Evaluating subtle cognitive changes in women following chemotherapy treatment for breast cancer: A functional perspective

A/Prof Lynette Mackenzie, Dr. Christine Chapparo, Dr. Judy Ranka & Ms Joanne Lewis
Discipline of Occupational Therapy, Faculty of Health Sciences

Email: Lynette.Mackenzie@sydney.edu.au

Background
Cognitive strategies are the internally generated mental techniques that we use to function effectively in order to:
- identify important information
- understand, retain and retrieve information
- plan and modify responses, and
- cope with distractions

The PRPP (Perceive, Recall, Plan, Perform) model provides a cognitive task analysis that describes the cognitive processes that underlie performance of tasks and the cognitive strategies used to respond adeptly to complex situations. Cognitive changes (or disorders in cognitive strategy use) are commonly experienced by women following treatment for breast cancer and need to be measured to distinguish between effects of co-morbidities such as depression or anxiety. Assessment of cognitive strategy use during functional activities is needed to identify where disorders are occurring when strategy use does not match environmental demands.

Research questions
Following treatment for breast cancer, what cognitive strategies are affected for women? Can subtle cognitive changes be detected and identified?

Study aims
To identify cognitive processing difficulties defined by the PRPP system of task analysis identified by women who have experienced cognitive changes.

The Perceive, Recall, Plan, Perform (PRPP) Model

**Perceive**
- Strategies used to attend and gather sensory information and to form highly discriminative sensory pictures of oneself and the task environment

**Recall**
- Strategies reflecting processes associated with information storage, recognition and retrieval

**Plan**
- Strategies associated with making plans, decisions and judgments about the nature and quality of performance

**Perform**
- Strategies used to carrying out and adjusting performance

**Rationale for using the PRPP system of task analysis**
- The tool is not deficit-driven but examines what a person needs to do and identifies any issues encountered when attempting selected tasks such as omissions, errors in accuracy and timing or repetition.
- The tool is not based on cognition per se, but analyses the cognitive strategies needed to undertake tasks.
- The tool is very ecologically valid and does not manipulate tasks for assessment.
- The tool allows for an interpretation of why cognitive difficulties are being experienced and identification of interventions to address them.

**Method**
A secondary data analysis was undertaken of transcripts from interviews with nine women about their experience of cognitive difficulties following their treatment for breast cancer. Data were categorised according to PRPP constructs.

**Results**

<table>
<thead>
<tr>
<th>Perceive</th>
<th>Recall</th>
<th>Plan</th>
<th>Perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Noticing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Discriminating:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Regulates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Discriminates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Recalling facts:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Labels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Recalling procedures:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Recalls steps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Programming:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Calibrates (emotion)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Sequences</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Transcripts consistently identified cognitive strategy difficulties in the above areas, and these resulted in challenges undertaking functional activities.

**Perceive**
- “I only read half the email message, then reply”
- “Anything too detailed is really challenging”

**Recall**
- “You can almost see things in front of your head, but you can’t name them”
- “I put my swimsers in the freezer in a plastic bag”

**Plan**
- “I could read the easy stuff but not the hard stuff. It makes you feel dumb”
- “Less tolerant of things...very cranky...lost some of my coping mechanisms”

**Perform**
- “A job might take so much longer, but I just suck it up. A report takes 5 hours to write now, but I can only charge 3 hours”
- “It’s as though you’ve got glue in the system”

There were also examples of positive cognitive strategies used by women to adapt to these cognitive challenges.

**Discussion**

The PRPP tool was able to identify difficulties in cognitive processing around everyday tasks commonly experienced by these women. It is now appropriate to test this tool with a larger sample to identify consistent issues and potential interventions. As the PRPP tool is behaviour-based and strategy-based any interventions can be individually targeted. It is possible that some observed cognitive processing difficulties in this population could be incorrectly interpreted as only fatigue or depression. Further in-depth assessment, using a tool like the PRPP that focuses on functional activity, is needed to evaluate the key issues contributing to observed cognitive difficulties.

REFERENCES