Evaluating Cognitive Services for Non-literate and Visually Impaired Patients in Community Pharmacy Rotation Sites

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The study’s purpose was to develop a pictorial labeling system and pharmacy rotation sites to teach students educational and counseling skills needed to provide pharmaceutical care for low literate and visually impaired patients. A quasi-experimental crossover group design was utilized to evaluate the system. Five of nine pharmacy sites were randomly selected to first implement and evaluate the pictorial system, then the traditional system. Pharmacists’, students’, and patients’ perceptions of the systems were evaluated. The pictorial labeling system was rated favorably. Most pharmacists and students were satisfied with the pictorial labels and felt the system was easy to implement. Patients receiving pictorial labels felt that the print size of the labels made them easier to read than those receiving traditional labels (t=2.47, P=0.014). ANCOVA results indicated the pictorial system led to better understanding of prescription directions for non-literate patients (F=3.37, P=0.01). Further analysis indicated that non-literate patients who received pictorial labels (x̄=9.0, SD=1.2) understood their prescription directions more than did those receiving traditional labels (x̄=7.0, SD=1.8). Pharmacy programs should consider developing community pharmacy rotation sites in areas where patients are predominantly low-literate to teach students skills needed to provide care to these patients.

INTRODUCTION

Patient medication information, including prescription labels, is generally written at the sixth to eighth grade level or higher(1,2). Therefore, people who are functionally illiterate or low-literate have problems comprehending and understanding how to adhere to their medication instructions and thus may be unintentionally noncompliant. Also, some medical terms or phrases commonly seen on prescriptions are not understood by individuals who can read, such as “vaginal” or “rectal.” Labels are usually typed printed with small letters or have auxiliary warning labels with tiny letters which make it difficult for people with poor eyesight to read the instructions. Furthermore, prescription bottles typically have a clear, shiny piece of tape covering the label which protects the label which creates a glare making it even more difficult for visually impaired people to read.

The National Literacy Act of 1991 defined literacy as “an individual’s ability to read, write, and speak in English and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one’s goals, and to develop one’s knowledge and potential”(3). There are various levels of illiteracy: low literates, skills below the fourth grade level; functional illiterates, skills between the fourth and eighth grade level; and marginal illiterates, skills between the eighth and twelfth grade level(4). For this paper, non-literate will describe those individuals who read at the functionally illiterate level or lower. Non-literate have a very serious implication on society since they comprise a large percentage of the population. A recent study showed that 26 percent of the total US population is illiterate and there are about 1.4 billion non-literate adults worldwide (5). This is a conservative estimate since this does not include the homeless, those incapable of being tested, and those institutionalized. Nor does it include those 65 years old or older, a group whose percentage of members with less than five years of schooling is more than double that of the general population(6). This group is especially vulnerable since the elderly consume a disproportionately high amount of prescription medications. Data have shown that low-literate to illiterate people tend to live in poor and rural areas of the country(7).

Literacy should be of great concern to health care providers. Patients unable to read their prescription labels may be noncompliant which could lead to serious complications and increased health care costs. These complications can vary in degree from minor side effects to death. A 1992 study among elderly patients on medication after hospital discharge showed that noncompliance is a serious problem. Out of the 44 elderly patients who completed the survey, 64 percent of the patients used at least one medication not ordered by the doctor, 73 percent did not take the medication according to the way it was prescribed by the physician and 32 percent of medications were not taken at all(8).

The major obstacle facing health care providers is identifying non-literate patients. Most low-literate to illiterate patients are too embarrassed to admit that they are unable to read the directions on their prescriptions. Therefore, many of these patients have devised ploys to disguise their illiteracy. Some say they have “left their glasses at home and don’t have time to go over the directions that thoroughly. Even if some patients can read the labels, are they actually comprehending the directions? Many words and phrases that patients can read are not actually understood by patients. Words such as vaginal, rectal, or orally and phrases such as “... as needed,” or “take 2 tablets 2 times a day” can oftentimes misunderstood or not understood at all by patients.

Seeking patient information, such as education level, is not an accurate or viable method of determining patient’s...
reading ability. A recent study (9) showed that individuals read at a level of 4.6 grade levels below their educational status or last year completed in school. Additionally, socioeconomic status and race, although related to illiteracy, cannot be used to accurately predict literacy status.

