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Do low vision interventions, including prescription and training in the use of low vision devices, such as magnifiers, telescopes, selective transmission lenses, electronic devices, and computers, enhance older adults' vision in reading standard labels on medication bottles?

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AOTA Critically Appraised Papers Series

Evidence Exchange

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

CRITICALLY APPRAISED PAPER (CAP)

FOCUSED QUESTION

Do low vision interventions, including prescription and training in the use of low vision devices, such as magnifiers, telescopes, selective transmission lenses, electronic devices, and computers, enhance older adults' vision in reading standard labels on medication bottles?

Markowitz, S. N., Kent, C. K., Schuchard, R. A., & Fletcher, D. C. (2008). Ability to read medication labels improved by participation in a low vision rehabilitation program. *Journal of Visual Impairment and Blindness*, 102(12), 774–777.

CLINICAL BOTTOM LINE:

Visual impairments are on the rise, especially in the elderly population. By 2025, it is expected that the prevalence of individuals with visual impairment will double the current rate in the Western world. Visual impairments can lead to various difficulties while participating in everyday living, hampering activities that were previously taken for granted, such as dressing, eating, writing, traveling from place to place, and communicating with others. Reading labels on the prescription bottles is an example of a common everyday task that older adults are engaged in daily. Individuals with low vision face the challenge of not being able to read the medication labels for proper dosage and frequency, which can negatively affect their accuracy in self-administering prescribed medications.

In this study, an occupational therapist provided each participant a minimum of 3 individual intervention sessions within a 12-month period. After the initial low vision evaluation, low vision reading devices were introduced in the follow-up visit. Each participant was instructed in the assembly, maintenance, and appropriate usage of the recommended low vision devices. One or more subsequent sessions were also provided to train the individuals in reading with suprathreshold optotypes (larger than critical print size) or continuous print materials. The results from this study indicated that low vision interventions, which include prescription and training in the use of low vision reading devices, such as magnifiers, telescopes, selective transmission lenses, electronic devices, and computers, may enhance older adults' ability in reading standard labels on medication bottles.

However, the evidence supporting the results of the study was very weak. There were multiple measurement biases, including the possibility of recall bias, as some participants were allowed to read the labels on their own medication bottles. Another measurement bias was the utilization of poorly defined scales in the measurements, therefore threatening the validity of the measurements.

In addition, the author did not use proper statistical analysis and reported only distribution statistics in the results.

RESEARCH OBJECTIVE(S)

The objective of this study is to assess the impact of low vision rehabilitation interventions on individuals with low vision, particularly on the ability to read standard labels on medication bottles.

DESIGN TYPE AND LEVEL OF EVIDENCE:

Prospective, nonrandomized one-group pretest and posttest; Level III evidence

Limitations (appropriateness of study design):

Was the study design type appropriate for the knowledge level about this topic? *Circle yes or no, and if no, explain.*

YES NO

SAMPLE SELECTION

How were subjects selected to participate?

Participants were recruited from clinical offices that provided low vision rehabilitation services.

Inclusion Criteria

Only participants who were diagnosed with low vision conditions, such as age-related macular degeneration, glaucoma, and others, were included in the study. The conditions could not have been amenable to any further medical or surgical treatments, and the participants could not have had a history of a neurological disease or cognitive impairment. Only patients who were prescribed and received low vision rehabilitation interventions were included.

Exclusion Criteria

Not reported (NR).

SAMPLE CHARACTERISTICS

$N = 57$

% Dropouts	0
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# (%) Male	17.67 (31%)	# (%) Female	34.77 (61%)
Remaining	4.56 (8%) (NR)		

Ethnicity	NR
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Disease/disability diagnosis	Individuals with low vision
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Check appropriate group:

<20/study group	20–50/study group	51–100/study group ✓	101–149/study group	150–200/study group
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INTERVENTION(S) AND CONTROL GROUPS

Add groups if necessary

Group 1

Brief Description	Participants received low vision rehabilitation interventions to improve their ability to read standard labels on medication bottles. The low vision reading devices recommended for the task were introduced in the follow-up session. The low vision reading devices used in the study included magnifying glasses, telescopes, selective transmission lenses, electronic devices, and computers. Each participant was further instructed in the assembly, maintenance, and appropriate usage of the recommended low vision device. The participants were also taught the proper reading distance that matched the focal distance of the magnification device under adequate lighting for the task prior to discharge. In addition, they were trained to read using suprathreshold optotypes (larger than critical print size) or continuous print material.
Setting	NR
Who Delivered?	An occupational therapist.
Frequency?	Not specified. There was a minimum of 3 or more sessions.
Duration?	Not specified. The whole study lasted 12 months.

Intervention Biases: Circle yes or no and explain, if needed.

Contamination

YES NO

Only one group of participants in the study.

Co-intervention

YES NO

NR. But there was the possibility that the participant might have medication changes addressing their low vision conditions during the study period.

Timing

YES NO

The study was conducted over a span of 12 months. There were 3 or more visits per participant, but the period in between each intervention session was not reported. And if the visits were spaced out over several months, there was the possibility of further deterioration in the participants' low vision over time.

