Cognitive intervention for breast cancer patients undergoing adjuvant chemotherapy: a needs analysis

This item was submitted to Loughborough University’s Institutional Repository by the/an author.


Additional Information:

- This article is a non-final version of an article published in final form in the journal Cancer Nursing: http://journals.lww.com/cancernursingonline/

Metadata Record: https://dspace.lboro.ac.uk/2134/10219

Version: Accepted for publication

Publisher: © Lippincott, Williams & Wilkins

Please cite the published version.
This item was submitted to Loughborough’s Institutional Repository (https://dspace.lboro.ac.uk/) by the author and is made available under the following Creative Commons Licence conditions.

![Creative Commons Licence](https://creativecommons.org/licenses/by-nc-nd/2.5/)

** Attribution-NonCommercial-NoDerivs 2.5**

You are free:

- to copy, distribute, display, and perform the work

Under the following conditions:

** Attribution.** You must attribute the work in the manner specified by the author or licensor.

** Noncommercial.** You may not use this work for commercial purposes.

** No Derivative Works.** You may not alter, transform, or build upon this work.

- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

Your fair use and other rights are in no way affected by the above.

This is a human-readable summary of the **Legal Code** (the full license).

[Disclaimer](http://creativecommons.org/licenses/by-nc-nd/2.5/)

For the full text of this licence, please go to:
[http://creativecommons.org/licenses/by-nc-nd/2.5/](http://creativecommons.org/licenses/by-nc-nd/2.5/)
Cognitive Intervention for Breast Cancer Patients Undergoing Adjuvant Chemotherapy: A 
Needs Analysis

Published in: Cancer Nursing, 2011, 34; 385-392

Fehmidah Munir, PhD; Katryna Kalawsky, BSc; Catherine Lawrence, MSc; Joanna Yarker, 
PhD; Cheryl Haslam, PhD; Samreen Ahmed, MD

Author Affiliations: Work and Health Research Centre, Division of Psychology, School of Sport, 
Exercise & Health Sciences, Loughborough University, Loughborough, Leicestershire, LE11 
3TU (Dr Munir, Ms Kalawsky, MS Lawrence Professor Haslam); Affinity Occupational 
Psychologists, London SW12 9NW (Dr Yarker) and Cancer and Haematology, Leicester Royal 
Infirmary, Infirmary Square, Leicester, LE1 5WW (Dr Ahmed)

Correspondence: Dr Fehmidah Munir, Work and Health Research Centre, Division of 
Psychology, School of Sport, Exercise & Health Sciences, Loughborough University, 
Loughborough, Leicestershire, LE11 3TU. Email: f.munir@lboro.ac.uk. Tel: +441509 22 8228 
Fax: +44 1509223940

Acknowledgements

This study was supported by a grant from Breast Cancer Campaign (2008MaySP11). We are 
grateful to all of the participants for taking part in this research.
Abstract

Background: Evidence suggests women with breast cancer who had received chemotherapy experienced cognitive problems. Although these are largely subtle deficits, they can negatively impact a patient’s quality of life, ability to work and subsequent employment decisions.

Objective: This study explored what healthcare information and support is available to help women understand the effects of chemotherapy on daily functioning at home and at work. It also explored what information and support they would find useful as interventions.

Methods: Qualitative interviews were carried out with 31 patients attending a breast cancer clinic four months after treatment completion (phase 1); and with five oncology health professionals (phase 2). Fifteen women who took part in the interviews completed a short questionnaire on suitable interventions (phase 3).

Results: Participants reported problems with fatigue, low mood, memory and attention. Problems with remembering tasks at work were most common. Participants requested more information and support on cognitive difficulties. Oncology health professionals discussed the need for information and support for patients on managing cognitive problems. From the findings, four interventions and delivery modes were identified and validated. These were: information and activities on cognitive strategies, help with emotional distress associated with cognitive difficulties and advice for families and employers.

Conclusion: Despite mixed evidence for cognitive problems associated with chemotherapy, there is a need for an intervention and this may be related to managing emotional distress associated with perceived cognitive problems.