Pharmacists are in an ideal position to effectively educate illiterates and visually impaired patients on their drug therapies and related prescribed behaviors. Pharmacists are the most easily accessible health care provider and usually have a more personal relationship with patients than any other type of health care provider. In addition, since pharmacists dispense prescriptions to patients, they are typically the last health care practitioner with whom patients come into contact before taking their medication. Unfortunately, few pharmacists and pharmacy schools are equipped with proper programs, skills and knowledge to effectively counsel these types of patients. Therefore, an education program to address this need and provided by a school of pharmacy is worth developing. Such a program would require preceptors to be trained to develop the appropriate skills and knowledge. Ideally, this program should also be simple and straightforward so that it would be transferable to practicing pharmacists and other pharmacy schools. Of great concern, is that the program be effective and helpful to visually impaired and low-literate patients. Therefore, the program must also be evaluated in terms of the effectiveness or positive influences on low-literate and visually impaired patients’ comprehension and compliance of drug therapy.

OBJECTIVES
Pharmacists and students need to use appropriate materials, including prescription labels, to meet the logic, language and experience levels of their patients, especially patients with underdeveloped language skills or visual impairment. Traditional instruction methods are not serving the needs of these patients (labels are typically written at the sixth grade reading level or higher and are typed with small print). Gaps exist in the availability of materials to assist non-literate and visually impaired individuals in achieving adequate understanding of prescription instructions.

The overall objective of this study was to develop pharmacy rotation sites for students to teach them methods, educational skills and counseling techniques for dealing with non-literate and visually impaired patients. Critical in establishing these rotations was developing a pictorial labeling system and counseling protocol that furnished students with the tools necessary to provide pharmaceutical care for these patients.

Therefore, the first priority of this project was to develop a pictorial labeling system that would be useful for non-literate and visually impaired individuals. The second priority was to develop pharmacy student rotation sites which included implementing the system, training students to counsel these patients, and evaluating the system from pharmacists’, students’, and patients’ perspectives.

METHODS
A labeling/counseling system designed for illiterate and visually impaired patients was developed in 10 experiential training pharmacy sites. The system included: communication skills training modules for preceptors and students, prescription vial labels designed to provide prescription instructions so that illiterate and visually impaired patients may understand them, and pictogram auxiliary labels.

To evaluate the system, a quasi-experimental crossover group design was utilized. Five of the 10 pharmacy sites were randomly selected to first implement and evaluate the pictorial system followed by evaluating the traditional system. The other five sites evaluated the traditional system first, followed by the pictorial system. Patients in the study from all the sites who received the pictorial labels and counseling were classified as the experimental group. Those who received traditional labels and counseling were classified as the control group. The control group was compared to the experimental group on the basis of: patient comprehension; and patient demographics, which included literacy category, age, education, income, etc. In addition, pharmacists’ and students’ perceptions of the pictorial system were evaluated.

Pictorial Labeling System Development
The development of this system was conducted in two phases. The objectives of Phase I were to compile various auxiliary pictograms and pictorial instruction labels, to evaluate these labels in focus groups, and to develop a set of auxiliary pictograms and instruction labels using focus group feedback. The purpose of Phase II was to determine whether non-literates reading the pictorial labels had a higher level of understanding than did non-literates reading traditional labels. Phase II results also identified specific auxiliary pictograms that needed further refinement. The overall objective for evaluating these pictorial labels was to determine whether or not they could be understood before the entire system was implemented and evaluated at pharmacy rotation sites for teaching pharmaceutical care to special needs patients.

In developing the pictorial labeling system, 223 interviews were conducted to compare understanding between traditional prescription labeling systems and the pictorial labeling system. In this study, the non-literate category included: illiterate, low-literate, and visually impaired individuals. ANCOVAs were used to determine differences in understanding between the two systems. Results of Phase II indicated that non-literates receiving the pictorial system (instruction labels and auxiliary labels) had a better understanding of the prescription directions than did non-literates receiving the traditional system, even after counseling ($F=6.63, P=0.016$ for the instruction labels and $F=9.91, P=0.004$ for the auxiliary labels). Furthermore, the understanding for non-literates receiving the pictorial labeling system did not differ significantly from literates receiving the pictorial labeling system. Whereas for traditional labels, there was a significant difference ($F=82.95, P=0.0001$ for the instructional label and $F=90.23, P=0.0001$ for the auxiliary labels). Analysis of individual pictogram auxiliary labels indicated that only “Take on empty stomach,” needed further refinement.

