer survivorship on employment for workers aged 55 and older.[6] In 2013 a study of over 2,000 cancer survivors was conducted to evaluate the impact of living in a rural versus urban area and how it influenced employment.[7] Majority of cancer patients self-report they are working at the time of diagnosis. The question remains, is there a pattern or trends pointing out those patients who cannot or will not return to work due to the new challenges of living with a cancer diagnosis? In all the studies listed, a diagnosis of cancer is found to have a direct correlation to reduced work hours and reduced income.

Methods

Participants and Survey

This study was conducted between 2016 and 2020. The focus was on specific curative cancers and stages including breast (Stage I, Stage II, Stage III); lung (Stage I, Stage II, Stage III); prostate (Stage I, Stage II Stage III); colorectal (Stage I, Stage II, Stage III), testicular (Stage I, Stage II, Stage III, Stage IV), uterine (Stage I, Stage II, Stage III), cervical (Stage I, Stage II, Stage III), bladder (Stage I, Stage II, Stage III), esophageal (Stage I, Stage II, Stage III), head and neck (Stage I, Stage II, Stage III, Stage IVa), and stomach (Stage I, Stage II, Stage III).

One to three months after the completion of treatment participants were asked to complete a survey (Period 1), assessing the following: employment status, income changes, hours worked, and return to work status after cancer treatment has been completed. The questions were aimed to explore how specific cancer diagnoses and treatments may affect patients' likelihood of returning to work. The survey questions captured the following: 1) patients' employment status prior to cancer diagnosis, 2) leave of absence, 3) current employment status at time completing the survey, 4) employment job type, 5) level of income, 6) hours worked prior to and after being diagnosed with cancer, and 7) intent to return to work.

At one year from the initial survey, participants completed a second survey (Period 2).

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Outcome Variable Measures

This survey captured the following: 1) patients' employment status prior to cancer diagnoses, 2) leave of absence, 3) current employment status at time completing the survey, 4) employment job type, 5) level of income, 6) hours worked after being diagnosed with cancer, and 7) intent to return to work.

The electronic medical record was used to collect cancer type and staging.

Statistical Analysis

Chi-squared tests were employed for comparative analysis of changes in job title, employer, and income between periods 1 and period 2.

Furthermore, we employed a marginal modeling approach utilizing Generalized Estimating Equations (GEE) to account for employment status and work hours, while incorporating three distinct time points: the time of cancer diagnosis, the time of the initial survey, and the time of the second survey.

Marginal adjacent categories were offered using logit model for ordinal responses using uniform correlation structure.[8,9]

$$\text{logit}(P(Y_{it} \leq j|\boldsymbol{X}_i)) = \beta_{0j} + \beta_1 x_{i(time_i=1)} I(A) + \beta_2 x_{i(time_i=2)} I(A)$$

Where $i = 130, t = 1,2,3, j = 1,2$ and $I(A)$ is the indicator function for the event A.

Here $\mathbf{X}_i$ denotes the covariate matrix for subject i that includes the response variable of the time.

The employment status variable consists of an ordinal response category, encompassing three levels: "not employed," "part-time" (defined as fewer than 20 hours), and "full-time." Also, work hours are represented as an ordinal response variable categorized into three groups: less than 30 hours, over 30 hours but less than 40 hours, and 40 hours or more per week. In the covariate analysis, demographic factors such as gender, race, education, and marital status were accounted for. The Wald test was employed to compare the goodness-of-fit between two nested GEE models. P-values of 0.05 or less were considered statistically significant.

Results

Group 1 consisted of one hundred forty-two (142) participants. Group 2 consisted of one hundred thirty-four (134) participants. Breast cancer was the largest group size with 74 participants or 52.1%. The second largest group size was prostate cancer with 20 participants or 14.1%. The third largest group size was head and neck cancer with 17 participants or 12%. Regarding the alteration of job titles, there was a shift in job titles across two distinct periods (P-value=0.001). In period 1, 10 patients (7%) had a different job title, while in period 2, this number increased to 30 patients (22.4%). Furthermore, there was a change in employer over time (P-value<0.001). 8 patients (5.6%) answered that they had a change in employer in period 1, and 25 patients (18.6%) in period 2. Additionally, a discernible decrease in income levels was observed between the two periods (P-value=0.02). In period 1, 19 patients (13.4%) reported having substantially lower income compared to when they were diagnosed with cancer, while in period 2, this number increased to 26 patients (19.4%) (Table 1).

