

IN-DEPTH REVIEW

Employment and the common cancers: correlates of work ability during or following cancer treatment

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Aims	To provide an in-depth review of the impact of cancer and cancer-related issues on work ability for those working during or following cancer treatment.
Methods	Of total, 19 papers published between 1999 and 2008 on cancer and work ability were reviewed.
Results	Studies have shown that most types of cancers result in decreased work ability compared to healthy controls or those with other chronic conditions. Some cancer types have more decreased work ability than other types. Decreased work ability is associated with type of treatment (chemotherapy), treatment-related side-effects (e.g. fatigue) and co-morbidity with other health conditions. For most cancers, work ability improves over time irrespective of age.
Conclusions	More longitudinal research is required to fully determine the impact of cancer and its treatment on work ability, occupational health services can help such employees make a full recovery and maintain employment by regularly assessing work ability and working hours so that work adjustment and support can be appropriately tailored.
Key words	Cancer; productivity; psychosocial; review; treatment; work ability.

Introduction

With advances in detection and treatment, the number of people who recover from cancer has increased significantly in recent years [1]. There are now numerous published studies on the employment consequences of cancer survivorship, the majority of which focus on return to work outcomes. These suggest that between 44 and 100% of those diagnosed with cancer return to work following treatment [2], typically between 6 and 12 months following diagnosis. The return to work rate is reported to vary according to type and severity of cancer, treatment type and other disease-related factors such as fatigue, pain and concentration problems [3–5]. Age, gender, income, employment type and work ability also play a role in return to work outcomes [6–8], as do work-related factors such as supervisor and co-worker relations, availability of work adjustments and perceived workplace support [9]. There are now a number of review articles that have focused on these with the main spotlight on identifying the

correlates associated with whether an individual recovering from cancer is able to return to work, and if so, ‘when’ they return to work [8,10,11]. Despite this focus, there are a growing number of studies on the influence of cancer and its treatment on work performance for those working during treatment or returning to work following treatment. These have not yet been reviewed as to their significance and magnitude of the problem in work ability. Still to be considered are the issues of whether work ability improves or declines over time; and what disease-related, socio-demographic and work-related factors impede work. Although Taskila [8] conducted a review on work ability, this largely focused on return to work and other employment outcomes. While one of the main tasks for occupational physicians is to facilitate return to work by means of rehabilitation procedures, they should also ensure that a number of solutions and support mechanisms are put in place to assist employees working during or following treatment. With better knowledge about the effects of cancer and its treatment, and other factors on work ability, occupational physicians can be better equipped to provide the right kind of support and solutions.

The aim of the present study is to integrate relevant information from different areas of research related to work ability among those diagnosed with cancer. Therefore, rather than perform a comprehensive literature review or meta-analysis, the goal is to give an overview of what factors have been associated with work ability for

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a non-cancer specialist audience. For the purpose of this study, work ability is defined as ‘... how able is a worker to do his or her job with respect to the work demands, health and mental resources’ [12] rather than the ability to enter or return to employment. This definition takes into account all the factors that may influence the work capacity of the worker and make the job more or less manageable.

Methods

A literature review was undertaken to identify current published papers on the work ability of individuals diagnosed with cancer who had either continued to work during treatment or had returned to work following treatment. The information was reviewed as to its relevance to work ability and included studies that measured work ability or productivity in various ways (e.g. questionnaire instruments, reduction in work hours, self-report work ability) across all cancer types. Web of Science (incorporating psychinfo and ingenta) and Medline databases were searched with the following key words combined with the term ‘cancer’: ‘work ability’, ‘work limitations’, ‘work productivity’ ‘work disability’ and ‘work impairments’. The terms cancer and ‘work’ were then further combined with the terms ‘longitudinal studies’, ‘prospective studies’ and ‘qualitative studies’. The latter was included as the value of qualitative reviews is increasingly recognized [13,14] and can contribute important insights into core activities particularly with regard to interventions [15]. To expand our literature base, the references of the literature found were also searched.

