

## The Importance of Pictograms in Pharmacy Practice

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**Abstract:** Pictograms are signs designed using a pictorial language, aimed at eliminating the communication barrier between different cultures. Pictograms have international meaning and information and the communication speed is extremely fast when compared to written communication. Therefore, it is believed that their use during counseling in pharmacy services will contribute positively to the treatment of the patient and it can be used as an effective and alternative tool for communicating with hearing-impaired and illiterate patients or who use the wrong/incomplete medication. Thus, the frequency of the undesired side effects due to misuse will be reduced by ensuring that the patient uses the drug correctly and effectively and the meaningful contribution may be made to the country's economy through decreasing health expenditures by rational drug use. In this study, it is aimed to give information about the subject and draw attention to its importance by examining the studies performed on the subject.

### INTRODUCTION

According to Stiebner, the definition of the pictogram, derived from the Latin words “pictus” and “gram”, which means unwritten drawing, was made by Ambrose and Harris as a “graphic element that describes a movement or situation through a series of visual references or clues”<sup>1</sup>.

Since pictograms have an international meaning, and have a structure independent of spoken languages, they do not require any language education or literacy. Accordingly, they can eliminate possible communication barriers and everyone easily understands them<sup>1</sup>. In addition, it is known that communication speed and power in multicultural areas are higher than in writing<sup>2</sup>. In this context, they were designed and used to enable different cultures to communicate in many international areas from industrial business and working environments to Olympic Games from cultural centers such as museums and conference areas to hospitals and airports<sup>3</sup>.

In order for a pictogram to be comprehensible by large masses, it must have some features. These are as follows;

- The knowledge, beliefs and concerns of the target population should be determined accurately,
- Similar, easy and understandable symbols should be used,
- Pictures should be as simple and as realistic as possible to ensure maximum recognition and comprehension,
- Appropriate backgrounds should be included; it should be as simple and understandable as possible,
- It should be of appropriate size, and the selection of colors should be made carefully,
- Understanding and usability should be tested through pre-tests,
- It should be designed independently of a special culture and appeal to the people of the world,
- The pictogram should not offend a taboo or belief,
- The pictogram should be perceived by people of various educational levels,
- The pictogram should be readable as visible<sup>4</sup>.

Images generally have a universal language and can be easily remembered by everyone, regardless of the language spoken and the culture. For this reason, it is thought that symbols can be used in the field of pharmacy. According to the United States Pharmacopeia (USP), where pictograms are the most common, pharmaceutical pictograms are defined as “standardized graphic images that help to convey medication instructions, precautions and/or warnings to patients and consumers”<sup>5</sup>. For this purpose, 29 pictograms containing simple, plain and understandable designs were published in the 1989 issue of the USP Dispensing Information (USP DI) and this number has increased to 81 in the 1998 issue<sup>4</sup>. Some examples of pictograms selected from the USP are shown in Figure 1-6 below<sup>5</sup>.

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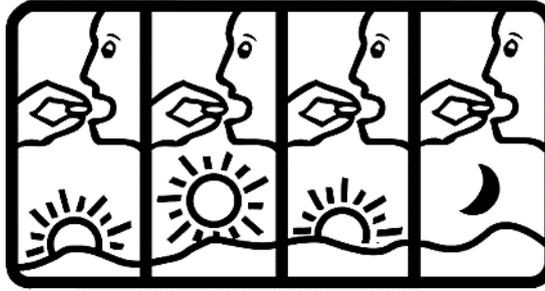
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Place drops in ear

Figure 1. Place drops in ear

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Take 4 times a day

Figure 2. Take 4 times a day

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Place drops in lower eyelid

Figure 3. Place drops in lower eyelid

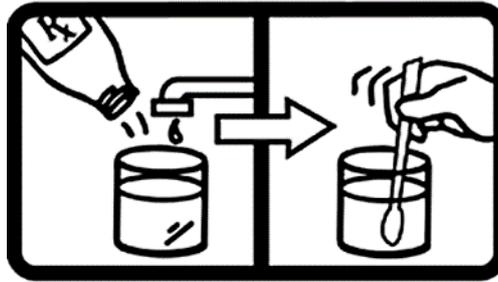
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Do not take if breast-feeding

Figure 4. Do not take if breast-feeding

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Dilute with water

Figure 5. Dilute with water.

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Take at bedtime

Figure 6. Take at bedtime.