These results support that the newly developed pictorial labels are better understood by non-literates than the traditional labels and that these labels assist non-literates in understanding the instructions to the same level as literates. Therefore, these pictorial labels were used as part of the intervention on the experimental sample of this study. The labels that were developed for use in the community pharmacy rotation sites included: an instructional label, “take by mouth,” “for the eye,” “for the ear,” “for the nose,” “vaginally,” “rectally,” “do not take by mouth,” “store in refrig
Fig. 1. Examples of pictorial and traditional labels (shown in actual size).
Community Pharmacy Rotation Site Development

In coordination with the North Carolina Area Health Education Center (AHEC) Program, 10 pharmacy sites were selected. The selection criteria for the community pharmacy sites was: > 75 prescriptions/day; located where the average household income is at poverty level or below (or in a pharmacy that has reported a high percentage of illiterate or non-English speaking patient populations); and two or more months during the Spring of 1994 where pharmacy students would be enrolled for their experiential community. Students at these sites were required to learn interviewing and special counseling skills. The activities designed to meet this project’s objectives fulfilled the project requirement for the community pharmacy rotation. All 10 sites used the pictorial system as well as the traditional system for this study. Five sites were randomly assigned to implement the pictorial system and evaluate patients for one month, then switched to their traditional method of labeling and counseling to evaluate patients for one month. The other five sites were selected to evaluate the traditional system first.

The pharmacist preceptors who participated in the study completed a four-hour continuing education program to learn how to use the system and inform them about the project before the project was implemented in their pharmacy. The training program required participants to complete two hours of didactic work, including a manual, videotape, and lecture material. The principal instructor of this CE program was a professor who teaches patient counseling and communication in the School of Pharmacy. An additional two hours, involving participation in small group exercises to utilize counseling techniques for illiterate patients was undergone. This program was an intensive course designed to educate practitioners in identifying, understanding, and counseling illiterate patients so that they may better serve this patient population.

Twenty pharmacy students assigned to the 10 sites, completed a two-part program. The first part was similar to the preceptor program, in that it concentrated on teaching students how to use the pictorial system and how to counsel low literate or visually impaired patients. As with the pharmacist program, students practiced the counseling techniques in small groups. The second part of the program focused on teaching students how to conduct the enrollment survey and the follow-up survey. Proper interviewing techniques and etiquette were covered in this session as well. Students were instructed to conduct themselves professionally and courteously throughout the entire interview. Simulated interviews were then conducted with the principal investigator observing and making comments.

Data collection began one week after students and pharmacists were oriented to the system (either traditional or pictorial) with students enrolling patrons who presented new prescriptions in the pharmacy. Patients were enrolled in a continuous fashion. The pharmacies which were evaluating the traditional system first, continued to label and dispense prescriptions in the same manner as they have always done, whereas the pharmacies evaluated the pictorial system first, labeled and dispensed prescriptions according to the method developed. During the second week, each student enrolled participants for seven to 10 days to obtain about 20 participants. The third and fourth week, pharmacy students met with the respondents either at the pharmacy or at the respondent’s home and completed the interview. Once all participants were interviewed for the first month, the students and pharmacists completed an evaluation form of the system. During the second month of the experiment, the four pharmacy sites evaluating the pictorial system, switched back to the traditional system of labeling prescriptions and counseling patients and evaluated the traditional system. The five sites that were evaluating the traditional labels first, implemented the pictorial system and evaluated that system.

Practitioner and Student Evaluation

As mentioned earlier, pharmacist preceptors and students completed a self-administered questionnaire after the project ended. The purpose of this survey was to obtain their opinion of the usefulness of the pictorial system, the ease with which the system was implemented, and any comments or suggestion to improve the system. Only those students who assisted during the month the pictorial system was being used were asked to complete the survey. The questionnaire was the same for both the pharmacists and the students, with only a few differences, which will be explained in more detail. The first part of the questionnaire asked the pharmacists and students to rate their satisfaction with specific aspects of the pictorial system. These items included: label size, print quality, print size, glare, label adhesiveness, and paper stock. They were also asked to rate the usefulness of these labels in terms of: ability to understand, aids patient counseling, helpful to non-literate and visually impaired patients, confusing to patients, and flexibility of system. Finally, only the pharmacists were asked to rate the ease with which the system was implemented into their pharmacy.

