Return to work and work productivity in patients with breast cancer: a longitudinal study (abridged secondary publication)

WWT Lam *, R Fielding, A Mehnert, A Kwong, M Chan, A Or, D Fong, A Molasiotis, W So, S Chan

KEY MESSAGES

1. Among patients with breast cancer, 52% returned to work within 24 months after surgery, although some required up to 284 days until workforce re-entry.
2. Older age, extensive surgery, chemo- and/or radiotherapy, and unfavourable working condition (prolonged sitting) were barriers to return to work.
3. Higher monthly household income and the presence of financial difficulties were factors associated with return to work.
4. The presence of nausea at baseline predicted greater absenteeism at 24 months post-surgery.
5. Excessive job demands predicted greater loss in a patient's work ability and performance at 24 months post-surgery.

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[1] WWT Lam, [1] R Fielding, [2] A Mehnert, [3] A Kwong, [4] M Chan, [4] A Or, [5] D Fong [5,6] A Molasiotis, [7] W So, [8] S Chan

[1] *School of Public Health, The University of Hong Kong, Hong Kong SAR, China*
[2] *University Medical Center, The University of Leipzig, Germany*
[3] *Department of Surgery, The University of Hong Kong, Hong Kong SAR, China*
[4] *Kwong Wah Hospital, Hong Kong SAR, China*
[5] *School of Nursing, The University of Hong Kong, Hong Kong SAR, China*
[6] *School of Nursing, Hong Kong Polytechnic University, Hong Kong SAR, China*
[7] *The Nethersole School of Nursing, The Chinese University of Hong Kong, Hong Kong SAR, China*
[8] *Department of Surgery, United Christian Hospital, Hong Kong SAR, China*

* Principal applicant and corresponding author: wwtlam@hku.hk

Introduction

Breast cancer is the most common cancer among women, both in Hong Kong and worldwide. A substantial number of women diagnosed with breast cancer are of working age, highlighting the need to examine issues regarding return to work (RTW) after cancer diagnosis. RTW indicates reintegration into normal life, which is essential for preserving self-identity and enhancing psychological well-being.[1] Facilitating RTW is economically beneficial, enhances productivity, and therefore has high societal value. However, less attention has been directed towards the impact of cancer diagnosis on work productivity including absenteeism (ie, missing time from work), presenteeism (ie, reduced performance while at work), and activity impairment. Thus, we aimed to examine RTW status and time to RTW, work productivity (absenteeism and presenteeism), and activity impairment among women diagnosed with breast cancer after completion of primary breast cancer treatment, and to identify factors associated with RTW status, time to RTW, work productivity, and activity impairment.

Based on factors proposed by Mehnert,[1] we examined whether time to RTW and work productivity and activity impairment were related to demographic factors (ie, age, education level, and marital status), physical functioning, psychosocial functioning, work satisfaction, and work-related factors. We also investigated whether the effects of medical factors on time to RTW and work productivity were mediated by their effects on physical and psychosocial functioning, work satisfaction, and work-related factors, and whether there were interactions between medical factors and demographic factors in terms of time to RTW and work productivity.

Methods

Consecutive Chinese patients aged ≥18 years who were newly diagnosed with non-metastatic breast cancer, had paid or self-employment at the time of diagnosis, and underwent surgery as primary treatment within 4 weeks of diagnosis were recruited from three public breast care units in Hong Kong between December 2018 and November 2020. Patients with linguistic or intellectual difficulties or a diagnosis of metastatic breast cancer were excluded.

Eligible patients were identified by clinicians at each study unit and then approached by a trained research assistant while awaiting post-surgical follow-up consultations. Patients were asked to complete a baseline questionnaire immediately (T1). Follow-up assessments were conducted via telephone interviews at 4 months (T2), 6 months (T3), 12 months (T4), 18 months (T5), and 24 months (T6).

Medical data were retrieved from hospital medical records using a standardised medical information profile.