Implications for practice: Nurses should include potential cognitive problems when providing information to patients.
Word count: 250

Keywords: Neuropsychological; breast cancer; oncology; intervention; work; emotional distress

Short title: Cognitive intervention: a needs analysis
Background

A number of studies suggest that chemotherapy for breast cancer is associated with a number of neuropsychological deficits, including impairments in attention, working memory, speed of information processing, and executive function (e.g. planning).\textsuperscript{1} These impairments are reported during treatment and may persist more than a year after treatment.\textsuperscript{1} Although recent evidence suggest that the effect sizes for neuropsychological tests are modest\textsuperscript{2} and within the average range of functioning, cognitive problems can have a profound effect on patients’ lives. Studies suggest that cognitive difficulties not only affect women functioning at home;\textsuperscript{3} but also impact on their quality of life and emotional well-being.\textsuperscript{4,5} In particular, problems with memory and executive functioning (assessed by neuropsychological tests) have been associated with self-reported fatigue, depression and cognitive confusion.\textsuperscript{6}

Neuropsychological impairments have also been reported to affect work ability,\textsuperscript{7} and may hinder return to work and work-related outcomes.\textsuperscript{8} Work plays an important role in quality of life for many individuals, yet many women with breast cancer report being unable to work during or after treatment.\textsuperscript{8} Those who do return to work, report problems in their ability to perform mental tasks such as concentrating, learning new things and multi-tasking.\textsuperscript{9,10} To date, except for two studies,\textsuperscript{7,8} most of the evidence for the effect of cognitive impairments on the quality of working life come from self-report studies.\textsuperscript{10-13} Thus, it is possible that breast cancer patients are sensitive to subtle changes in cognitive function that current neuropsychological test employed are unable to detect\textsuperscript{1} or that neuropsychological tests may not equate with everyday cognitive problems.\textsuperscript{3} There is moderate evidence that self-reported cognitive problems are more likely to
be associated with emotional distress, depression and fatigue than with neuropsychological functioning.\textsuperscript{14} These psychological factors are also reported to be associated with poor work ability.\textsuperscript{15} Regardless of the debate around the factors underlying neuropsychological impairment and subjective cognitive functioning among cancer patients, the perceived impact of cognitive functioning by women on their quality of life, particularly working life, needs to be addressed.

Despite the uncertainty around the clinical significance of neuropsychological changes in breast cancer patients, a number of interventions have been developed. These offer information, training to improve cognitive function and compensatory strategies (e.g. keeping a diary) following the end of treatment.\textsuperscript{16} The results are mixed, with one study reporting improvements in cognitive function as measured by neuropsychological tests,\textsuperscript{16} and another reporting minimal evidence for improvement.\textsuperscript{17} The mixed results may be due to differences in the rigor of the study design, control groups and sample sizes. Despite the mixed findings, these studies have not adequately evaluated the effects of their intervention on quality of life outcomes among cancer patients. In particular, as to whether these interventions improve cognitive functioning at home and more importantly, at work i.e. whether they influence return to work decisions and return to work outcomes. There is currently a lack of methodologically sound return to work interventions for breast cancer women.\textsuperscript{18} As women who have had breast cancer report experiencing cognitive problems at work following treatment,\textsuperscript{10} cognitive interventions could be targeted to improve these work-related outcomes.

Before designing a cognitive intervention to improve return to work outcomes, it is important to carry out a needs analysis. The aim of this pilot study was to examine the need for interventions
related to perceived cognitive problems from the perspectives of patients and of healthcare staff. In particular, the study examined whether cognitive interventions were required to help patients manage return to work, and maintain satisfactory cognitive function at work.

**Method**

This was a mixed-method study consisting of three phases of data collection four months after the end of chemotherapy treatment: 1) semi-structured interviews with patients with breast cancer recruited from an NHS hospital breast cancer clinic, 2) semi-structured interviews with health professionals involved in care of the women participating in the study, and 3) intervention validation questionnaire sent to participants interviewed in phase 1. The study took place between September 2008 and August 2009. The study was approved by the NHS Research Ethics Committee.