The second part of the survey was more qualitative in nature. Respondents both students and pharmacists, were asked to provide candid remarks about what they liked about the system, what they disliked about the system, and suggestions for improving the system. Lastly, pharmacists were asked whether they would like to continue using the system in their pharmacy. A follow-up phone call to each site gathered information about the number of patrons who are low literate or visually impaired.

Patient Evaluation

Patients receiving new prescriptions were invited to participate in the study with the understanding that they were assisting the University of North Carolina in conducting a study on prescription medication labels. Those patients who agreed to participate were categorized into either an experimental group or control group depending on which system was being evaluated at that particular site at that time. If the pictorial system was being evaluated, then the patients were classified as the experimental group. In contrast, if the traditional system was being evaluated, they were classified as the control group.

Those patients enrolled in the experimental group were told they were assisting the University in testing some new
labels. Those in the control group were told they were helping in evaluating existing labels for understanding. The criteria for inclusion was: patient must be receiving a new prescription medication, the individual being interviewed must be the one either using or responsible for administering the medication, and the patient must agree to a follow-up interview.

Patients were evaluated using two instruments: an enrollment survey and a follow-up survey. Patient’s ability to read a typical prescription label, patient understanding of prescription directions, readability of specific label factors (print size, glare, and directions), satisfaction with labels and demographic information were variables that were collected on the two surveys. The primary purpose of the enrollment survey was to enroll patients in the study, collect demographic information, and assess whether patients could read a typical prescription. Once patients (both experimental and control) agreed to participate, a prescription vial was handed to them with the following instructions:

<table>
<thead>
<tr>
<th>John Doe</th>
<th>Dr. Brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/28/94</td>
<td>250mg, #22</td>
</tr>
<tr>
<td>Take 2 now, then 1 tablet by mouth 3 times a day</td>
<td>Amoxicillin</td>
</tr>
<tr>
<td>(morning, noon, and night)</td>
<td>for respiratory infection</td>
</tr>
<tr>
<td>NO REFILLS</td>
<td></td>
</tr>
</tbody>
</table>

Respondents were then asked how to take this medication, according to these instructions. They were evaluated on their understanding of these instructions using a 10-point scale. Respondents received the following points for certain bits of information: dosage: 1 point; how many times per day, 1 point; what time medication should be taken, 3 points; indication, 3 points (if they understand respiratory and infection); and auxiliary instruction, 2 points. This reading ability score was used as a proxy to classify patients. Those receiving a score of six or lower were classified as non-literate, while those receiving seven or higher were in the literate group. Their phone number, gender and ethnicity was also collected at this time. Patients then received the new prescription(s) that they had brought to be filled and were counseled accordingly (either with the new pictorial labels or with traditional labels).

Seven to 10 days after patients were enrolled, follow-up surveys were conducted. Copies of prescription labels that the patients had received were attached to this survey, and patients were asked how the directions said to take their medication. Patient understanding of prescription directions was measured for each new prescription the patient received. During the follow-up survey, patients were asked what the directions on their prescription(s) were. A 10-point scale which included dosage, daily consumption, what time medication was taken, indication or drug name and auxiliary instructions was used for evaluation. Patient’s score was recorded for each prescription received and an average of these scores was computed as an overall understanding score. Respondents also assessed the readability of the labels (either the pictorial or traditional) based on: print size, glare, and directions on a scale of one to five. On a similar scale, patients were asked how satisfied were they with the prescription labels and auxiliary labels. Finally, open-ended questions were asked to allow patients to comment on the labels.

ANCOVAs and t-tests were utilized to evaluate comprehension between the experimental and control groups. The dependent variable was the understanding score, while the independent variables were the groups (experimental and control) and reading ability (low literate and literate). Computer programs from the Statistical Package for the Social Sciences was used for analyzing the data. The alpha probability for the analysis was set at 0.05.

