Enhancing Label Readability For Over-The-Counter Pharmaceuticals by Elderly Consumers

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ABSTRACT

The most common information source for over-the-counter (OTC) pharmaceuticals is the container label. Most OTC labels contain so much text that the print must be substantially reduced in size to fit the available surface area. As a consequence, people with vision problems, such as the elderly, have difficulty reading the print. Some OTC drugs are being marketed in containers with easy-open caps to facilitate access (but at the same time, reduce child resistance). The increased surface area afforded by the cap design could be used to enhance the labeling. An experiment compared elders' (mean age of 75) evaluations to different label variants. Experimental bottles contained additional labeling attached to the cap that reiterated and extended some of the most important warnings and instructions. The additional labeling of the experimental bottles had print that was larger than the existing back label, and among them, differed in background color. These bottles were compared to two control conditions (one with the original store-bought label and one with the back and side labels removed). Participants ranked the containers on six dimensions (e.g., noticeability of the label, willingness to read the label, willingness to purchase the product). Results showed that the participants preferred the bottles with the additional cap labeling and most preferred the one with the distinctive fluorescent green color. Implications of these results are discussed.

INTRODUCTION

Every over-the-counter (OTC) pharmaceutical product sold in the U.S. has labeling containing directions for use, contraindications, warnings, and other information. The purpose of this information is to inform people about the appropriateness of the medicine for the condition that they or someone in their family (or important other) has. In fact the only way for many persons to learn about the characteristics of OTC medications is through the instructions and warnings found on the labeling associated with the product.

Most OTC container labels have so much text that the print size must be substantially reduced to fit the limited available surface space. This produces text which is very difficult for individuals with vision problems to read (Vanderplas and Vanderplas, 1980; Zuccollo and Liddell, 1985). In fact, the elderly who are quite likely to have age-related visual difficulties (presbyopia, cataracts) also tend to take more medicines. As a consequence, this population is likely to have problems reading important information about the drugs that they take. Apparently, it is assumed by the parties involved (e.g., government regulatory agencies and pharmaceutical manufacturers) that it is better to include all potentially relevant information on container labels without deference to the fact that, doing this produces text that is illegible and unreadable by many of the people who use the products.

Some OTC pharmaceuticals include, as part of the package materials, patient-product inserts (PPIs). These enclosures lack the space constraints of the container label, and therefore, could be designed so that the information is easier to read, i.e., printed in a larger font and/or simplified. However, most PPIs are not any easier to read (and sometimes they are more difficult to read) than the information on the container label. In addition, many kinds of OTC products contain exterior or outside packaging (e.g., cardboard box) surrounding the container that holds the medicine itself. The outside packaging material could be used to provide more surface space to make the material easier to read and understand. PPIs and exterior packaging materials often provide much the same information as the container label, but they can serve different purposes (e.g., information on the exterior packaging can assist purchase decisions, and the PPI can serve as as a more complete reference source). Notwithstanding their supplemental value,

PPIs and exterior container packages are frequently discarded after using the product. As a result, these materials are of little help when the product is used at a later time (Wogalter, Forbes, and Barlow, 1993).

One possible solution to this labeling-communication problem is to add space to the surface area of the container label onto which more legible and possibly more extensive instructions and warnings could be printed (Wogalter and Young, 1994). Wogalter and Young (1994) added surface area using an extended tag label attached to a small glue container. The use of the tag allowed the warning and other printed information to be printed in larger font sizes than the original (control) label. Results showed that compliance behavior (wearing protective gloves) increased with the tag label compared to the control label.

Barlow and Wogalter (1991) and Wogalter et al. (1993) found that the elderly preferred glue containers having labels with increased surface area. One of the most preferred bottle designs by this population was a wings (or fin) design that not only provides more surface area for print information but also makes it easier to hold and turn the cap. Recently, several drug manufacturers have begun to package OTC pain medications in easy-open containers with caps having extended fins. This new design makes it easier for someone with arthritis or with a hand/arm disability to gain access to the container's contents. Unlike other containers for this and other pill-type medications, the new design lacks child resistance. The only guard against access by small children is a small warning stating the bottle is not child resistant.