**Participants**

Participants were 31 patients with breast cancer stages I-III who were taking part in a larger longitudinal study (with 50 women), examining the effects of chemotherapy on psychosocial factors, cognitive functioning and work–related outcomes (study ongoing). Patients eligible for the study were aged between 18 and 55 years in age, had a primary diagnosis of cancer, were receiving adjuvant chemotherapy and were employed at the time of diagnosis. They were recruited prior to their first chemotherapy appointment and were assessed on a number of cognitive and psychosocial measures prior to treatment (Baseline Timepoint1), mid-treatment (Timepoint2) and end of treatment (Timepoint3). For this study, participants were interviewed after 4 months of completing their chemotherapy. Thirty-one women took part in the interviews.
As the researchers felt that data saturation was reached (i.e. no new information was provided in the last few interviews), no further participants were invited to participate.

*Interview procedure*

The interviews were conducted either face-to-face at the hospital or over the telephone on a day that was convenient. The semi-structured interview schedule was designed to explore a) changes experienced in fatigue and well-being following chemotherapy; and the concerns or impact of these aspects on home and work life; and b) changes experienced in cognitive functioning following chemotherapy; and the concerns or impact of these changes on home and work life; and c) what healthcare information and support is currently available to help these women understand impact of chemotherapy and its side effects on their home and work life, and d) the kind of information and support they would find useful (i.e. to identify possible interventions). Each interview took place approximately four months after the patient had completed their treatment. The interviews lasted 25 minutes and were audio-recorded and transcribed verbatim.

*Additional measures*

The 25-item Cognitive Failures Questionnaire (CFQ)\(^{19}\) was used to assess women’s current perceptions of their everyday cognitive functioning. Participants were asked to indicate the frequency in which they had recently made common mistakes in attention, memory and motor function using a Likert scale of 0-4 (where 0 = “never” and 4 = “very often”). A total score was calculated ranging from 0 to 100, where higher scores indicated greater cognitive impairment. The CFQ provides an overall reliable picture of a patient’s ability to cope with the demands of day-to-day thinking and behaving,\(^{20}\) and has been used in previous cancer studies.\(^{21,22}\)
Depression

The Beck Depression Inventory (BDI-II)\textsuperscript{23} was used to measure the severity of depressive symptoms. The inventory has good reported validity and reliability particularly in the cancer population.\textsuperscript{24} The BDI-II comprises of 21 multiple choice self-report items with scores ranging from 0 (mild) to 3 (severe). A total score of BDI-II is calculated ranging from 0 to 63. Scores within the range of 16-19 are considered as mild-moderate depressive symptoms and a score of 20 and above are considered as moderate to severe.

Fatigue

The Fatigue Severity Scale (FSS)\textsuperscript{25} was used to assess fatigue. It consists of 9 items around the interference of fatigue on physical functioning and emotional well-being. The measure has been used in previous cancer studies and has good reported reliability and validity.\textsuperscript{25} Participants are required to rate their level of agreement with each item on a 7-point Likert scale (where 1 = ‘strongly disagree’, and 7 = ‘strongly agree’). The total score is averaged to provide a score ranging from 1-7; where scores of ≥ 5.5. are considered to reflect moderate-severe fatigue.

Phase 2: Oncology Health Professional Interviews

Participants

Five Oncology Health Professionals involved in the care of breast cancer patients were invited to assess the feasibility of possible interventions generated from the findings in Phase 1. The health professionals were all female, aged between 30 and 45 years of age and consisted of an
Oncologist, a Chemotherapy Services Manager, a Deputy Senior Chemotherapy Nurse, and two Clinical Nurse Specialists.

*Interview procedure*

The health professional interviews were conducted face-to-face at the breast cancer clinic or over the telephone. The semi-structured interview schedule was designed to a) determine the importance of chemotherapy-related cognitive impairment in the Oncology community, b) establish what healthcare information and support was currently available (by whom and when) on chemotherapy-related cognitive impairment and ability to work, c) establish the feasibility and usefulness of possible interventions as generated from the findings in Phase 1, and d) to identify further interventions. The health professional interviews lasted approximately 20 minutes and were conducted by the same investigator, audio-recorded and transcribed verbatim.

