Work productivity loss in breast cancer survivors and its effects on quality of life

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Abstract

BACKGROUND: Return to work is an important process for many breast cancer survivors (BCSs) that acts as a positive step towards their reintegration into society.

OBJECTIVES: This study examined whether work productivity loss due to presenteeism could predict the quality of life (QOL) of employed BCSs.

METHODS: This study used a cross-sectional design. Seventy-five BCSs and seventy-five participants in the Non-Cancer Comparison (NCC) group were surveyed. The main outcome measures were productivity loss (as measured by the Work Limitations questionnaire) and quality of life (as measure by the European Organization for Research and Treatment Quality of Life questionnaire C30). Other measures included psychological distress (as measured by the Hospital Anxiety and Depression Scale) and cognitive limitation at work (as measured by the Cognitive Symptom Checklist).

RESULTS: The BCS group had a lower summary score, a lower global health related score and greater work limitation in all domains than the NCC group. The productivity loss due to presenteeism of the BCS group was 8%. The multiple regression model shows that work productivity loss and level of job stress were the significant predictors of quality of life in the BCS group.

CONCLUSION: These findings raise questions about the effects of level of job stress and work productivity loss on the QOL of BCSs. Longitudinal studies are needed to map these relationships.

Keywords: presenteeism, job stress, work flexibility, return to work

1. Introduction

Return to work (RTW) is an important process for many cancer survivors. RTW helps patients to regain a sense of normalcy and acts as a positive step towards their reintegration into society [1]. Although there has been an increase in the breast cancer survival rate in the past decade [2], heterogeneity has been found in RTW trends of breast cancer survivors (BCSs) in different countries. BCSs in the United States recorded the highest rate of RTW (93%) 12 months after diagnosis in the world [3]. In European countries such as the Netherlands, the proportion of partial RTW remained stable while the proportion of full RTW decreased [4]. In China, less than 20% of BCSs could RTW and they tended to RTW on average 21 months after diagnosis [5].

Work has an effect on the quality of life (QOL) and psychosocial well-being of BCSs [6]. Continuing to work after being diagnosed with breast cancer has been shown to be beneficial to all domains of health-related quality of life such as physical well-being, social well-being and functional well-being [7, 8]. In addition, women who continued to work throughout the treatment had lower levels of psychological distress, higher levels of physical functioning and higher QOL than women who never returned to work, returned to work post-treatment or stopped working during treatment [6].

BCSs who perceived their ability to fulfil work responsibilities to be greater had higher scores in all domains of QOL such as emotional well-being, physical well-being, functional well-being and social well-being [9]. However, BCSs reported reduced work ability upon RTW or even permanently reduced work ability [10-17]. Long-term BCSs also had poorer work ability than cancer-free women [18]. This may be due to certain types of treatment, treatment-related side effects such as fatigue, low workplace support and receiving early disability pensions [11-14, 18]. Moreover, perceived work ability has been associated with perceived productivity loss [19].

Presenteeism is a term describing an individual being at their workplace but not fully engaged with their work because of health issues [19]. On-the-job productivity loss and at-work productivity loss are synonyms of presenteeism [19]. Substantial research findings show that BCSs experienced a greater reduction in work productivity than cancer-free women [20, 21]. BCSs had a reduction in productivity 3.1% greater than that of healthy workers, equivalent to a loss of 2.48 hours of work over two weeks of full-time employment [20]. In addition, a causal relationship has been demonstrated between absenteeism (sick leave) and work productivity loss due to presenteeism [20, 22]. BCSs with lost work productivity reported to have more sick leave [20]. In a longitudinal study, 75% of the long-term cancer survivors took sick leave within the first 12 months after their diagnosis and the sick leave rate remained high for the following four years [23]. Recent research has shown that, compared with cancer-free women, younger BCSs (aged between 18 and 44 years) lost an additional of 15.6 days of work while older BCSs (aged between 45 and 64 years) lost an additional of 8.1 days of work due to sick leave [24].