RESULTS

Initially, 10 sites were selected, however, one month into the experiment one pharmacy withdrew, for a total of nine community pharmacy rotation sites. The pharmacist from the pharmacy that withdrew indicated that she was no longer interested in the study because she was too busy. The nine pharmacies were located in various urban and rural areas of North Carolina. Eight of the nine pharmacist preceptors completed their survey, while only six of the nine pharmacy students who were involved in the pictorial system evaluation returned theirs. Due to the small sample size, only a descriptive analysis of this data was conducted. All eighteen sets of patient evaluations from the nine sites were turned in by students within two weeks of completing the rotation. A total of 307 patients were enrolled in the study. Of those 307, 49 (16.1 percent) refused to participate in the follow-up survey. Therefore, a total of 258 respondents completed the survey and only these responses were used for analysis.

Practitioner Evaluation Results

Of the preceptors surveyed, one complaint from the majority (89.0 percent, N=8) was regarding the large label size of both the instructional labels and the auxiliary labels. Because of having to use large labels, large vials had to be used to fit the instructional labels along with the new auxiliary labels. Another complaint was that some patients were confused due to misunderstanding of the pictorial labels. Some of the auxiliary labels, such as “avoid alcohol,” and “refrigerate,” were misunderstood by some patients, therefore, each pictogram used needed explaining by the pharmacist. However, during the training sessions, it was explained to pharmacists that such counseling was necessary for every pictorial label on a prescription vial. The pictorial system requires additional counseling since patients are being taught how to “read” the pictorial labels. This was reinforced by a comment which a few of the pharmacists made: “more patient counseling time was required by the pharmacist than would have been necessary using the traditional labeling system.” However, once patients learn how to “read” these labels, it should not take as much time to counsel.

Most of the pharmacists did comment positively on the print quality (x=1.65), glare (x=1.63), label adhesiveness (x=1.38), and paper stock (x=1.38) of both the pictorial instructional labels and auxiliary pictograms. These items were ranked on a five-point scale, one being very satisfied and five being not at all satisfied.

They also remarked that the bright coloring of the labels gained the patients attention and perhaps increased patient awareness and understanding. Also, 78 percent (N=7) of the pharmacists felt that the pictorial labels would benefit the non-literate patients and all of them concluded that the
pictograms would be a distinct advantage in aiding the comprehension and compliance of the visually impaired patients.

Four of the nine pharmacists said they did not wish to continue using this system, primarily because the labels were so large they had to use larger vials. One of these four said that using larger vials would increase costs to the pharmacy and the patient. Interestingly, these sites reported having the fewest number of illiterates or patients requiring these labels compared to the other sites. The other five sites all wanted to continue using the labels and said they were very pleased with the results.

Student Evaluation Results

The students reported some of the same problems as voiced by the pharmacists. Primarily, the label size was much too large which necessitated the use of a larger vial. Also, some of the pictograms were confusing to the patients, e.g., confusing the sun with its eyes closed for bedtime instead of in the evening. However, the students commented positively about counseling patients using the pictograms.

The students did have positive comments in regard to the print quality, print size, lack of glare, label adhesiveness, and paper stock of the instructional labels and auxiliary labels. They also commented that the labels were relatively easy to understand and useful with a variety of prescriptions which aided patient counseling. Likewise, the students agreed that the system would be helpful to non-literate and visually impaired patients.

Patient Evaluation Results

The sample consisted of 79 males (30.6 percent) and 179 females. The average age of respondents was 44.3 years old (SD=19.38) which ranged from 15 to 94 years old. The majority of the participants were Caucasian (53.7 percent, N=139) followed by black (42.3 percent, N=109). Educational status was obtained by the respondent’s last year completed in school, and the average was 12.2 (SD=3.28). Patient’s reading ability, calculated on a ten-point scale of their ability to read a typical prescription label, was very high (x=9.07, SD=1.96). Income level was categorized into three groups: low income (less than $9,999); moderate income ($10,000 - $19,999); and high income (greater than $20,000). The results showed that the percentage of respondents in each category were: 38.9 percent (N=68), 26.9 percent (N=47), and 34.5 percent (N=60), respectively. Eighty-three respondents refused to report their total family income.

Table I shows the descriptive analysis between the experimental and control groups. As indicated on the table, age, education, reading ability, and income differed significantly between the experimental and control groups. Since the sample for both the experimental and control came from the same pharmacy sites, it is not clear why the demographics of the two differed. However, patients were recruited for each sample group for only seven to 10 days, therefore there is potential for differences to occur.

As indicated in Table II, patients were very satisfied with both types of labels. The only factor which differed was print size. Patients receiving the pictorial labels felt the print size was easier to see.