*Phase 3: Intervention utility validation*

Findings from phase 1 and phase 2 were used to identify suitable interventions for cognitive problems and their effects at home and at work. These were refined to include the effect on well-being following a literature review on current interventions to manage cognitive function in cancer patients. All women who participated in the first phase were sent a report of the main findings from phase 1 and a short questionnaire outlining types of interventions that could be offered. These were sent to the women two-six months after their interview. Participants were asked to rate the usefulness of each of these using a Likert scale of 1-5 (where 1 = not useful at all and 5 = very useful). In addition participants were asked to indicate who they thought should
provide these interventions (e.g. breast cancer nurse, cancer charity, employers). Fifteen women (45 %) completed and returned the short questionnaire.

**Data Analyses**

*Qualitative data*

Interview data from phase 1 and 2 were analysed by a combination of qualitative and quantitative content analyses \(^{26-28}\) by an independent researcher who was not involved in the data collection but was closely involved in all stages of study design and is also carrying out similar research to this study. This was due to interviewer becoming ill following data collection. First, quantitative content analyses was used to quantify and generate frequencies on interviewees’ statements on types of 1) cognitive changes experienced 2) information received from healthcare professionals and 3) information/support required. This process is widely used in qualitative research \(^{29, 30}\) to answer pre-defined questions. A sub-sample of transcripts was read and preliminary codes were formulated to create an initial coding scheme. The remaining transcripts were read and coded. During this iterative process, new codes were added if novel data emerged to generate a more precise coding scheme. The consistency of the coding was re-checked by the lead author who independently coded all transcripts to ensure the reliability. Descriptive statistical analyses, namely frequencies and percentages were applied. For qualitative content analysis, relevant comments from the transcripts were highlighted and quotations were excerpted to illustrate codes. This enabled a deeper understanding of the context of codes (see Table 1).

*Questionnaire data*
Data were analyzed using SPSS version 16.0. For phase 1, data on self-report cognitive functioning, fatigue and depression were analyzed using repeated measures ANOVA or the Friedman Test to compare scores across T1 (baseline), T2 (mid-treatment) and T3 (end of treatment). Correlations were run to examine the relationship between these variables. Descriptive statistics were used to summarize the findings from phase 3.

**Results**

**Findings from phase 1**

*Characteristics of the patients*

Table 2 outlines details of the participants with breast cancer. The mean age was 47 years (range 34-62 years). Seventeen (52%) participants had a lumpectomy and 16 (48%) had a mastectomy. For chemotherapy, regimens included fluorouracil, epirubicin and cyclophosphamide (FEC); fluorouracil, epirubicin, cyclophosphamide and docetaxel (FEC-T); cyclophosphamide, methotrexate, and fluorouracil (CMF), or docetaxel and cyclophosphamide. Twenty (61%) participants reported their job as manual work and 13 (39%) reported their job as non-manual. Prior to chemotherapy 18 (58%) participants were pre-menopausal or peri-menopausal and 13 (42%) participants were postmenopausal. Prior to diagnosis 26 (84%) participants were working and four (13%) were on sick leave. At end of chemotherapy (4 months after treatment), 17 (57%) were working and 13 (43%) were still on sick leave. The Friedman test showed a statistically significant increase in depressive symptoms from baseline to after treatment \( \chi^2(2, n=24) = 9.13, p \leq 0.01 \), but only a near statistically significant increase in perceived cognitive problems across the study period \( \chi^2(2, n=24) = 5.36, p = 0.07 \). For fatigue, repeated measures ANOVA revealed a significant increase in self-report fatigue across the study period \([F(2, 42) = 11.55, p \leq 0.01\).
Spearman’s rho correlation analyses revealed no statistically significant correlation between these three variables at baseline. At T2 and T3, subjective cognitive functioning positively correlated with depressive symptoms ($r_s = 0.54$ and $0.82$ respectively, $p<.01$) and with fatigue ($r_s = 0.66$ and $0.66$ respectively, $p<.05$).

