



AOTA Critically Appraised Topics and Papers Series
Traumatic Brain Injury

**A product of the American Occupational Therapy Association's
Evidence-Based Literature Review Project*

CRITICALLY APPRAISED PAPER (CAP)

Focused Question

What is the evidence for the effect of interventions to address cognitive/perceptual functions (attention, memory, executive functions) on the occupational performance for persons with traumatic brain injury (TBI)?

Wilson, B. A., Emslie, H. C., Quirk, K., & Evans, J. J. (2001). Reducing everyday memory and planning problems by means of a paging system: A randomized control crossover design. *Journal of Neurology, Neurosurgery, and Psychiatry*, 70, 477–482.

PROBLEM STATEMENT (JUSTIFICATION OF THE NEED FOR THE STUDY)

State the problem the authors are investigating in this study.

External aids are most certainly the best compensatory strategies for people with impaired memory, but they are difficult to use. People with cognitive difficulties often forget to record information and forget to access information that is already recorded. Also, some people find external aids embarrassing to use. To overcome these problems, a radio paging system using an alphanumeric pager was devised. Studies have shown a significant improvement in achieving everyday targets while using the pager, but some patients revert to problematic states after returning the pager. Such findings suggest that the presence or absence of executive impairments might determine whether provision of the pager system would be a long-term or short-term intervention.

RESEARCH OBJECTIVE(S)

List study objectives.

Determine whether this paging system enabled people with memory and planning problems after brain injury to carry out everyday tasks. Answer whether the kind of impairment (e.g. memory or executive functions), the degree of impairment (e.g. mild, moderate, or severe), or both influence the effectiveness of the paging system?

Describe how the research objectives address the focused question.

The goal of the study is to determine the effectiveness of an intervention to improve occupational functioning of patients after traumatic brain injury (TBI).

DESIGN TYPE:

Randomized control, crossover

Level of Evidence:

I

Limitations (appropriateness of study design):

Was the study design type appropriate for the knowledge level about this topic? *If no, explain.*

Yes

No

SAMPLE SELECTION

How were subjects selected to participate? Please describe.

Potential participants throughout United Kingdom were sent a letter of invitation; those who responded were seen for a 2–3 hour interview and assessment, with a carer.

Referrals came from occupational therapists and clinical psychologists.

Randomly assigned to Group A, pager first, then nothing; Or Group B, waiting list first, pager second. Randomization broken for 9 patients to suit schedules.

Inclusion Criteria

At initial interview, the pager was demonstrated and a trial message sent. Acceptable participants were able to read the message on the pager and respond appropriately to the message (i.e., press the correct button). Participants had to have memory and/or planning and organizational difficulties; have some degree of insight to acknowledge everyday memory, planning, or organizational problems; and be willing to try to overcome problems with pager.

Exclusion Criteria

None except reciprocal of inclusion.

Sample Selection Biases: *If yes, explain.*

Volunteers/Referrals

Yes responded to a letter of invitation

No

Attention

Yes possibly, but controlled by the crossover design

No

Others (list and explain):

SAMPLE CHARACTERISTICS

$N = 209 \rightarrow 198 \rightarrow 180 \rightarrow 173 \rightarrow 156$ (completed all phases) $\rightarrow 143$ (all data in hand). Mean age = 38.6 years (range 8–83); 72% living at home with family

% Dropouts

(%) Male

(%) Female

Ethnicity

Disease/disability diagnosis

NR = Not reported.

Check appropriate group:

<20/study group	20–50/study group	51–100/study group <input checked="" type="checkbox"/>	101–149/study group	150–200/study group
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Sample Characteristics Bias: If no, explain.

If there is more than one study group, was there a similarity between the groups?

Yes Generally; 47% of Group A and 39% of Group B had TBI. No significant difference in terms of current age or age at insult, number of years postinjury, sex, diagnostic group, independence category, or neuropsychological test results.

No

Were the reasons for the dropouts reported?

Yes initial 11 dropped out before 1st appointment (death; cost of travel); 18 did not proceed after 1st appointment (8 reason beyond participant control; 6 denied problems; 3 had compensatory systems they wanted to keep; 1 unable to read). 7 failed to return forms at end of baseline; 17 withdrew for a variety of reasons. 156 completed all phases, but 11 did not return the final set of forms and data lost for 2. 143 participants used, a 67.5% response rate.

No

INTERVENTION(S)—Included are only those interventions relevant to answering the evidence-based question.

Add groups if necessary

Group A—Pager first after a 2-week baseline

Brief Description	Participants were involved in establishing target behaviors to be monitored throughout the trial; they and their carers were asked to go through a typical day to elicit problems with which they might need help. Only messages suggested or agreed to by the participant were selected for transmission. Participants also chose the wording of the messages and were free to modify these as necessary during the trial. Participant received a phone call on day 1 or 2 after starting to use the pager to check that everything was going well. Mean number of messages sent each day was 8.78 for Group A and 8.26 for Group B.
Setting	Home and community
Who Delivered?	Pager is a transmitted message
Frequency?	Daily, all day
Duration?	7 weeks

Group B—Waiting list first after a 2-week baseline

Brief Description	No treatment
Setting	
Who Delivered?	
Frequency?	
Duration?	7 weeks

Intervention Biases: *Explain, if needed.*

Contamination

Yes

No crossover and baseline period control for this

NR

Co-intervention

Yes

No

NR

Timing

Yes

No

NR

Site

Yes

No

NR

Use of different therapists to provide intervention

Yes

No

NR

MEASURES AND OUTCOMES—Included are measures relevant to answering the focused question.