RTW was defined as the time needed to return to work after an absence due to the cancer diagnosis (ie, time off from work, including paid or unpaid sick leave).[1] At each assessment (T1-T6), patients were asked to indicate whether they were continuing sick leave; if they had RTW, they were asked to specify the date of RTW. Time to RTW was defined as the number of days between the first day of sick leave due to the breast cancer and the first day of RTW, irrespective of any changes in job nature (eg, new job, different job responsibilities, or reduced working hours).[1]

Work productivity and activity impairment were assessed using the Chinese version of the Work Productivity and Activity Impairment questionnaire, with a recall period of 7 days.[2] The six-item questionnaire measures four domains: absenteeism (number of work hours missed due to current health condition), presenteeism (extent to which the current health condition affects productivity at work), work productivity loss (extent of work inability induced by the current health condition), and activity impairment (extent to which the current health condition affected regular activities other than work).

Work satisfaction was measured using the 12-item Work Satisfaction Scale[3] on a seven-point Likert scale. Patients rated their satisfaction with various aspects of work such as co-workers, working condition, and working hours.

Perceived job strain (eg, working overtime, time pressure, and high pressure of competition) was assessed using a 10-item scale,[3] and working condition (eg, physically heavy work and under-challenging work) were assessed using an eight-item scale.[3]

Physical and psychosocial functioning were assessed using the standard Chinese versions of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire and the breast cancer-specific module.[4] The former comprises 30 items across five functional domains (physical, role, emotional, cognitive, and social), three symptom scales (fatigue, pain, and nausea/vomiting), a global health-related quality of life subscale, five single-symptom items (dyspnoea, appetite loss, sleep disturbance, constipation, and diarrhoea), and financial difficulties. The latter is a breast cancer-specific measure consisting of 23 items across four functional domains (body image, sexual functioning, sexual enjoyment, and future perspective) and four symptom scales (arm symptoms, breast symptoms, adverse effects of systemic therapy, and being upset by hair loss).[4]

Kaplan-Meier survival analysis was used to estimate the mean time to RTW. Cox regression analysis was performed to identify factors associated with RTW status. Hazard ratios (HRs) represent the RTW probability; an HR of >1 indicates an increased likelihood of work resumption. Linear regression analyses were performed to identify covariates of time to RTW, work productivity, and activity impairment. The coefficient B or beta indicates the direction of each association between outcome variables and covariates. Bonferroni correction was used to calculate adjusted P-values for multiple comparisons.

Results

Of 532 eligible patients, 378 (71%) agreed to participate and completed baseline assessment. Of these, 311 were included in the analysis who completed assessment at 4 months (n=289), 6 months (n=263), 12 months (n=225), 18 months (n=161), and/or 24 months (n=145) [Table 1]. Attrition rates for follow-up assessments ranged from 23.5% to 61.6%. The remaining 67 patients were excluded from analysis due to death, diagnosis with stage 4 disease, or absence of ≥3 follow-up assessments.

The rate of RTW ranged from 22.8% to 70.6% across the six timepoints (Table 2). On average, 52.36% of the patients returned to work within 24 months after surgery. Kaplan-Meier survival analysis showed that the average time to RTW was 9.47 months (standard error=0.50). It is estimated that 75% and 25% of the patients remained out of the workforce at 2.77 months and 15.33 months, respectively.

In the multivariable Cox regression model, higher monthly household income (>HK$30 000 per month) [HR=2.22, P<0.001] and more prolonged sitting at work (HR=1.28, P<0.001) were associated with a higher likelihood of work resumption within 24 months after surgery. Conversely, extensive surgery (mastectomy with/without reconstruction) [HR=0.60, P<0.001], chemotherapy (HR=0.51, P<0.001), radiotherapy (HR=0.55, P<0.001), and greater financial difficulties (HR=0.99, P=0.045) were associated with a lower likelihood of work resumption (Table 2).