**Psychosocial and cognitive changes experienced at home and at work**

The majority of women interviewed (28/31) reported experiencing fatigue, low mood and cognitive problems following chemotherapy. For cognitive problems memory, concentration and attention were highlighted. Over half the participants (19/28) thought chemotherapy treatment and fatigue contributed to their cognitive problems. More than half the participants who were working (12/17), reported having frequent problems with remembering tasks at work:

I would flit from one job to another… I still find now that if I’ve remembered I’ve got to do something, I try to do it there and then, because I think I’m going to forget to do it (Participant 30).

I’ve got a girl that works really closely with me… she’ll help me decide what it is that we need… and we write it all down. (Participant 10).

Five out of 13 women who had not yet returned to work, questioned their confidence in their ability to return to work or to carry out work tasks as a result of the cognitive changes they were experiencing:

Its [problems with memory] made me anxious about going back to work. And that’s why I’ve been very clear about only doing one day a week for the first month. (Participant 7).
Not all that confident…At work, you’re telephoning and using the computer at the same time. So I’m … apprehensive about that. (Participant 23).

Managing fatigue and emotional distress associated with not being able to carry out normal cognitive tasks also concerned women with regard to returning to work.

*Available information on cancer treatment and symptoms, side effects and work*

All women received information (in a leaflet or verbal) regarding physical side effects and effects of fatigue associated with treatment. They also received some information on psychological well-being and general emotional distress associated with cancer diagnosis and treatment. In contrast, only nine (27%) women received information (in a leaflet or verbal) about memory and concentration problems from their oncology team; of which five were patient-led discussions. Only two women were told how this might affect them in their job. Both of these were patient-led discussions. Only three women received information about cancer and work. The participants discussed how lack of information can negatively affect well-being and recovery. One participant commented that if the researcher had not told her about the possibility of cognitive problems, she would have thought she was going senile. Another participant noted:

> I think it would have been useful to know that your brain will still function but you’ve got to narrow its activity a little bit…Perhaps, if someone had told me that, because you feel as if you’re losing that faculty. (Participant 6).

A third of participants felt that advice on working during treatment was not clear, and that more should be done to advise patients on this.
It would be useful to have a leaflet which would encourage people to stay, if not full-time work, at least part-time work, and to explain to people the [cognitive] side effects….and that they can do this and that…. If you raise awareness, and at the same time encourage people that it’s not that bad, and there’s no need to just stay at home. (Participant 2).

Type and delivery of intervention

A broad question was asked on what information or help participants would like to help them manage their cancer and treatment better. In total, 7 types of interventions were identified from the transcripts. The most frequent was for more information and help with managing cognitive changes associated with chemotherapy (19/33 participants), and its affect on work (7/17 participants). Participants felt these may help to alleviate distress as they would know what to expect. Over half of these participants (55%) also suggested a cognitive activity (e.g. crossword puzzles and word searches) to keep the brain active would be useful. The remaining suggestions were for information for family, colleagues and employers on cognitive problems and how best to support the patient and information on return to work and finances. A third felt the intervention (e.g. information) should be delivered by their breast cancer nurse or by cancer charities to include as part of their rehabilitation/support. Less than half of the participants thought an intervention on compensatory strategies (e.g. use of diaries) were required as most were already using such strategies.

Findings from phase 2: Interviews with oncology health professionals

All five participants were aware of breast cancer patients reporting psychosocial problems such as fatigue and distress and problems with memory and attention during their chemotherapy treatment. All participants felt that the most significant impact of fatigue and cognitive problems
would be at work, and which may exacerbate their distress and ability to cope with the difficulties experienced.

[Work] affecting their thought process or it’s affecting their short term memory then it makes their day so much harder, because they’re having to double-check everything they’re doing. (Clinical Nurse Specialist).