The average understanding score for the entire sample was 9.39 (SD=1.53), which indicated that overall respondents understood their prescriptions. Pearson’s correlation analysis was conducted between the understanding score and age, education level, reading ability, and income to determine whether any of these variables should be held as a covariate in further analysis. These four variables were found to be significantly different between the experimental and control groups. Education was the only variable which was found to be significantly correlated to the understanding of the prescription labels (R=0.16, P=0.02). Therefore, education was used as a covariate to determine whether there were differences in understanding between the experimental and control groups.

As mentioned in the methods section, to determine whether there was a difference in understanding prescription labels between those receiving the traditional labels

### Table I. The comparison of selected demographics between the experimental and control samples

<table>
<thead>
<tr>
<th></th>
<th>Experimental (N=146)</th>
<th>Control (N=114)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>47.4 (SD=20.2)</td>
<td>39.8 (SD=17.3)</td>
</tr>
<tr>
<td>Education</td>
<td>11.7 (SD=3.8)</td>
<td>12.5 (SD=2.3)</td>
</tr>
<tr>
<td>Reading Ability</td>
<td>8.70 (SD=2.3)</td>
<td>9.6 (SD=9.7)</td>
</tr>
<tr>
<td>Gender</td>
<td>71% females</td>
<td>67.2% females</td>
</tr>
<tr>
<td></td>
<td>(N=125)</td>
<td>(N=88)</td>
</tr>
<tr>
<td>Race</td>
<td>50.6% Caucasian</td>
<td>58.0% Caucasian</td>
</tr>
<tr>
<td></td>
<td>(N=89)</td>
<td>(N=76)</td>
</tr>
<tr>
<td>Income</td>
<td>52.6% low income</td>
<td>21.8% low income</td>
</tr>
<tr>
<td></td>
<td>(N=51)</td>
<td>(N=17)</td>
</tr>
</tbody>
</table>

### Table II. Patient evaluation of prescription label factors

<table>
<thead>
<tr>
<th>Label factors</th>
<th>Overall (N=254)</th>
<th>Pictorial (N=140)</th>
<th>Traditional (N=114)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Size</td>
<td>1.38 (SD=0.80)</td>
<td>1.26 (SD=0.70)</td>
<td>1.52 (SD=0.90)</td>
</tr>
<tr>
<td>Glare</td>
<td>1.49 (SD=0.85)</td>
<td>1.52 (SD=0.89)</td>
<td>1.44 (SD=0.81)</td>
</tr>
<tr>
<td>Directions</td>
<td>1.43 (SD=0.37)</td>
<td>1.35 (SD=0.80)</td>
<td>1.50 (SD=0.92)</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>1.54 (SD=0.99)</td>
<td>1.43 (SD=0.84)</td>
<td>1.62 (SD=1.11)</td>
</tr>
</tbody>
</table>

*For the factors of print, size, glare, and directions, patients were asked to rate how each factor effects the readability of the label (1 = very easy to read; 5 = very difficult to read). Overall satisfaction was rated 1 = very satisfied to 5 = not at all satisfied with the prescription labels.

<table>
<thead>
<tr>
<th>Test statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>x²=3.18</td>
<td>P=0.002</td>
</tr>
<tr>
<td>x²=2.01</td>
<td>P=0.045</td>
</tr>
<tr>
<td>x²=4.37</td>
<td>P=0.0001</td>
</tr>
<tr>
<td>x²=17.99</td>
<td>P=0.0001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>x²=3.8</td>
<td>P=0.532</td>
</tr>
<tr>
<td>x²=3.73</td>
<td>P=0.154</td>
</tr>
<tr>
<td>x²=17.99</td>
<td>P=0.0001</td>
</tr>
</tbody>
</table>

and those receiving pictorial labels, an ANCOVA was conducted. The results indicated that there was a significant difference within the model ($F=3.368$, $P=0.011$). Further analysis indicated that there was a significant difference in the low literate group between experimental and control groups ($t=5.25$, $P=0.026$). Respondents who had a low reading ability and received the pictorial labels scored significantly higher ($x=9.0$, $SD=1.2$) in understanding their prescription labels than those receiving the traditional labels ($x=7.0$, $SD=1.8$). Not too surprisingly, there was a significant difference in the control (traditional) group between literate and non-literate respondents ($t=2.25$, $P=0.020$) with literate respondents having a much higher average of understanding ($x=9.44$, $SD=1.5$) than did non-literals ($x=7$, $SD=1.8$).