Table 1. A Comparative Analysis in Change of Job Title, Employer, and Income Between Periods 1 and 2

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Outcome	Categories	Period1, n=142 (%)	Period 2, n=134 (%)	P-value
Job title	Yes, the same job and title Yes, same job with title with reduced responsibilities No Non-response	124 (87.3) 8 (5.6) 10 (7.0) 0 (0.0)	96 (71.6) 6 (4.5) 30 (22.4) 2 (1.5)	0.001[a]
Same Employer	Yes No Non-response	133 (93.7) 8 (5.6) 1 (0.7)	103 (76.9) 25 (18.7) 6 (4.5)	<0.001[b]
Income	Substantially higher Somewhat higher Approximately the same Somewhat lower Substantially lower Non-response	1 (0.7) 14 (9.9) 91 (64.1) 17 (12.0) 19 (13.4) 0 (0.0)	3 (2.2) 26 (19.4) 70 (52.2) 8 (6.0) 26 (19.4) 1 (0.7)	0.02[c]

[a]Pearson's chi-squared test, [b] McNemar's chi-squared test, [c]Fisher exact test

Table 2. Summary Table of Employment Status and Work Hour of Previous Diagnosis, Period 1, and Period 2

Outcome	Categories	Time diagnosed with cancer, n=142 (%)	Period1, n=142 (%)	Period 2, n=134 (%)
Employment status	full-time part-time No Non-response	111 (78.2) 30 (21.1) 1 (0.7) 0 (0.0)	102 (71.8) 33 (23.2) 7 (4.9) 0 (0.0)	89 (66.4) 23 (17.2) 18 (13.4) 4 (3.0)
Work hours	Less than 30 hours 30-40 hours Greater than 40 hours Non-response	23 (16.20) 41 (28.87) 77 (54.22) 1 (0.70)	42 (29.6) 43 (30.3) 56 (39.4) 1 (0.7)	38 (28.4) 31 (23.1) 63 (47.0) 2 (1.5)

Table 3. Parameter Estimates for the Marginal Proportional Odds in Response of Employment Status and Work Hours

Outcome	Parameter	Estimate	SE	95% Confidence Interval	p-value
Employment status	β_{01}	-3.066	0.174	(-3.408, -2.724)	<0.001
	β_{02}	-1.393	0.222	(-1.828, -0.959)	<0.001
	Time1	0.385	0.152	(0.087,0.684)	0.011
	Time2	0.811	0.218	(0.383,1.238)	<0.001
Work hours	β_{01}	-1.552	0.191	(-1.926, -1.178)	<0.001
	β_{02}	-0.288	0.174	(-0.629, 0.053)	0.097
	Time1	0.616	0.131	(0.359, 0.873)	<0.001
	Time2	0.473	0.160	(0.159, 0.787)	0.003

*Estimated standard errors based on the sandwich covariance matrix; SE: Standard error

Based on the marginal proportional odds model results, the odds of being employed were 1.470 times greater at the time when diagnosed with cancer ($e^{0.385}$=1.470, 95% CI of [1.09, 1.98]) than period 1. Moreover, it was observed that the odds of being employed were substantially greater at the time of cancer diagnosis ($e^{0.811}$ =2.250, 95% CI of [1.47, 3.45]) than in period 2 (Table 2). In relation to work hours, when diagnosed with cancer, patients had 1.852 times greater odds ($e^{0.616}$=1.852, 95% CI of [1.43, 2.39]) of engaging in longer work hours compared to period 1. Furthermore, when diagnosed with cancer, patients had 1.604 times higher odds ($e^{0.473}$=1.604, 95% CI of [1.17, 2.20]) of engaging in longer work hours compared to period 2 (Table 3). No demographic covariates were found to be statistically significant; therefore, they were not included in the model.

Conclusion

Over the last decade, the cost of cancer care has continued to rise. With multiple factors attributed to this increase, the result for patients equates to financial toxicity. In addition to financial toxicity, patients suffer from side effects extending beyond diagnosis and treatment. These side effects for many are life altering and impair one's ability to continue or maintain employment similar to before diagnosis. As evidenced through this study, a cancer diagnosis and treatment have a direct impact on the ability to maintain employment and sustain income levels. The reduction of income coupled with rising cost of cancer care leads to growing disparities in how patients can be treated over time. The implementation of financial navigation programs in addition to ongoing supportive care and survivorship are essential to cancer patients continued success and access to high quality healthcare.

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