It is still not known whether work productivity loss due to presenteeism affects the QOL of BCSs. Therefore, this study aims at investigating the effects of work productivity on the QOL of BCSs. The objectives are: 1) to compare work productivity loss, QOL and other cognitive and psychological measurements between the BCS and Non-Cancer Comparison (NCC) groups; 2) to explore the association between work productivity and QOL; and 3) to see whether work productivity loss can predict the QOL of BCSs.

2. Methods

2.1. Design

This study used a cross-sectional design. Prior to the data collection, the study's protocol was approved by the ethics committees for human subjects at the Hong Kong Polytechnic University and the West China Hospital of Sichuan University. Convenience sampling was used to select the participants.

2.1.1. Inclusion criteria

The inclusion criteria for the BCS group were: (1) female, (2) aged between 18 and 65 years old, (3) diagnosed with breast cancer (Stages I–III), (4) completed primary treatment (surgery, chemotherapy, radiation therapy, or a combination of treatments) of breast cancer at least 24 months prior to the assessment part of the study, (5) occupationally active: working on a full-time (at least 40 hours per week) or part-time (less than 40 hours per week) basis at the time of the assessment, and (6) able to read and understand simple questions.

The inclusion criteria for the NCC were: (1) female, (2) aged between 18 and 65 years old, (3) never received a diagnosis of any type of cancer, (4) working on a full-time (at least 40 hours per week) or part-time (less than 40 hours per week) basis at the time of the assessment, and (5) able to read and understand simple questions.

2.1.2. Exclusion criteria

The exclusion criteria for both study groups were: (1) a history of being diagnosed with dementia, brain injury, adult attention deficit hyperactivity disorder, epilepsy, substance-related disorder, or metastatic cancer, and (2) inability to provide voluntary consent.

2.2. Measures

2.2.1. Demographics, clinical characteristics and work status

Both the BCS and NCC groups completed questions regarding demographics including information on age, marital status, whether or not they had children and education level. Work-

related questions included type of occupation, occupational status and length of time in current job (in months). Moreover, participants were asked to rate their perceived job stress at their present job on a four-point Likert scale (never, seldom, sometimes and often) [25-28].

The BCS group answered medical-related questions, including stage of tumor, treatment received (i.e., surgery, radiation and chemotherapy), and the date of the completion of their primary treatment.

2.2.2. Psychological distress

The Hospital Anxiety and Depression Scale (HADS) [29] is a self-assessment scale for measuring depression and anxiety in the general population. The HADS consists of 14 items and two subscales, one measuring anxiety (HADS-A = 7 items) and one measuring depression (HADS-D = 7 items), which are scored separately. Each item is rated on a scale ranging from 0 to 3. The anxiety and depression scores on the subscales range from 0 to 21. Scores between 8 and 10 indicate mild cases, 11 and 15 moderate cases and 16 or above severe cases [29]. The HADS has been found to have higher levels of sensitivity, specificity and positive predictive value than other conventional measures for BCSs [30-32]. Moreover, the HADS has previously been used to measure anxiety and depressive symptoms of employed BCSs [25, 26]. The Chinese version of the HADS has been validated for use with cancer patients [33, 34].

2.2.3. Cognitive functioning

The Cognitive Symptom Checklist (CSC-W21) was developed to assess patient-reported challenges at work involving specific cognitive functions. The CSC-W21 consists of 21 specific work tasks that can present cognitive challenges in the work environment. Factor analysis shows that these tasks are related to working memory, executive function, and task completion and that the scale demonstrates both construct validity and internal reliability ($\alpha = .88$) [35]. It consists of

three domains, namely working memory, executive function and task completion. The psychometric properties of the Chinese version of CSC-W21 have been tested for BCSs and have demonstrated good validity and reliability while executive function and task completion merged as one domain [36].