This new container design substantially increases the usable surface area of the container (relative to other containers) and enables the printing of larger, better warnings. The present study examined the effect of making use of this added surface area by reprinting and extending some of the most important warnings and directions for use onto the container cap section. The issue addressed was whether elderly participants would prefer the labels with information added to the container top. Participants' evaluations included likelihood of noticing and reading the label. Comparisons were made to control containers without this added information.

In addition, the experimental label conditions differed with respect to color of the added label: white, orange, fluorescent green, and a two-toned version with the signal-word header in orange and all other warning text in white. The issue here was whether certain color conditions would make the added label more salient (the fluorescent green and two-tone) as opposed to the white and orange (the main colors of the other parts of the existing store-bought bottle label).

These experimental containers were compared to two control conditions. One control was the container of an actual OTC pain reliever as it is sold. (This control bottle also served as the basis for all of the experimental bottles.) The other control was identical to the first control except it lacked the back and side label. The purpose of the second control condition was to determine whether it mattered to participants whether the container had the (rather considerable amount of) text found in these label sections.

A group of elderly participants evaluated the bottles according to several dimensions which are described in more detail in the next section.

METHOD

Participants

Sixty residents (19 males and 41 females) of retirement communities in North Carolina and Virginia participated. Participants had a mean age of 75.1 years and 14.78 years of education (2.7 years post high school). Fifty-five participants (92%) wore corrective lenses.

Figure 1. The printed material on the experimental container cap labels

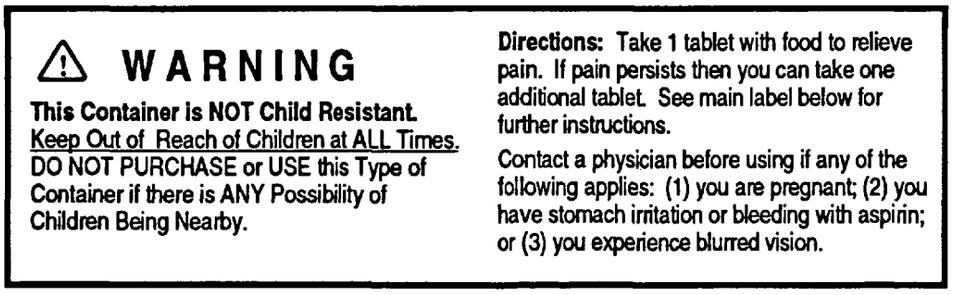
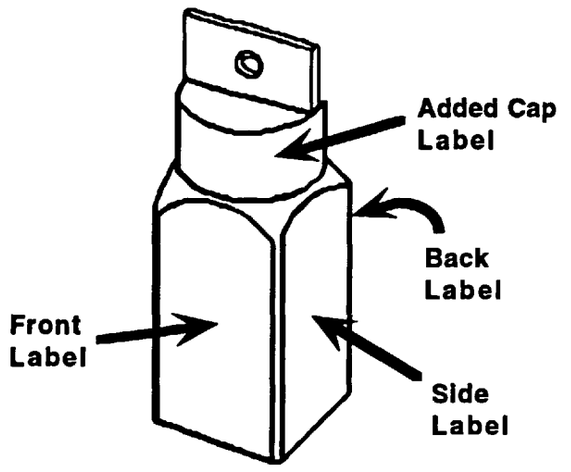