Results

The literature search resulted in 19 articles published between 1999 and 2008 that met our inclusion criteria. Four of the articles were qualitative studies and of the remaining quantitative studies, the majority were cross sectional and three longitudinal. The types of cancers largely represented in these studies are breast, colorectal, prostate and testicular. These cancers are not only the most prevalent but also have a higher survival rate due to advances in treatment [1]. Therefore, the likelihood of returning to work following cancer diagnosis and treatment within these cancer groups are relatively high [16]. Smaller numbers of other cancer types have also been examined/included in some studies and consist of head and neck, brain tumours, skin, uterus, stomach and gastrointestinal cancers. Some studies do not differentiate between those working or not working when assessing work ability and longitudinal studies assess work ability from sick-leave to post return to work. As some cancers are sex specific or prevalent in different age groups (prostate and colorectal affect older age groups), studies have either controlled for potential confounding factors or presented findings sep-

arately for these demographic groups. Treatment also varies by cancer type with breast cancer treated most aggressively involving surgery, radiotherapy and chemotherapy. Finally, some studies also take into account differences in employment, income, education and different labour market attachments by gender and age; and a number of studies have included comparison groups matched on demographics (general working population). In terms of measure of work ability, very few studies have utilized well-validated measures (see Table 1), making it difficult to synthesize findings across studies.

Cancer and work ability

Although studies show that those diagnosed with cancer who have relatively high work ability score are most likely to be working during or following cancer treatment [17,18], most cancer survivors still have lower work ability compared to those without a history of cancer or those with other chronic conditions (on average 2 years post-diagnosis) (Table 2). Those with a recent history of breast cancer [3,19], malignant brain tumours [20], stomach [21], prostate, colorectal, testicular and other cancers [22–24] reported either lower work productivity, impairments in physical and mental work ability or reduced working hours compared to a comparison group of those employed and with no history of cancer. One study found no difference in work ability between those with cancer (breast, prostate, testicular, lymphoma) and a comparison group for both genders [17]. Bradley *et al.* [19] also reports no difference in working hours between those diagnosed with prostate cancer (6 months post-diagnosis) and a comparison group. These findings may largely be attributed to the good prognosis of the cancer groups in both studies. Longitudinal studies have shown that the work ability of those with cancer does improve over time [3,18,19]. Working hours for those with breast cancer are reduced at 6 months post-diagnosis but increase at 18 months post-diagnosis although they are still lower when compared to a healthy comparison group [19]. Similarly, work ability scores across different cancer types (using a modified version of the work ability index and measured on scale of 0–10, 10 representing optimal work ability) are reported to be on average 4.3 at 6 month post-diagnosis and on average 6.7 at 18 months post-diagnosis although no comparisons can be made with the general working population [18].

Compared with other chronic conditions, both males and females with a recent history of cancer are more likely to report higher work disability than those with either heart disease, lung disease, stroke [25,26], arthritis, major depression or panic disorder [26]. The type of cancer associated with the lowest work ability is varied. In one study, men with testicular cancer are reported to have the least physical and mental impairments at work compared to those with breast, prostate or lymphoma [17]. In