In the multivariable linear regression model, older age (B=0.16, P=0.050), extensive surgery (mastectomy with/without reconstruction) [B=2.57, P=0.020], chemotherapy (B=4.07, P<0.001), and radiotherapy (B=3.27, P=0.010) were associated with a longer time to RTW. In contrast, perceived working condition that involved more prolonged sitting (B=-1.48, P=0.020) was associated with a shorter time to RTW (Table 3).

Extensive surgery (mastectomy with/without reconstruction) was positively associated with a longer time to RTW (β=3.98, P=0.001) but negatively

TABLE 1. Clinical characteristics of patients (n=311)

Characteristic	Value*
Age at diagnosis, y	52.62±8.18
Time since cancer diagnosis, m	4.34±7.62
Marital status	
Married/cohabited	186 (59.8)
Single/divorced/separated/widowed	124 (39.9)
Missing	1 (0.3)
Education level	
No formal/primary education	43 (13.8)
Secondary/tertiary	266 (85.5)
Missing	2 (0.6)
Job title	
White collar	116 (37.3)
Blue collar	132 (42.4)
Professional, manager, or self-employed	63 (20.3)
Monthly household income, HK$	
<10 000	56 (18.0)
10 001-30 000	124 (39.9)
≥30 001	122 (39.2)
Missing data	9 (2.9)
Surgery type	
Breast conserving (including axillary lymph node dissection)	150 (48.2)
Mastectomy or plus reconstruction	160 (51.4)
Missing data	1 (0.3)
Active treatment at baseline	
Chemotherapy	64 (20.6)
Radiotherapy	24 (7.7)
Target therapy	36 (11.6)
Hormonal therapy	58 (18.6)
No active treatment	191 (61.4)
Missing data	0
Active treatment at 4 months	
Chemotherapy	65 (20.9)
Radiotherapy	32 (10.3)
Target therapy	41 (13.2)
Hormonal therapy	130 (41.8)
No active treatment	57 (18.3)
Missing data	48 (15.4)
Active treatment at 6 months	
Chemotherapy	25 (8.0)
Radiotherapy	30 (9.6)
Target therapy	37 (11.9)
Hormonal therapy	151 (48.6)
No active treatment	77 (24.8)
Missing data	45 (14.5)
Active treatment at 12 months	
Chemotherapy	3 (1.0)
Radiotherapy	6 (1.9)
Target therapy	20 (6.4)
Hormonal therapy	143 (46.0)
No active treatment	73 (23.5)
Missing data	77 (24.8)
Active treatment at 18 months	
Chemotherapy	3 (1.0)
Radiotherapy	0
Target therapy	5 (1.6)
Hormonal therapy	120 (38.6)
No active treatment	43 (13.8)
Missing data	146 (46.9)
Active treatment at 24 months	
Chemotherapy	3 (1.0)
Radiotherapy	2 (0.6)
Target therapy	3 (1.0)
Hormonal therapy	98 (31.5)
No active treatment	42 (13.5)
Missing data	165 (53.1)

* Data are presented as mean ± standard deviation or No. (%) of patients

associated with physical (β= -8.61, P<0.001) and role (β= -6.70, P=0.033) functioning. Physical (β= -0.10, P<0.001) and role (β= -0.051, P=0.0046) functioning were both negatively associated with a shorter time to RTW, indicating putative mediation effects. Bootstrapping procedures with 5000 iterations were performed to test mediation effects.[5] Extensive surgery had indirect effects on time to RTW mediated through physical (β=0.86, 95% confidence interval [CI]=0.28-1.63) and role (β=0.34, 95% CI=0.014-0.87) functioning. After controlling for these two mediators, the direct effect of extensive surgery on time to RTW remained significant (β=3.12, P=0.015 and β=3.64, P<0.001, respectively). These findings indicate that physical and role functioning independently and partially mediate the association between time to RTW and surgery type.