2.3. Main outcome measures

2.3.1. Work limitations and productivity loss

The Work Limitations Questionnaire (WLQ) is a 25-item measure of the impact of health problems and their treatments on job performance and the effects of work limitations on productivity [37]. It was designed to be applicable to a wide range of health conditions, including breast cancer in different occupational sectors [25, 37, 38]. The WLQ measures impairment on four job-task dimensions/scales: (1) time management (TM = 5 items) assesses difficulties handling a job's time and scheduling demands; (2) physical demands (PD = 6 items) examines difficulties performing job tasks involving bodily strength, movement, endurance, coordination and flexibility; (3) mental-interpersonal demands (MI = 9 items) examines difficulties with cognitively demanding tasks and on-the-job social interaction; and (4) output demands (OD = 5 items) assesses the impact on productivity at work. The scores of all four scales are weighted to form a productivity loss score (PLS), which is an estimate of the percentage of productivity loss at work. A higher PLS indicates greater limitations.

2.3.2. Quality of life

The European Organization for Research and Treatment Quality of Life Questionnaire C30 (EORTC QLQ-C30 version 3) is a 30-item cancer-specific scale that addresses various aspects of QOL. It consists of 15 domains, including five functional subscales (physical, role, emotional, cognitive and social), three multi-item symptom subscales (fatigue, pain and nausea/vomiting), a

global health/QOL subscale, and six single items addressing various symptoms and perceived financial impact [39]. All items are transformed to a 0–100 score. For the functioning and global health/QOL subscales, a higher score represents better functioning and global health/QOL. In contrast, a higher score on the symptom subscales represents greater symptom severity [40]. The Chinese version of the QLQ-C30 (version 3) has been validated used with patients with breast cancer [41].

2.4. Data analysis

Descriptive statistics were used to summarize participants' demographic, clinical and work characteristics, as well as the mean scores of the outcome measures. Independent *t*-test and Chi-square test were used to test for differences in demographics and symptom profiles between the BCS and NCC groups.

Bivariate correlation analysis was used to explore the relationships between variables, such as the demographics, clinical characteristics and different outcome measures. Then, multiple linear regression using forward stepwise method was performed to explore the significant predictors of the QOL of BCSs. All data analyses were conducted using IBM SPSS program version 23. The significance level was set at $p < .05$.

3. Results

A total of 150 participants, 75 participants with a diagnosis of breast cancer in the BCS group and 75 participants in the NCC group, completed the study. All of the participants were Chinese women from Sichuan, a southwestern province in China. Most of the participants in the BCS group were above 40 years old (52%), were married (68%), had children (86.7%) and had attained high school or lower educational qualification (52%). A high level of work stress was reported by 60%

of the participants in the BCS group. The mean time since starting current job was 7.67 years for the BCS group. Demographics of the two groups are shown in Table 1. Clinical characteristics of the BCSs are shown in Table 2.

The results of the independent t-test show that the BCS group had greater psychological distress than the NCC group as indicated by the HADS anxiety and depression score ($p < .001$). The BCS group also had greater cognitive limitation than the NCC group as indicated by the CSC-W21 total score, but this difference was not significant. For QOL as measured by the EORTC QLQ-C30, the BCS group had a lower summary score and global health status score than the BCS group ($p < .001$). For work limitation and productivity loss as measured by the WLQ, the BCS group had greater limitation than the NCC group in all four domains (time management, physical demands, mental-interpersonal demands and output demands). By multiplying the productivity loss score by 100, it was calculated that the percentage of productivity loss due to presenteeism of the BCS group was 8% while the percentage of productivity loss due to presenteeism of the NCC group was 2% ($p < .001$). Table 3 summarizes the comparisons of the scores on different measures between the two groups.