Table 1. Measures used to assess changes in work ability since cancer diagnosis

Authors	Work ability measure
Bradley <i>et al.</i> [19]	Hours worked per week; and participants were asked if they experienced difficulties in performing tasks involving physical effort, stooping, heavy lifting, concentrating, analyses, keeping pace and learning new things
De Boer <i>et al.</i> [18]	Work ability measured by the first three items from the Work Ability Index [36]: Participants asked to rate their current work ability with their lifetime best (0 = cannot work at all, to 10 = best ever). Also asked to rate current physical and mental work ability in relation to job demands (0 = very low, to 5 = very high)
Feuerstein <i>et al.</i> [20]	Work Limitations Questionnaire [37]
Gudbergsson <i>et al.</i> [22]	Hours worked per week, self-rated physical and mental work capacity (no further information on the content of these questions)
Henry <i>et al.</i> [27]	Number of missed work days in the past year to receive treatment for cancer and/or for associated side-effects of cancer treatment
Kessler <i>et al.</i> [26]	Participants asked how many days out of the past 30 were they totally unable to work; and how many days they had to cut back on work or how much they got done because of their health
Lee <i>et al.</i> [21]	Participants were asked if they had reduced work hours and lessened work-related ability than before diagnosis
Maunsell <i>et al.</i> [3]	Hours worked per week, number of jobs
Short <i>et al.</i> [23]	Hours worked per week: full time (35+ hours per week), working usual hours per week or not working
Short <i>et al.</i> [25]	Participants were asked if they had any kind of impairments or health problems that limited the kind or amount of paid work they could do
Steiner <i>et al.</i> [28]	Hours worked per week; Occupational Role Questionnaire (adapted; eight items: working more slowly, taking longer breaks, lessening of ability to concentrate etc.)
Taskila <i>et al.</i> [8,17]	One item used from the Work Ability Questionnaire [36]: Participants asked to rate their current work ability with their lifetime best (0 = cannot work at all, to 10 = best ever). Additional two questions on whether cancer had impaired physical or mental work ability
Yabroff <i>et al.</i> [24]	Lost productivity measured by asking participants they had limitations in ability to work due to health problems, limitations in the amount or kind of work because of health problems, and number of days lost from work in the past year (all answered yes or no)

another study, those with leukaemia are reported to have the lowest scores compared to those with breast, cervical, gastrointestinal and genitouriological cancers [18]. Yabroff *et al.* [24] found in their study that those with lung and gastrointestinal cancers reported the most limitations in work ability compared to those with breast, prostate or colorectal cancers. In a comparative study of prostate (men) cancer and breast (women) cancer, those with breast cancer reported difficulties in both mentally and physically demanding work regardless of job type. In contrast, men with prostate cancer largely reported difficulties in physically demanding work [19]. As these studies adopted different measures of work ability and study design, it is difficult to draw conclusions regarding cancer type and work ability. Moreover, it is likely that differences between the cancer types are due to severity of the disease, treatment-related factors as well as work-related factors.

Impact of physical and behavioural symptoms of cancer and treatment

Chemotherapy has one of the strongest associations with work ability and has been consistently linked to poor work ability in comparison to other treatments in those working

during or following cancer treatment [17,18,27,28], irrespective of cancer type. A number of specific side-effects associated with cancer treatment which affect work ability have also been reported. Fatigue is increasingly recognized as one of the most common and distressing side-effects of cancer treatment and that has a significant impact on work ability [20,21,27–29]. Among those treated for cancer, the prevalence of fatigue or lack of energy experienced at work ranges from 22 to 94% [21,27–29]. Fatigue has also been associated with lower work productivity [20], work cut back and absenteeism [26,27], together with changes in job role [28]. Other side-effects of cancer diagnosis and treatment have also been correlated to poor work ability. Nausea and vomiting, depressive symptoms, cognitive impairments and poor sleep quality have been related to higher work limitations [20], missed work days [27] and changes in job role [28].

Although most studies control for confounding factors, few studies have examined the influence of these on work ability. Co-morbidity with other illnesses [17,22,24] and re-occurrence of cancer [23] were all related to poor work ability among those recovering from cancer. In terms of gender, women show lower work ability than men at 6 months post-diagnosis but show the most improvement over time [18]. This finding must be interpreted with

Table 2. Summary of study results on the work ability of those diagnosed with cancer and working during or following cancer treatment