Chemotherapy was positively associated with a longer time to RTW (β=5.64-5.73, P<0.001) but negatively associated with physical functioning (β= -7.30, P=0.015) and work satisfaction (β= -0.28, P=0.026). Physical functioning (β= -0.095, P=0.001) and work satisfaction (β= -1.91, P<0.001) were negatively associated with a shorter time to RTW, indicating putative mediation effects. Using the

TABLE 2. Predictors of work resumption in multivariable Cox regression model (n=302) [χ^2=108.88, P<0.001]

Variable	B	Standard error	Hazard ratio (95% confidence interval)	P value	Adjusted P value
Monthly household income, HK$					
10 000 (reference)					
10 001-30 000	0.40	0.22	1.48 (0.96-2.29)	0.074	0.67
≥30 001	0.80	0.22	2.22 (1.48-3.44)	<0.001	<0.001
Surgery type					
Breast conserving (including axillary lymph node dissection) [reference]					
Mastectomy or plus reconstruction	-0.51	0.14	0.60 (0.46-0.80)	<0.001	<0.001
Chemotherapy	-0.67	0.15	0.51 (0.38-0.69)	<0.001	<0.001
Radiotherapy	-0.60	0.17	0.55 (0.39-0.77)	<0.001	<0.001
Working condition					
Incorrect one-sided posture	-0.17	0.081	0.84 (0.72-0.99)	0.033	0.30
Frequent/long hours in sitting position	0.24	0.073	1.28 (1.11-1.47)	<0.001	<0.001
Financial difficulties	-0.007	0.002	0.99 (0.98-0.99)	0.005	0.045

TABLE 3. Predictors of time to return to work in multivariable linear regression model (n=311) [R^2=0.33, P<0.001]

Variable	B (95% confidence interval)	β	t	P value	Adjusted P value
Age	0.16 (0.047 to 0.26)	0.15	2.82	0.005	0.05
Monthly household income, HK$					
10 000 (reference)					
10 001-30 000	-	-	-	-	-
≥30 001	-2.52 (-4.40 to -0.65)	-0.15	-2.65	0.008	0.080
Surgery type					
Breast conserving (including axillary lymph node dissection) [reference]					
Mastectomy or plus reconstruction	2.57 (0.81-4.33)	0.15	2.87	0.004	0.040
Chemotherapy	4.07 (2.26-5.87)	0.23	4.43	<0.001	<0.001
Radiotherapy	3.27 (1.28-5.25)	0.17	3.25	0.001	0.010
Frequent/long hours in sitting position	-1.48 (-2.40 to -0.57)	-0.16	-3.19	0.002	0.020
Physical functioning	-0.042 (-0.091 to 0.007)	-0.096	-1.68	0.095	0.95
Financial difficulties	0.38 (0.007 to 0.068)	0.14	2.44	0.015	0.15

same bootstrapping procedures,[5] Chemotherapy had indirect effects on time to RTW mediated through physical functioning (β=0.70, 95% CI=0.20-1.39) and work satisfaction (β=0.53, 95% CI=0.05-1.14). After controlling for these two mediators, the direct effect of chemotherapy on time to RTW remained significant (β=4.94, P<0.001 and β=5.20, P<0.001, respectively). These results indicate that physical functioning and work satisfaction independently and partially mediate the association between time to RTW and chemotherapy.

Radiotherapy was positively associated with a longer time to RTW (β=4.44, P<0.001) but negatively associated with work satisfaction (β= -0.33, P=0.016). Work satisfaction (β= -2.00, P<0.001) was negatively associated with a shorter time to RTW, indicating putative mediation effects. Radiotherapy had indirect effects on time to RTW mediated through work satisfaction (β=0.67, 95% CI=0.10-1.35). After controlling for this mediator, the direct effect of radiotherapy on time to RTW remained significant (β=3.77, P<0.001), which indicates that work satisfaction partially mediates the association between time to RTW and radiotherapy.

Moderation analysis showed significant interactions of chemotherapy × age (β=0.27,

P=0.026) and chemotherapy × education level (β= -6.61, P=0.015) with time to RTW, suggesting that age and education level independently moderate the association between time to RTW and chemotherapy.