**DISCUSSION AND CONCLUSION**

Overall, the pictorial labeling system was rated favorably by pharmacists, students, and patients. Pharmacists and students were satisfied with the print quality, glare, adhesiveness, paper stock and flexibility of the pictorial labels. Patients, in turn were satisfied with the pictorial labels and felt that the print size, glare, and directions that the pictorial labels offered made the labels easy to read. Patients receiving the traditional labels were equally satisfied with the labels. There was no significant difference in overall satisfaction between the traditional group and the pictorial group. However, patients receiving the pictorial labels felt that the print size of the labels made them easier to read than did patients receiving the traditional labels. A few even commented that the larger labels made it easier to read and caught their attention. Interestingly, pharmacists and students had a differing opinion, they felt that the labels were too large. The labels were felt to be too large primarily because pharmacists had to use larger vials to attach the necessary labels.

The majority of the pharmacists were very satisfied with the pictorial labels and felt that the system was easy to implement into their current dispensing routine. The major change they would have to make is to allow more time to counsel patients so that they have ample time to “teach” patients how to read their new labels. Some pharmacists commented that patients were a little confused by some of the labels and had to be told what they meant. Pharmacists had been told in the training session that every pictorial label must be explained to the patients as they received their prescription(s). Therefore, it was concluded that additional training sessions or reminders (on how to teach patients to use the aids) should be sent to pharmacists and students who would like to use the system.

Another purpose of the study was to determine whether the pictorial system provides a tool which can lead to a better understanding of prescription directions for non-literate and visually impaired patients. The results of an ANCOVA support this ($F=3.37$, $P=0.011$). Further analysis indicated that patients who were classified as non-literate and received the pictorial labels ($x=9.0$, $SD=1.2$) understood their prescription directions more than did those receiving the traditional labels ($x=7.0$, $SD=1.8$). However, patients who were considered to be literate scored no differently between the experimental and control groups. This means that the pictorial labeling system assisted the patient for whom they would like to use the system.

Future studies should address the effects of this pictorial system (or a similar system) on understanding, compliance, and health outcomes. It is important for health care providers to be fully aware of the impact of understanding and compliance on patient health outcomes and the effects of implementing a system or tool which can impact understanding or compliance. As this study indicated, the pictorial system requires counseling and educational skills training to be effective. Simply handing a prescription bottle with pictorial instructions to the patients is not enough. Patients need to be counseled and taught how to read these new labels. Any new tool or system which is designed to aid patients requires teaching health care provider’s how to use the system and how to teach patients to use the aids.

Finally, training future pharmacists before they develop specific dispensing and counseling techniques is very important(4). Students did not make any remarks or suggestions that patients appeared to need more counseling, as did the pharmacists. This suggests that perhaps students counseled patients on the pictograms more regularly and thoroughly than did the pharmacists. Pharmacy programs should consider developing community pharmacy rotation sites in areas where patients are predominantly low-literate to teach students skills necessary to counsel this type of patient.

**LIMITATIONS**

The study had some limitations which should be considered when interpreting the results. As with any study, generalizing the results to a larger population is a limitation. Sites selected were those that participate in the school’s Academic Internship Program and thus may not accurately reflect the population.

Selection bias was another potential limitation of this study. Respondents who had low literacy skills may have declined to participate in the study. This may be reflected in the high average reading score of the prescriptions. When low literate and literate individuals were identified, only 13.0 percent (N=32) of the sample was in the low literate group.

Pharmacists and students may not all have counseled patients receiving the pictograms adequately. This was reflected by some pharmacists who commented that patients were confused about some pictograms. They recommended that patients should be told what the pictograms meant. During the training session it was emphasized that counseling and teaching patients how to read the new labels was necessary. Role play scenarios were used to practice these techniques. Perhaps, more strenuous sessions and site visits would be necessary until pharmacists have incorporated these techniques.

Compliance was not measured since over half of the interviewers neglected to put the date of the follow-up visit. Although pill counts were taken, since it was unknown what the actual amount remaining should be, compliance could not be computed.

**References**


(6) *Literacy Profiles of America’s Young Adults*, National Assessment of Educational Progress Study. Princeton NJ (1986).