Authors	Study design	Study population	Population differences	Disease-related factors associated with low work ability	Demographic factors associated with low work ability	Support and work adjustments to help with work ability
Bradley <i>et al.</i> [19]	Longitudinal study: 18 months	294 men with prostate, 496 women with breast; and 300 as healthy controls	Breast cancer reported less working hours than health controls; and work impairments	Treatment (type not specified)	–	–
De Boer <i>et al.</i> [18]	Longitudinal study: 18 months (6, 12 and 18 months)	195 different types of cancers	Haematological cancers reported lowest work ability. Work ability improved over time for all cancers and all ages	Chemotherapy	Female	–
Feuerstein <i>et al.</i> [20]	Cross sectional	95 with malignant brain tumours, 131 as healthy controls	Cancer group reported higher work limitations	Depressive symptoms, fatigue, cognitive, sleep	–	–
Gudbergsson <i>et al.</i> [22]	Cross sectional	216 women with breast, 214 men with prostate or testicular; 596 health controls	Cancer group had poorer physical and mental work capacity	Co-morbidity, general health status in male cancer survivors	Female	–
Henry <i>et al.</i> [27]	Cross sectional	841 with different types of cancers receiving chemotherapy or radiotherapy (within 12 months since diagnosis)	No differences between cancer types	Chemotherapy and radiotherapy; number of side-effects	–	–
Kessler <i>et al.</i> [26]	Cross sectional	3032 with different chronic conditions including cancer (exact figure not reported)	Cancer group had most work impairments and work loss days	Fatigue	–	–
Lee <i>et al.</i> [21]	Cross sectional and retrospective	408 with stomach cancer; 994 as healthy controls	Cancer group had reduced working hours and higher work-related disability	Fatigue	–	–
Maunsell <i>et al.</i> [3]	Longitudinal (3 year follow-up)	646 with breast cancer; 890 as healthy controls	Breast cancer group had more reduced working hours	–	–	–
Pryce <i>et al.</i> [29]	Cross sectional	328 with different types of cancers	No differences between cancer types	Fatigue	–	Flexible working hours, time off for medical appointments
Short <i>et al.</i> [23,25]	Cross sectional	504 with different types of cancers; 3903 healthy controls	Cancer group worked less hours	Re-occurrence of cancer	–	–

Table 2. (Continued)

Authors	Study design	Study population	Population differences	Disease-related factors associated with low work ability	Demographic factors associated with low work ability	Support and work adjustments to help with work ability
Short <i>et al.</i> [23,25]	Cross sectional	647 with different types of cancers; 5988 comparison group reporting a chronic condition	Cancer group had higher work disability than other chronic conditions	–	–	–
Steiner <i>et al.</i> [28]	Cross sectional and retrospective	100 with different types of cancers	No differences between cancer types	Chemotherapy, fatigue, nausea/vomiting, depression, anxiety	–	No difference between support received and reduced working hours
Taskila <i>et al.</i> [31]	Cross sectional	640 with either breast, prostate, testicular or lymphoma	–	–	–	Support required most from occupational health especially by those who had chemotherapy
Taskila <i>et al.</i> [8,17]	Cross sectional	591 with either breast, prostate, testicular or lymphoma; 757 as healthy controls	No difference between cancer group and health controls; testicular cancer had fewer work impairments	Chemotherapy, co-morbidity	Females: older age; Males: lower education	Co-worker support and better social climate
Yabroff <i>et al.</i> [24]		1823 with different types of cancers; 5469 as healthy controls	Cancer group had higher lost productivity	–	–	–

caution as breast cancer is the most prevalent cancer diagnosis among women, the majority of whom undergo aggressive treatment regimes and therefore are more likely to experience lower work ability [30]. For most cancers, work ability improves over time since diagnosis, irrespective of age [18]. Other studies report no relationship between these factors and work ability [27,28].

Employer support and work adjustments

Few studies have taken into account the important influence of psychosocial work factors on the work ability of those working during or following cancer treatment. With regard to work adjustments and workplace support, Pryce *et al.* [29] found that over half of those diagnosed with cancer disclosed their illness to their line manager but less than half received any work adjustment or support. This was the case for both those who were working during treatment for those who had returned to work following sick leave, irrespective of cancer type, disease stage, treatment and symptom side-effects. With regard to work ability, those who continued to work during treatment were more likely to do so if they had flexible/alternative work arrangements and paid time off to attend medical appointments. In a study by Taskila *et al.* [31], those diagnosed with cancer received the most support from co-workers irrespective of cancer type. Compared to other cancer treatments, those who had chemotherapy received the most support from supervisors and co-workers but not from occupational health physicians and reported requiring more practical and emotional support through occupational health. Women in general required more support from their supervisors and from occupational

health; and men who had lymphoma had low education or worked in blue-collar occupations also reported requiring more support. While the findings of this study are most informative in terms of workplace support requirements, the study did not correlate the amount of support with work ability and therefore it is not known whether support helps buffer the negative effects of treatment and other factors on work ability.