Participants agreed there was a lack of information, support and advice to patients on cognitive difficulties they may experience as a result of their diagnosis and treatment. They also agreed there was a need to provide more staff-led information on what cognitive problems patients may experience at home and at work. Participants were undecided about the type of interventions beneficial to patients, most felt information leaflets were sufficient. Only the consultant felt there was a need for an activity-related intervention for cognitive problems. Work was a strong theme among participants and generated the most discussion. One view was that work itself could be an effective intervention.

If they’re working when they’re on the treatment, probably they’re using their brains more frequently anyway. Maybe the exercising of their brains is doing them good because they’re carrying on working. (Deputy Senior Chemotherapy Nurse).

**Findings from Phase 3: Intervention utility validation**

From the findings from phases 1 and 2 interviews and from a literature review were used to identify suitable interventions for perceived cognitive difficulties and their effects at home and at work. A summary of the findings were sent to all the participants with breast cancer and together
with a questionnaire outlining the interventions arising from all interviews and from the literature review. Fifteen women completed and returned the questionnaire. All respondents verified that the summary of the findings accurately reflected their views. However, there was no dominant intervention that emerged from the questionnaire. Table 3 shows that the majority of women confirmed that an assessment of their cognitive functioning before and after treatment would be useful. Activities to help them manage their cognitive problems would also be useful. Equally, most of the women felt that help with coping with emotional stress and help in how to tell others about their cognitive problems would be beneficial. Table 4 shows that most participants felt any of these interventions could be delivered as information in a form of a leaflet, as a website activity or in the form of support from the oncology team. Intervention activities for maintaining cognitive function were also preferred by the majority of participants (10/14, 71%) compared with activities to compensate for cognitive problems experienced (8/13, 62%).

**Discussion**

Drawing from multiple perspectives this study presents novel information about the type of interventions required to support breast cancer patients manage the perceived cognitive effects of chemotherapy at home and at work. It also highlights patients’ needs for intervention on managing emotional distress associated with perceived cognitive problems at home and in the workplace.

Overall, the study found that perceived cognitive functioning is a concern for breast cancer women. The majority of the participants thought that chemotherapy treatment and fatigue contributed to their cognitive problems, with over half of those working indicating that they
experience frequent problems remembering tasks at work. While evidence regarding the true 
impact of chemotherapy on cognitive functioning remains mixed,\textsuperscript{1,2} it is clear that for many 
breast cancer patients there is a perceived impact on their cognitive functioning and they believe 
that this affects their work ability and their confidence to do their job well. This is supported by 
Wefel\textsuperscript{7} who found that women with breast cancer demonstrating cognitive decline on objective 
neuropsychological tests also reported experiencing greater difficulty at work shortly after the 
end of chemotherapy. Research into the relationship between cognitive functioning and work 
ability is still at infancy and more empirical research is required to examine the relationship 
between treatment, cognitive functioning, psychosocial factors and work ability.

This study found that there is a lack of information, advice and support available regarding work 
and managing side effects at work; as well as lack of information on cognitive functioning. Less 
than a third of participants in this study received information about memory or concentration 
problems while undergoing chemotherapy. Furthermore, for those who did receive information 
over half reported that this discussion was patient-led. Interestingly, all oncology health 
professionals interviewed indicated that they believed there was a lack of information available 
to breast cancer women in on cognitive difficulties they could experience.

