

ITERATIVE TEST AND DEVELOPMENT OF PHARMACEUTICAL PICTORIALS

Amy Barlow Magurno
North Carolina
State University
Raleigh, NC, 27695-7801

Michael S. Wogalter
North Carolina
State University
Raleigh, NC, 27695-7801

Jill R. Kohake
North Carolina
State University
Raleigh, NC, 27695-7801

Jennifer Snow Wolf
Georgia Institute of
Technology
Atlanta, GA, 30332

ABSTRACT

The current research tests a set of pictorials from the U.S. Pharmacopoeia Convention (USPC) plus a set of redesigned pictorials developed based on (a) error analyses of previously-tested subjects and (b) rough illustrations produced by focus-groups. The results showed that several of the revised designs were more successful in capturing the correct meaning than the originals. However, in other cases the revised pictorials were still unable to garner an adequately large percentage of correct answers. The processes involved in the redesign of pictorials are discussed.

INTRODUCTION

The hazards of many kinds of pharmaceutical drugs are not commonly known by the public. Although information is available from a variety of sources (e.g., inserts, advertising, news media, physicians, and pharmacists), often the only educational printed materials that are directly aimed and available to users at the time they take medications are those printed on the label. However, this method of communication can be ineffective for certain populations of users. The print on the labels may be too small for persons without good vision (e.g., presbyopics) or not understandable to persons unable to read the printed language (e.g., illiterates and some non-native speakers).

Besides printed language, another potentially beneficial method for alerting people to the proper use of medications is pictorials. Research has indicated that pictorial road signs can be identified at greater distances (smaller visual angle) than the associated-verbal message signs occupying the same surface area (e.g., Jacobs, Johnston, and Cole, 1975). Also, persons who do not understand the language of the printed label could potentially acquire the information from the illustrations. These benefits assume that the pictorials are sufficiently well designed to convey the appropriate information to the user.

The U.S. Pharmacopoeia Convention (USPC) has produced a set of label designs that combine pictorials and brief verbal descriptions that represent 30 different concepts (e.g., "Take at bedtime," "Place drops in ears").

Persons able to read the material can obtain that information from the printed verbal description, but other persons who are unable to read the text must rely on the pictorials to comprehend the instruction. Only one study (Wolff and Wogalter, 1993) has examined whether these pictorials adequately communicate the intended meanings, and only a subset of the pictorials was evaluated. One purpose of the current research was to perform additional comprehension testing of the USPC pictorials.

Most research on pictorials has focused on comprehension testing of already-existing pictorials (e.g., Collins, Lerner, and Pierman, 1982; Laux, Mayer, and Thompson, 1989). However, there has been virtually no research on pictorial redesign. Indeed, virtually all prior work in this area shows that one or more of the concepts being tested were not adequately communicated by the pictorials under study. After pointing out that the pictorials did not reach some acceptable level, the research usually goes no further. The question left unanswered is whether the pictorial(s) can be redesigned for greater understandability.

One reason for the deficiency of research in this domain is that the testing process itself involves considerable cost (in terms of time, effort, and funding). Further work on the redesign of misunderstood pictorials involves evaluating the wrong answers from earlier testing, generating new ideas for the pictorials, drafting the alternative depictions, and testing them. Thus, the complete process can require a long period of systematic investigation and development. Because of the need for commu-

tablets or open capsules." "This medicine may make you drowsy," "Insert into rectum," "Do not store near heat and light") resulted in correct responses better than 85%. However, in eight cases ("Do not take other medicines with this medicine," "Insert into vagina," "Take by mouth," "If you have questions, call this number," "Take 1 hour before meals," "Take 2 hours before meals," "Take 1 hour after meals," and "Take 2 hours after meals"), the revised pictorials were still unable to garner enough accurate definitions to reach the ISO criterion. Analyses of the responses for these pictorials were performed to determine why errors were made. For example, participants often misinterpreted the four pictorials "Take one (or two) hours before (after) eating" which suggested that alternative methods of indicating time should be used. These analyses provided input for revisions of these pictorials, to be tested in the next stage of the project.