Other studies have examined the impact of support and work adjustments on work ability. Among women with breast cancer, co-worker support was correlated with better work ability [17]. Changes in working hours can also be seen as a work adjustment related to work ability [3,19,23,26]. It is likely that for those who are unable to reduce their working hours due to the effects of cancer and its treatment, are less likely to be working. Better social climate and high job commitment have also been associated with better work ability among those with different cancer types [17]. One study did not find any relationship between work ability (measured as changes in work hours and job role) and workplace support, barriers or illness disclosure [28]. It is evident that more studies are required to explore these factors.

Qualitative studies: workplace support and adjustments

Qualitative studies describe the difficulties experienced with fatigue, sleep and cognitive thinking on work ability (Table 3) [32–35]. A number of psychosocial factors such as poor coping and loss of confidence have also been described as contributing to the difficulties experienced with work tasks and work interactions. Problems with

Table 3. Results from qualitative studies on work ability

Authors	Study population	Findings
Amir <i>et al.</i> [32]	41 with different cancer types	Two-thirds reported fatigue, loss of confidence and cognitive difficulties affecting work ability. Most were given work adjustments in terms of flexibility, reduced demands and shorter working hours.
Kennedy <i>et al.</i> [33]	24 with breast cancer, 3 with other types of cancers	Third of participants reported difficulties in concentration, feeling overwhelmed with job pressures and difficulty in coping with work. Employers do not realize how long side-effects can last.
Main <i>et al.</i> [34]	28 with different cancer types	Fatigue, sleep problems, depression and cognitive impairments all affected work productivity. A combination of support, adjustments and working 'smarter' e.g. self-adjustments in work pace and work hours helped those recovering from cancer to manage their work ability.
Maunsell <i>et al.</i> [35]	13 with breast cancer	Fatigue affected work ability. Most asked for adaptations to account for poor work ability (or changed employment) or made self-adaptations. Others received adaptations they did not want e.g. demotions, task changes.

employers in understanding the long lasting effects of cancer were consistently reported as a significant barrier to accessing long-term support and work adjustments to help improve work ability. Only some employers offered adjustments such as flexibility, reduced demands and shorter working hours. Some employers made unwanted adjustments such as a demotion or job role change. These caused additional stressors and problems to those managing cancer and its treatment effects. Overall, these studies found that many employees had to ask for adjustments to be made or were making self-adjustments i.e. working 'smarter' [34] to help them manage their work ability. These studies suggest that the prevalence and relationship between support, work adjustments and work ability should be explored further.

Discussion

In summary, it is evident that those undergoing treatment for cancer are likely to have poor work ability compared with both healthy individuals and those with chronic conditions such as depression, heart disease and diabetes [25,26]. Some types of cancers such as breast and haematological cancers are more likely to be affected than other types of cancers such as testicular and prostate. These differences may be due to the type of treatment received [19]. For example, those with breast cancer are more likely to undergo aggressive treatment regimes involving surgery, radiotherapy, chemotherapy and hormonal therapy. In contrast, those with prostate cancer may only be treated with surgery and radiotherapy [19]. Thus, the type of treatment received, particularly chemotherapy, will have a significant impact on work ability and this may take a number of years to improve. One recent study has found that work ability improves for all cancer types over time irrespective of age (from 6 months post-diagnosis to 18 months) [18]. This suggests that given time, and with the right support, most employees are able to return to their normal work tasks within 18–24 months of being diagnosed. Interestingly, although work ability was measured in a variety of ways, a clear picture emerged with regard to working hours in that most employees reduced their work hours due to treatment and its effects (i.e. fatigue) [3,19,21,22,28]. Again, there is some evidence that work hours do increase over time [3], although by 18 months, they may not fully return to an individuals' normal working hours as prior to cancer.