Figure 2

Representation of the Container and Label Placement



Design and Stimulus Materials

Six label configurations were examined in a within-subjects experimental design. All were based on the bottle and label configuration of a national-brand ibuprofen pain reliever (Motrin IB®, The Upjohn Co, Kalamazoo, MI). Two were controls: One was the bottle and label identical to the Motrin IB (130 tablet size) as it is sold in stores; the other control was identical to the first except the back and side label were detached which eliminated most of the on-container warning/instruction text. The most prominent colors of the container and label were orange and white. There were also two very small sections (less than 5% of the available surface) having the colors yellow or brown. Most print was in black. The other four labels were identical to the store-bought control (with the complete label), but they also included warning material on the cap section. The information on the cap label is shown on Figure 1. This label includes: a signal icon (triangle enclosing an exclamation point) and the signal word WARNING. It emphasized the containers' lack of child resistance and provided some of the most important directions for use and warnings found on the other parts of the container label as well as information in the 1993 edition of the *Physicians Desk Reference.*

The added label message was printed in 10- point New Helvetica Narrow, a san serif font. The signal word, the not-child-resistant message, and the directions heading were printed in a bold version of this font. The signal word was printed in 17-points. The existing (predominately orange) label on the main panels of the container (front, side, and back) contained san serif type of various sizes, but the most of the information contained on the label (including directions, warnings, indications, etc.) was printed in 4-point type.

A depiction of the containers' configuration is shown in Figure 2. The four experimental cap conditions differed with respect to the color of the cap: White, Orange, Orange/White, and Green). The orange and white colors on the cap were similar to the colors on the existing label container. The green was a bright fluorescent green. The cap label that combined both orange and white was designed to be similar to the warning panels described in existing standards for consumer product warnings (ANSI Z535.4). The label was identical to the white cap label condition except a rectangular panel enclosing the signal icon (triangle/exclamation point) and signal word was orange.

The cap labels were produced using a 600 dpi laser printer and laminated to the plastic white container caps. Questionnaires given to participants are described in the next section.

Procedure

Preliminary research using both Likert-type rating and rank order procedures suggested that oldest adults in this population had greater difficulty understanding the rating instruction than they did understanding the rank order instructions (to arrange the bottles from best to worst). It is for this reason that a ranking procedure was used, despite known difficulties in using and interpreting ordinal measurement and analyses.

Each participant was run individually in separate sessions. Participants were first given a short questionnaire that requested information about personal demographics (e.g., age, gender). After its completion, they were given a second questionnaire that asked participants to order the bottle according to each of the dimensions listed below (from most = 1 to least = 6):

- How easy is it to read the label?
- How likely would you be to notice the warnings on the label?
- How likely would you be to read the warnings on each label?
- Please rank your preference for each of the labels?
- How likely would you be to recommend each label to a friend or family member?
- How likely would you be to purchase each version of this product?

Table 1. Mean Ranks of Bottle Label Configurations†

	Control		Experimental Labels with Extra Information on Cap			
	No Back/Side labels	Store-Bought	White	Orange/White	Orange	Green
Mean	6.00	4.99	3.13	2.57	2.32	1.99
SD	0.00	0.09	1.06	1.02	0.97	1.05

Note. *Data is shown collapsed across questions.* †*Lower scores indicate greater preference.*

The order of questions was randomized for each participant. Before each question, the containers were arranged in a random sequence by the experimenter who recorded the order of each of the participants' bottle arrangements on a response sheet. After completion of these tasks, participants were debriefed and thanked.

RESULTS

A sequence of analyses were performed on the data. The first analysis revealed that participants tended to sort the bottles in the same order for all six questions. In fact, Spearman rank-order intercorrelations among the questions and label means were extremely high ranging from .95 to 1.0. In addition, exploratory 6 (question) X 6 (label type) analyses of variance failed to show evidence of any statistically significant interactions. Together these results indicate that participants were ranking the bottles to all questions on the same underlying dimension, which we believe is based on their liking or preference of the container labels. Therefore, to simplify subsequent analysis, the data were averaged across questions such that each participant provided one score for each bottle label. Means of these scores across participants (and questions) are shown in Table 1.