DISCUSSION

The benefits of good pictorials are clear. They can assist individuals who are unable to read printed language, either because of poor eyesight or inadequate language skills. To be useful in this regard, they need to communicate their intended meaning to these persons. Thus testing is necessary to assure that the pictorials are able to convey the appropriate message, and where a pictorial fails to perform adequately, it needs to be redesigned so that it does. The present study is a demonstration of the process of testing, development, and retesting of a set of pharmaceutical pictorials and it serves as a description of the procedures that future pictorial development might take. In particular, the present project illustrates that low cost testing can be performed in which the preliminary iterative cycles can use "convenience" participants to point out poor depictions.

In doing so, there is greater assurance that the evaluation includes depictions of the desired concepts that are likely to pass criterion in subsequent testing.

The results of this study again show that some of the

original USPC pictorials were not well understood by participants (cf. Wolff and Wogalter, 1993). However, the results also show that several of the revisions were successful in capturing identifications that were better understood than the original, surpassing the 85% acceptability criterion. At the same time, a few of the revised pictorials were still unsuccessful at communicating the intended concepts. Analysis of response errors in this study suggests some ways that these pictorials could be improved.

The present research is part of a continuing study of pharmaceutical pictorials. The project is now near a point where it is appropriate to test the pictorials on a representative, random sampling of the target population, stratified according to age, language skills and cultural background. The present study demonstrates that preliminary testing can reveal those pictorials that are likely to fall below a comprehension criterion in testing that involves expensive sampling procedures. Information collected from preliminary testing allows for a way to make revisions of pictorials before formal testing is undertaken. Thus, the cost and number of test-and-redesign iterations using samples of the target populations might be reduced because potentially better alternative pictorials have been designed in advance.

REFERENCES

- Collins, B. L., Lerner, N. D. and Pierman, B. C. 1982, *Symbols for industrial safety*, (Technical Report NBSIR 82-2485, U.S. Department of Commerce, Washington, DC).
- Laux, L., Mayer, D. L. and Thompson, N. B. 1989, Usefulness of symbols and pictorials to communicate hazard information, in *Proceedings of Interface '89* (Human Factors Society, Santa Monica, CA), 79-83.
- Jacobs, R. J., Johnston, A. W. and Cole, B. L. 1975, The visibility of alphabetic and symbolic traffic signs, *Australian Road Research*, 5 (7), May, 68-86.
- Wolff, J. S. and Wogalter, M. S. 1993, Test and development of pharmaceutical pictographs, in *Proceedings of Interface '93* (Human Factors Society, Santa Monica, CA), 187-192.

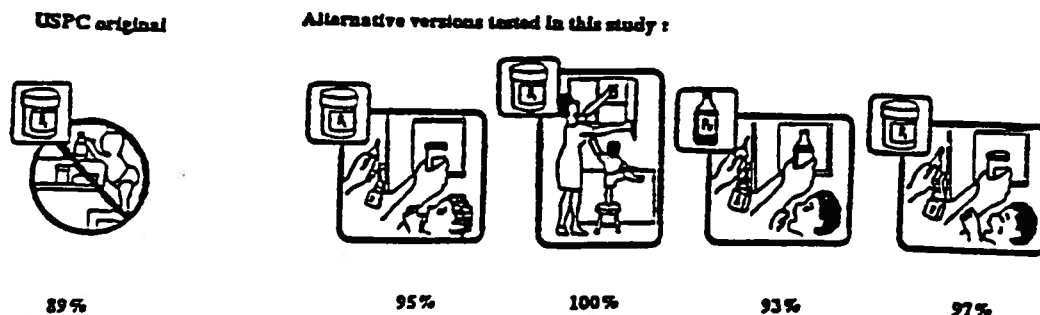


Figure 1. Percentage comprehension for pictorials depicting "store medicine out of reach of children."