Name of measure:

4–7 item questionnaire devised for each participant based on the earlier discussions of everyday memory and attention and other cognitive failures and possible reminders likely to be relevant throughout the 16-week study period.

Outcome(s) measured (what was measured?):

Whether the person remembered to do targeted tasks without anyone reminding him. One checklist completed by participant and another by the carer. (Differences between these were not addressed in results.)

Is the measure reliable (as reported in article)?

Yes

No

NR

Is the measure valid (as reported in article)?

Yes

No

NR

How frequently was the measure used for each group in the study?

Daily throughout all phases (baseline, pager, waiting)

Measurement Biases

Were the evaluators blinded to treatment status? *If no, explain.*

Yes

No self-report

Recall or memory bias *If yes, explain.*

Yes possibly; person was to fill out the checklist daily; could have forgotten by the time it was filled out

No

Others (list and explain):

Limitations (appropriateness of outcomes and measures) *If no, explain.*

Did the measures adequately measure the outcome(s)?

Yes probably, although no reliability information provided

No

RESULTS

List results of outcomes relevant to answering the focused question

Include statistical significance where appropriate ($p < 0.05$)

Odds Ratio Test; χ^2

Include effect size if reported

A chi-square test showed no difference in the proportions of targets hit and not hit between the two groups in the baseline period ($p = 0.68$). Group A achieved 46.82% and Group B 48.63% of their targets.

At time 2 (last 2 weeks of pager use or waiting list): chi-square test showed that Group A was significantly more successful in achieving target behaviors than Group B ($p < 0.001$). The percentage of targets achieved: Group A = 74.47%, Group B = 48.18%.
At time 3 (last 2 weeks of no pager or of pager use): chi-square showed that Group B was significantly more successful than Group A in achieving targets. Group B = 76.13%, Group A = 62.15%.

There were significant differences for Group A between baseline (time 1) and time 2 ($p < 0.001$), between time 2 and time 3 ($p < 0.001$), and between time 1 and time 3 ($p < 0.001$). There were no significant differences for Group B between times 1 and 2 ($p = 0.75$). There was a significant difference between time 1 (baseline) and time 3 (pager) ($p < 0.001$) and between time 2 (waiting list) and time 3 ($p < 0.001$).

Using the odds ratio test, of the 143 participants, 121 (84.6%) were significantly more successful with the pager than they had been in the baseline phase.

Postpager data: Group A only. Of the 74 participants successful with pager as compared to baseline, 54 (73%) were still significantly better than baseline after 7 weeks of not using the pager.

No demographic or diagnostic variables were significantly related to treatment outcome.

Was this study adequately powered (large enough to show a difference)? *If no, explain.*

Yes

No

Were appropriate analytic methods used? *If no, explain.*

Yes

No

Were statistics appropriately reported (in written or table format)? *If no, explain.*

Yes for neuropsychological tests—not focus of this review

No for comparison of groups on achievement of target behaviors—chi-square statistic not reported and exact probabilities not reported; therefore, effect sizes cannot be estimated.

CONCLUSIONS

State the authors' conclusions that are applicable to answering the evidence-based question.

The authors demonstrated in a randomized control trial with a crossover design that this particular paging system significantly reduces everyday failures of memory and planning and enables people with brain injury to carry out more everyday tasks at relatively low cost. Less than 50% of the target behaviors were achieved without the pager; with the pager, 76% were achieved. Seven weeks after the pager was removed, ~62% were achieved, still significantly more than at baseline. The system was NeuroPage, cost 60 English pounds per patient per month. Minimal training was needed.

Were the conclusions appropriate for the study design (level of evidence)? *If no, explain.*

Yes

No

Were the conclusions appropriate for the statistical results? *If no, explain.*

Yes

No

Were the conclusions appropriate given the study limitation and biases? *If no, explain.*

Yes

No

IMPLICATIONS FOR OCCUPATIONAL THERAPY

This section provides guidance about clinical practice, program development, and other implications of the study findings as they relate to the focused question.

Because of this well-controlled study, occupational therapists can feel relatively confident in recommending the use of NeuroPage to patients with brain injury who have some insight into their memory and planning problems, can read the pager, and can respond by pushing the correct button on the pager.

This section provides guidance about clinical practice, program development, and other implications of the study findings as they relate to the focused question.

This work is based on the evidence-based literature review completed by Catherine Trombly, ScD, OTR/L, FAOTA.

CAP Worksheet adapted from: Critical Review Form – Quantitative Studies ©Law, M., Stewart, D., Pollack, N., Letts, L., Bosch, J., & Westmorland, M., 1998, McMaster University. Used with permission.

For more information about the Evidence-Based Literature Review Project, contact the American Occupational Therapy Association, 301-652-6611, x 2052.



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