In analyses of factors associated with work productivity and activity impairment at 24 months post-surgery, only patients with active employment at 24 months were able to report their working hours and absence from work. Therefore, absenteeism and presenteeism data were not applicable to patients who were on sick leave or unemployed. At 24 months, 11.5% of active employment reported absenteeism due to their health condition. On average, their absence constituted 3.76% of their working time. In multivariable regression model, nausea (B=0.31, 95% CI=0.078-0.55, P=0.020) was positively associated with absenteeism. Additionally, 54% of the patients with active employment reported work impairment due to their health condition (ie, presenteeism). In the multivariable regression model, only perceived working condition with excessive demands remained a significant factor. Greater perceived work demands were associated with higher levels of presenteeism (B=8.18, 95% CI=0.41-15.94, P=0.040). Moreover, 25.10% of patients reported activity impairment due to their health condition. In multivariable regression model, only role functioning was negatively associated with activity impairment (B= -0.14, 95% CI= -0.26 to -0.22, P=0.021). Only physical functioning was a mediator of the association between activity impairment and hormonal therapy. Hormonal therapy was positively associated with activity impairment (β=14.21, P=0.0045) but negatively associated with physical functioning (β= -8.02, P=0.035). Physical functioning was negatively associated with activity impairment (β= -0.34, P=0.010), indicating putative mediation effects. Hormonal therapy had an indirect effect on activity impairment mediated through physical functioning (β=2.76, 95% CI=0.31-6.28). After controlling for the mediator, the direct effect of hormonal therapy on activity impairment remained significant (β=11.45, P=0.019), indicating that physical functioning partially mediates the association between activity impairment and hormonal therapy.

Discussion

Cancer diagnosis and treatment can affect RTW, work productivity, and activity impairment. RTW after cancer treatment can be challenging, especially during the initial recovery stage, as evidenced by the low rate of RTW at baseline. The time to RTW varies among patients; some individuals require up to 284 days to re-enter the workforce.

Our findings partially support Mehnert's explanation of work-related outcomes in cancer survivorship.[1] Older age, lower monthly household income, extensive surgery, chemo- and/or radiotherapy, unfavourable working condition (prolonged sitting), and financial difficulties were barriers to RTW. Specifically, physical functioning partially mediated the associations between RTW and both surgery type and chemotherapy; role functioning partially mediated the association between RTW and surgery type; and work satisfaction mediated the associations between RTW and both chemo- and radiotherapy. The impact of chemotherapy on RTW was strengthened by older age but weakened by higher education levels.

The physical symptom of nausea can result in absenteeism. A stressful work environment with excessive demands can adversely affect a patient's work ability and performance. Poor role functioning, and the indirect effect of hormonal therapy mediated through physical functioning, can impair a patient's ability to perform regular activities.

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1. Ng DWL, So SCY, Fielding R, et al. Return to work, work productivity loss and activity impairment in Chinese breast cancer survivors 12-month post-surgery: a longitudinal study. Front Public Health 2024;12:1340920.

References

1. Mehnert A. Employment and work-related issues in cancer survivors. Crit Rev Oncol Hematol 2011;77:109-30.
2. Reilly MC, Zbrozek AS, Dukes EM. The validity and reproducibility of a work productivity and activity impairment instrument. Pharmacoeconomics 1993;4:353-65.
3. Bürger W, Dietsche S, Morfeld M, Koch U. Multiperspective estimates on the probability of patient return to work following orthopaedic rehabilitation: findings and predictive relevance [in German]. Rehabilitation (Stuttg) 2001;40:217-25.
4. Aaronson NK, Ahmedzai S, Bergman B, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. J Natl Cancer Inst 1993;85:365-76.
5. Hayes AF. Introduction to Mediation, Moderation, and Conditional Process Analysis: a Regression-Based Approach. New York: Guilford Press; 2018.