The resulting data were analyzed with a Friedman test (a nonparametric test for multi-group repeated-measures designs). The Friedman Test showed a significant effect of bottle configurations, $\chi^2(5, N = 60) = 225.78$, $p < .0001$. The mean ranks showed that the most preferred designs were those with the added cap label. The most preferred was the green cap, followed by the orange, the orange/white, and the white cap labels. The store-bought control was ranked fifth and the control with no back or side labels ranked last by all participants. The Wilcoxon's Matched-Pair Signed-Rank test showed that each of the label conditions differed significantly from one another, except between the Orange/White and Orange labels and between the Orange and Green labels.

DISCUSSION

The results showed that elderly participants judged the containers with the added cap label on the cap more positively than the currently-sold container design which lacks the cap information (or a bottle without any information on the rear and side label). These results suggest that the elderly participants preferred having more information than less information.

The data also indicate that among the cap labels participants preferred the versions with color. The green color cap received the best mean rank scores. There are at least two explanations that can be offered for this result. One is that this particular hue is particularly noticeable as it is a particularly bright and noticeable fluorescent green. For example, in Raleigh, North Carolina and other sites across the U.S., new pedestrian signs are being erected with retro-reflective fluorescent green color background to increase their noticeability in substitute to the more usual yellow signs. An alternative explanation for the green label receiving the highest scores could be due to the fact that it is simply a different color than the rest of the label. The three other experimental caps had orange and/or white—which were the predominate colors of the other parts of the container or label. That is, these results can not determine whether another different hue that contrasts with the existing colors on the label would have produced the same results (e.g., a blue or yellow). Thus, it is unclear at this point whether the results are due to the green cap label just being different from the other colors on the label, because green in general is a color that they prefer, or because it was due to the particular type of green (fluorescent) that was used. Additional research is

necessary to determine the validity of these potential explanations.

The results also suggest that making use of added surface area on a container can enhance people's preferences because it makes the printed material easier to notice, read, etc. Moreover, the participants' scores indicated favorable attitudes towards purchasing the product with the alternative label configurations and a willingness to recommend the bottle to others. These results confirm those of Barlow and Wogalter (1991) and Wogalter et al. (1993) where strong preferences were found for glue bottles having labels with increased surface area space for larger print warnings. Greater surface area would also allow the inclusion of pictorials that could be useful in facilitating understanding and increasing the salience of particular warnings and instructions (Kalsher, Wogalter, and Racicot, in press).

The results can also be explained in a very different way. An alternative explanation is that participants took the role of information-seeking "good" subjects (Orne, 1962). "Good" subjects seek cues from the experimental situation to provide direction on how to behave properly, and in particular, how to behave in ways they think will help support the experimenter's hypothesis. Thus, our subjects might have noted the manipulation of color and information quantity and responded according to what they thought would be helpful to the experimenter (as opposed to helpful for themselves). However, the experimental procedure was purposely conducted to allow participants the opportunity to answer each of several questions in any way they wished. In addition, the instructions were written to limit any potential biases that would lead the participants to answer the questions differently than their actual beliefs. So, even though the results are consistent with an information-seeking good-subjects explanation, we believe that it is more plausible that the pattern of results accurately depicts our elderly participants' true inclinations and preferences about the different kinds of labels.

More research on ways to increase the legibility and understandability of pharmaceutical labels is needed. Informal discussions with participants in the post-experiment debriefing phase suggested that being able to read container labels is an important concern to them. While the dependent variables in the present research reflected participants' preferences, subsequent research is necessary to determine the effects of other relevant factors including: (a) what information participants examine when they look at the labels, (b) whether they understand the information presented, (c) what they already know about the product, (d) how familiarity affects their interactions with the product, (e) how hazardous they believe the product to be, and (f) whether they would be willing to pay more for better labels on products. Subsequent research in these areas will help us to understand the factors that enhance people's knowledge about the pharmaceutical that they take and in the end to promote safe behavior (e.g., resulting in proper medication consumption). We hope that the present study's positive results using prototype alternative label designs will help to spur additional research in this important area.

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