Results of bivariate correlation analysis show that WLQ productivity loss score and demographics including age, marital status and level of work stress were significantly correlated with global health status score (Table 4). Multiple linear regression analysis using forward stepwise method indicated that work productivity (WLQ productivity loss score) could predict QOL (QLQ global health status score). Age, marital status and level of work stress were entered at Step 1, explaining 9.5% of the variance in QOL. After entering the WLQ productivity loss score at Step 2, the total variance explained by the model was 42%, $F (4, 145) = 26.23$, $p < .001$. In the final model, only

level of work stress (beta = -.15, p = .027) and the WLQ productivity loss score (beta = -.65, p < .001) were statistically significant (Table 5).

4. Discussion

Our results show that the BCS group had significantly lower QOL and greater work limitation than the NCC group, which is consistent with the findings of previous studies [10, 26, 42, 43]. Although the BCS group also had higher cognitive limitation at work than the NCC group as indicated by the CSC-W21 total score, the difference was not significant.

Age, having children and time since starting current job were negatively correlated with productivity loss at work. However, stage of cancer and therapeutic method were not associated with productivity loss at work, which is different from previous findings that disease progression or severity and therapeutic method such as chemotherapy were associated with greater limitation after RTW [15]. In addition, psychological distress such as anxiety, depression and cognitive limitation at work were not associated with productivity loss at work, which is different from previous findings [10]. Previous research also found that symptom burdens such as hot flushes and fatigue were associated with work productivity [7, 20].

The BCSs in our study had significantly greater productivity loss at work when compared with the NCC group. The productivity loss due to presenteeism of the BCS group and the NCC group was 8% and 2% respectively. The mean difference in the productivity loss at work between the BCS group and the NCC group was 6%, which was higher than that found by Lavigne et al. (2008), who reported that the BCS group had a mean reduction in productivity of 3.1% below the healthy worker norm [20]. However, productivity loss due to presenteeism of BCSs may vary across different countries and a larger sample size is needed to further investigate this issue.

Our findings suggest that work productivity loss was the significant predictor of QOL in the BCS group, which had not been investigated before. Previous studies have shown that employment status (being employed) was the significant predictor of QOL of BCSs and that continuing work during and after the diagnosis could help BCSs maintain better psychosocial well-being [6-8]. Additionally, changes in employment status or work transitions such as downgrade from full-time to part-time job, termination or job loss have been significantly associated with poorer QOL [44, 45]. This reflects that work or being employed is an important factor in maintaining a QOL for BCSs. On the other hand, BCSs may have to bear symptom burdens and physical or cognitive limitations while at work, which may contribute to work productivity loss. Implementation of flexible workplace practices such as adjustment of working hours and job responsibilities and gradation of job-task difficulty should be considered as an intervention to improve the work outcomes of BCSs [38, 46].

Finally, since we do not have the data on the number of hours the participants worked per day or per week, we are unable to calculate the number of hours lost due to presenteeism. Previous studies on chronic diseases such as rheumatoid arthritis or osteoarthritis have calculated productivity loss by multiplying the percentage of productivity loss with the number of hours an individual worked [47, 48]. One study also compared the accuracy of various instruments such as the Health and Labour questionnaire (HLQ), Work Limitations questionnaire (WLQ), World Health Organization's Health and Work Performance Questionnaire (HPQ) and Work Productivity and Activity Impairment Questionnaire (WPAI) in estimating productivity loss [47]. Therefore, further research should focus on evaluating existing productivity loss instruments to determine whether they are valid for assessing the hours or days lost due to presenteeism and absenteeism in BCS populations.

5. Conclusions

This study highlights that BCSs had a higher rate of productivity loss due to presenteeism and a lower QOL when compared with the NCC group. In addition, work productivity loss was also associated with lower QOL of BCSs. There is a need to explore the factors associated with work productivity loss of BCSs. Workplace flexibility, government policies, therapeutic methods and psychosocial factors may contribute to productivity loss. As a result, it is recommended that future research should investigate whether existing instruments can accurately estimate the hours and/or days lost due to presenteeism and absenteeism in BCS populations as well as the means to facilitate RTW of BCSs.

Acknowledgements

The authors would like to thank all the participants in this study.

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