The findings from this study provide a basis to drive further intervention research. It also 
provides preliminary data for the content and delivery mechanism for future interventions. 
When interviewed and surveyed, participants indicated that an assessment of their cognitive 
function would be useful prior to, and at the end of chemotherapy. While it may not be feasible 
to offer this to patients, a self-assessment could be introduced at the end of treatment when
patients are planning on returning to work. This would give them a useful indication as to the work adjustments they may need from their employers. Participants also wanted a cognitive-based activity intervention. It is not known whether such activities would improve neuropsychological impairments, particularly as the evidence for such impairments are low to moderate at best. However, it is possible that these may help to improve confidence in managing cognitive tasks, which in turn may improve subjective reports of cognitive problems. Therefore any cognitive intervention would need to rigorously assess these possible outcomes. Participants indicated requiring support with emotional problems associated with the cognitive problems they are experiencing. Emotional distress has been associated with self-reported cognitive problems. In this study, although self-report cognitive problems did not significantly decline during chemotherapy treatment, it correlated with both depressive symptoms and fatigue as treatment progressed. While it not yet clear if subjective cognitive problems reflect emotional distress rather than actual neuropsychological impairments (i.e. impaired ability to think clearly is a possible symptom of depression), and which may exist pre-treatment, both subjective cognitive problems and emotional well-being are reported as to affect work ability. suggest that even if subjective cognitive problems do not appear to be based on neuropsychological compromise, these factors need to be addressed. Therefore identifying and reducing the emotional distress associated with subjective cognitive functioning should be a key outcome measure for any intervention.

This study was not without limitations. First, this study was an exploratory study and therefore while the sample recruited was relatively narrowly defined in terms of diagnosis and time interviewed, we did not control for type of chemotherapy drug taken, surgery variables or
occupation. Second, the participants were recruited from one hospital and therefore the nature of the information and advice available from healthcare staff may be biased to that provided by the particular Trust. It is also possible that the women taking part in this study were self-selected due to experiencing problems in cognitive function. However, all women agreed to participate prior to the start of chemotherapy and reported not experiencing problems at that time. Nevertheless, there could still be an issue of priming i.e. knowledge about chemotherapy-associated cognitive problems may have resulted in influencing perception of cognitive problems. Effort was made to reduce this possible bias by telling the patients that the study focused on work experiences and other psychosocial factors as well as cognitive functioning. However, as there was no control group it is not known to what extent this minimised priming and therefore the results of this study should be interpreted with caution. Another limitation of the study is that we did not include a healthy control group to compare the participants score on the CFQ. However, the inclusion of a healthy control group would not take into account potential disease and treatment related factors.

Conclusion

This study identified that breast cancer women perceive chemotherapy to impact upon their cognitive functioning and their ability to work. Interventions such as self-assessment of cognitive function; information and support on cognitive problems, cognitive activities and emotional distress and advice for families and employers were considered to be most important by the participants. Based on the findings from this study, further research in interventions are recommended. Intervention studies demand significant resource investments both in terms of
funding and researcher and participant time. It is important that researchers consider the needs, as identified by patients and oncology professionals, and use these as a platform to integrate and test sound psychological theories and interventions. It is hoped that these findings provide a platform for need-driven intervention studies in the future.

Word count: 4182

Pages (excluding abstract and references): 18.
References


11 Gudbergsson SB, Fossa SD, Elling Borgeraas E et al. A comparative study of living conditions in cancer patients who have returned to work after curative treatment. *Supportive Care Cancer;* 2006; 14: 1020-1029.


27 Cavanagh S. Content analysis: concepts, methods and applications. *Nurs Res* 1997; 4: 5-16.


29 Dasborough, MT. Cognitive asymmetry in employee emotional reactions to leadership behaviours. *Leadership Quart* 2006; 17: 163-178


31 Hermelink K, Küchenhoff H, Untch M et al. Two different sides of ‘chemobrain’: determinants and nondeterminants of self-perceived cognitive dysfunction in a prospective, randomized, multicenter study. *Psycho-Oncology.* 2010; published online DOI: 10.1002/pon.1695

32 Schagen SB, Das E, van Dam FSAM. The influence of priming and pre-existing knowledge of chemotherapy-associated cognitive complaints on the reporting of such complaints in breast cancer patients. *Psycho-Oncology.* 2009; 18: 674-678