Although the current studies are useful in understanding the work ability of those recovering from cancer, much more research is required. First, there are not enough longitudinal studies to fully determine the impact of cancer, its treatment, and particularly fatigue and depression, on work ability. The enduring effects of cancer and its treatment are consistently reported as a barrier to work within the qualitative research. Extending designs over a period of three, five or more years will help us to better under-

stand the long-term impact of cancer on work ability, and in doing so, appropriate support and interventions can be offered. Second, there is need for work ability to be measured in a systematic way using the same validated measures. A number of studies have either devised their own work ability questions or have taken only three items from the Work Ability Index [36] and it is not known whether the validity and reliability are similar to when using the full instrument. Third, the studies do not all differentiate between physical and mental work ability limitations (and the specificities within these domains). These distinctions are important to make as these will determine what type of work adjustments, work changes or other interventions are required. Fourth, although most studies controlled for confounding factors, few studies explored the impact of these on work ability. Gender, educational level, occupational status and co-morbidity of illness were found to be significant factors. More in-depth research is required to examine the effects of these factors for different cancer types and treatments as these may affect workplace rehabilitation outcomes. Finally, qualitative studies indicate that work adjustments and self-adjustments may contribute to better work ability. Very few quantitative studies have examined the effects of these adjustments on work ability [29,31]. More research is needed on the contribution that support, work adjustments and self-adjustments make to work ability and in maintaining the employment of those recovering from cancer.

A recent study on workplace support found that most employees who are undergoing, or have had chemotherapy require support from occupational health [31]. Although the relationship between support and work ability was not explored, it raises attention to how important it is to an individual recovering from cancer to receive support from occupational health. The findings from this review suggest that there are a number of activities that can be undertaken by occupational health professionals in managing an employee diagnosed with cancer. Although most return to work rehabilitation activities will involve phased returns and some kind of work adjustment, it is clear that these may need to be in place for at least 18 months and regularly assessed as work ability slowly improves. Women diagnosed with breast cancer may require more support as might those employees undergoing chemotherapy. Further, occupational health professionals can provide a pivotal role in facilitating the support from colleagues and line managers through offering knowledge and guidance. As the studies reviewed show working hours to be an important indicator of work ability, reducing work hours (or offering flexible work hours) may help employees manage their work ability and side-effects of treatment. Further, exploring alternative work adjustments with the employee may also help to increase work ability. By regularly assessing work ability and working hours, occupational health professionals can help such employees make a full recovery, maintain

employment and prevent an early exit from the workforce. Work ability can be assessed using well-validated instruments such as the Work Limitations Questionnaire [37] and the Work Ability Index [36]. Both instruments can be easily administered, scored and interpreted by occupational health professionals for a range of chronic health conditions. As best practice, occupational health professionals should aim to work closely with cancer support services providing rehabilitation to those employees, to obtain required information if necessary, to help plan for changes in work. While there is still much to learn about the complex factors that impact on a cancer survivors' work ability, occupational health professionals are well positioned to improve work ability, and in doing so, the experience of managing work for cancer survivors.

Key points

- Those undergoing treatment for cancer are likely to have poor work ability compared with both healthy individuals and those with chronic conditions such as depression, heart disease and diabetes.
- Some types of cancers such as breast and haematological cancers are more likely to be affected than other types of cancers such as testicular and prostate.
- The type of treatment received, particularly chemotherapy, will have a significant impact on work ability and this may take a number of years to improve.
- Work ability improves for all cancer types over time and with the right support, most employees are able to return to their normal work tasks within 18–24 months of being diagnosed.
- Most employees reduced their work hours due to treatment and its effects such as fatigue.

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