Site

YES NO

NR

Use of different therapists to provide intervention

YES NO

MEASURES AND OUTCOMES

Complete for each relevant measure when answering the evidence-based question:

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article--yes/no/NR [not reported]), and how frequently the measure was used.

Name of Measurement: "OT observation on participants' accuracy in reading"

1. Occupational therapist's observation and assessment on the participants' ability and accuracy in reading the medication labels. The reliability and validity were not reported. The participants were allowed to read their own medication bottles, if available. Otherwise, they were asked to read standard medication bottles with labels that they have not previously used prior to the study. The measurement was taken twice, before and after the intervention. Also, the participants were allowed to use their own reading devices in the initial pretest assessment.

Name of Measurement: "Participants' self-perception on their ability to read medication labels"

2. Participants' self-perceived ability to read the medication labels, as well as their confident level. A 0-2 grading scale was used: "0 = unable to access, 1 = able to access partially but not with confidence, and 2 = able to read the printed directions accurately and reliably" (p. 775). This is a subjective report from the participants. The validity and reliability of this measurement were not reported. The measurement was also taken twice, before and after the intervention.

Name of Measurement: "OT validation of participants' ability in self-administered prescribed medication"

3. Based on occupational therapist's observation (as measured in Item 1 above), the therapist further validated participants' self-perception (as measured in Item 2). "The occupational therapist interpreted the 1 rating as indicating some ability to self-administer prescribed medications, regardless of the frequency or accuracy in performing the task, and the 2 rating as reading the same medication labels after multiple trials, reading some or most details on the labels, and reading only some of the listed details printed on the labels" (p. 775). The reliability and validity of this validation methodology were not reported. The measurement was taken twice, before and after the intervention.

Measurement Biases

Were the evaluators blind to treatment status? Circle yes or no, and if no, explain.

YES NO

The occupational therapist was not blinded to the treatment. The therapist provided the intervention and the observation during the pretest and posttest assessments.

Recall or memory bias. *Circle yes or no, and if yes, explain.*

YES NO

There is possibly a recall bias, because some participants were allowed to use their own medication bottles. They might have known the types of medication due to the physical characteristics of the bottle rather than the information printed on the labels.

Others (list and explain):

The validity of the measurement scales used in this study posed another threat to the study. The participants' self-perception measurement scale was so poorly defined that it was, in fact, measuring different domains. While Level 1 was defined as partial accessibility to the medication labels but with low or no confidence, Level 2 was defined as able to read accurately and reliably. Similarly, the definitions for the validation scale that the occupational therapist used to interpret the participants' ability in self-administering prescribed medication were very confusing. In fact, it was defined under very different contexts: *1 rating as indicating some ability to self-administer prescribed medications, regardless of the frequency or accuracy in performing the task, and the 2 rating as reading the same medication labels after multiple trials, reading some or most details on the labels, and reading only some of the listed details printed on the labels* (p. 775).

RESULTS

List results of outcomes relevant to answering the focused question

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

Include effect size if reported

During the initial evaluation, 58% of participants were not able to access information on the medication labels, 40% were partially able to access the information, and only 2% were able to access the information accurately. At the time of discharge, 94% of participants were able to read the directions and prescribed medications accurately and reliably. Forty-two participants required new optical devices for vision enhancement, and 2 participants actually required CCTVs in order to identify and read the medication labels properly. Neither the effect size nor statistical significance was reported.

Was this study adequately powered (large enough to show a difference)? *Circle yes or no, and if no, explain.*

YES NO

They did not perform statistical analysis of the data or state the effect size.

Were appropriate analytic methods used? *Circle yes or no, and if no, explain.*

YES NO

NR. The authors reported only the statistical distribution of the results.

Were statistics appropriately reported (in written or table format)? *Circle yes or no, and if no, explain.*

YES NO

The authors also neglected to report the participants' self-perceived reading ability at the time of discharge, as well as the pretest accuracy and reading ability of the participants.

CONCLUSIONS

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

Even though the authors concluded that low vision rehabilitation--the use of low vision devices--could improve individual's ability to read medication labels accurately and reliably, the findings from this study demonstrated only a modest benefit. Nonvisual technique was not evaluated in this study. For future study, this aspect should be considered, because it will support further cost-effectiveness of low vision rehabilitation. Another limitation of the study was that the low vision intervention was provided by an occupational therapist. In many other offices or clinic settings, the same services could be provided by certified low vision therapists or certified low vision rehabilitation therapists. Hence, future study should consider including all of these different types of services. Furthermore, because some of the participants were allowed to use their own familiar medication bottles during pretest and posttest measurements, there was a high possibility of recall bias. For future study, the researcher should consider using unfamiliar standardized medication bottles for all participants.

This work is based on the evidence-based literature review completed by Kitsum Li, OTD, OTR/L (Assistant Professor, Dominican University of California), and Vanessa Carzon, Mallory Engelhardt, and Amanda Woods (occupational therapy students, Dominican University of California).

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