**Table 1: Summary of Themes**

<table>
<thead>
<tr>
<th>Phase 1: Participants With Breast Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of cognitive problems</td>
</tr>
<tr>
<td>Problems with memory and attention</td>
</tr>
<tr>
<td>Problems with remembering tasks at work</td>
</tr>
<tr>
<td>Low confidence in managing problems at work</td>
</tr>
<tr>
<td>Information and support received</td>
</tr>
<tr>
<td>Lack of information and support on cognitive problems</td>
</tr>
<tr>
<td>Impact on well-being and recovery</td>
</tr>
<tr>
<td>Information and support required</td>
</tr>
<tr>
<td>Activities that help compensate of maintain cognitive problems</td>
</tr>
<tr>
<td>Work-related support for cognitive problems</td>
</tr>
<tr>
<td>Written information about cognitive problems</td>
</tr>
<tr>
<td>Help with coping with emotional distress and talking about cognitive problems with others</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 2: Oncology Health Professionals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of cognitive problems</td>
</tr>
<tr>
<td>Being told by patients</td>
</tr>
<tr>
<td>Cognitive problems affecting work</td>
</tr>
<tr>
<td>Information and support</td>
</tr>
<tr>
<td>Lack of information and support available</td>
</tr>
<tr>
<td>Work as an intervention</td>
</tr>
<tr>
<td>Information leaflets</td>
</tr>
</tbody>
</table>
Table 2. Demographic Data and Mean Scores on Self-Report Cognitive Functioning, Depressive Symptoms and Fatigue (n=31)

<table>
<thead>
<tr>
<th></th>
<th>Baseline (T1)</th>
<th>Mid-Chemotherapy (T2)</th>
<th>1-4 Months Post Chemotherapy (T3)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>47 (6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manual occupation % (n)</td>
<td>61 (20)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sick leave % (n)</td>
<td>13 (4)</td>
<td>63 (19)</td>
<td>43 (13)</td>
<td>-</td>
</tr>
<tr>
<td>Cognitive problems, mean (SD)</td>
<td>35.33 (11.63)</td>
<td>43.00 (15.76)</td>
<td>42.42 (17.84)</td>
<td>.07</td>
</tr>
<tr>
<td>Depressive symptoms, mean (SD)</td>
<td>11.17 (6.50)</td>
<td>14.50 (7.75)</td>
<td>15.38 (9.29)</td>
<td>.01</td>
</tr>
<tr>
<td>Fatigue, mean (SD)</td>
<td>4.11 (0.91)</td>
<td>4.91 (1.14)</td>
<td>5.23 (1.22)</td>
<td>.001</td>
</tr>
</tbody>
</table>

*Friedman analyses
Table 3. Interventions Reported as ‘Quite a Bit Useful’ to ‘Very Useful’ to Help Cognitive Function at Home or at Work by Breast Cancer Women (n=15)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Home-related</th>
<th>Work-related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coping with emotional stress associated with cognitive problems</td>
<td>15 (100)</td>
<td>13 (93)</td>
</tr>
<tr>
<td>Assessment of cognitive function during and after treatment</td>
<td>15 (100)</td>
<td>13 (93)</td>
</tr>
<tr>
<td>Activities to help manage or compensate for cognitive problems</td>
<td>14 (100)</td>
<td>14 (93)</td>
</tr>
<tr>
<td>How to tell others about cognitive problems and what to tell them</td>
<td>13 (93)</td>
<td>14 (93)</td>
</tr>
</tbody>
</table>
Table 4. Types of Interventions and Delivery Methods Reported as ‘Somewhat Useful’ to ‘Very Useful’ by Breast Cancer Women (n=15)

<table>
<thead>
<tr>
<th></th>
<th>Activities that maintain cognitive function</th>
<th>Activities that compensate for cognitive problems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Leaflet</td>
<td>13 (92)</td>
<td>13 (92)</td>
</tr>
<tr>
<td>Website</td>
<td>12 (86)</td>
<td>12 (86)</td>
</tr>
<tr>
<td>Oncology team</td>
<td>13 (92)</td>
<td>13 (92)</td>
</tr>
<tr>
<td>Practical classes</td>
<td>10 (71)</td>
<td>8 (62)</td>
</tr>
<tr>
<td>Telephone support</td>
<td>8 (62)</td>
<td>8 (62)</td>
</tr>
</tbody>
</table>