In the Drug and Pharmacy Dictionary of Turkish Language Association, pictogram is defined as “the figure on the product that visually expresses any feature related to the product”<sup>6</sup>.

A project developed by the International Pharmaceutical Federation (FIP) focused on the use of pictograms to improve the quality and accessibility of patients' health information and to reduce the impact of low health literacy. In the project, a number of positive

outcomes such as patient understanding, compliance with medical instructions, recall of information in the short and long term were obtained through the use of pictograms together with the oral and written instructions provided to the patients. Some examples of pictograms prepared within the scope of this project are shown in figures 7-11<sup>7</sup>.



Figure 7. Take 1 capsule every 6 hours

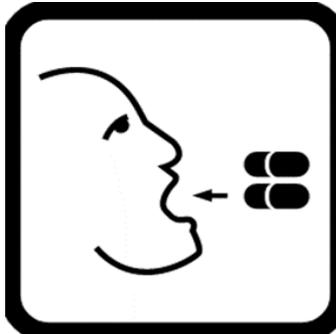


Figure 8. Take 2 capsules.



Figure 9. Indicated for headache.



Figure 10. Take with meals.

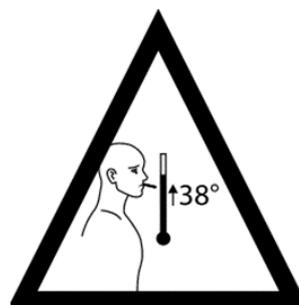


Figure 11. This medicine may cause high fever.

This study was planned to examine the use of pictograms in pharmacy and draw attention to its importance. For this purpose, the literature and studies on the subject were examined and the information obtained was compiled.

The information in the medicine prescribing information and explanations are mostly written in scientific language. While these paragraphs consisting of complex medical terms cannot be understood by some patient, they may also cause ambiguity and confusion. This causes drugs to be misused by elderly patients, especially those with a low literacy rate, and thus reduced treatment compliance. In order to prevent this and misunderstandings, the use of pictograms in pharmaceutical services has increased greatly in recent years and the studies on the subject have begun. Thanks to the pictograms, it was aimed to facilitate communication with specific patient groups (illiterate, elderly, hearing-impaired patients, children, etc.) and the importance of the subject was emphasized with the studies. As a result of the studies carried out by different researchers, it has been concluded that the use of pictograms in addition to verbal/written instructions in drugs with both prescription and over-the-counter use increases the patient's understandability and has the potential to increase treatment compliance through to the reminding effects of visuals<sup>8</sup>.

Literacy problem is an important problem in our country as well as all over the world and according to the latest data obtained from the Turkish Statistical Institute, 3,26 % of the population are illiterate in Turkey<sup>9</sup>. In order for the patients to continue their treatment effectively, they need to know what the drug they are using, why they are using it and how to use it. Elderly patients are also in the risky group in terms of literacy and understanding. Since they have also vision and hearing problems, even if the drugs' use are written, it will be difficult to use the drugs appropriately because they will not be able to read or they will find it too complicated and the desired treatment target cannot be achieved. For this reason, pharmacists should use more effective and permanent methods in communicating with these patients than written texts and verbal description. As the consultancy role of pharmacists has come to the fore especially in recent years, it is discussed that the consultancy is provided with pharmacists and pictograms to be used by decreasing the information on the labels of the drugs<sup>10</sup>.

In Poland, a study was carried out by Piotr Merks and *et al.* in 2016 in 5 community pharmacies, and 68 patients were included in the study. Of the 50 pictograms thought to be understandable 22 were selected for use in the study and it was shown individually to each patient and asked to guess their meaning. The answers were classified into five categories as "correct", "partially correct", "incorrect", "opposite answer" and "I don't know/I can't guess". The rate of accurately guess ability the pictograms of patients within this study varied between 70.8% to 100% and the researchers found the rate of guess ability significantly higher. The effects of changes, including changes in pharmacy practice in Poland, the introduction of advanced pharmacy services into routine pharmacy practice and providing more effective pharmaceutical care were better observed. It has been shown, that adding symbols to drug leaflets increases the level of patient safety, supports the information available in the text and improves the understanding of medical information<sup>10</sup>.

A study was carried out to ensure effective and reliable use of over-the-counter (OTC) group drugs and to reduce treatment errors in Australia. Within the scope of the study, standardized labels, which are identical for each drug, were designed on the pillboxes, containing the drug substance, the usage, posology of the drugs, the points to be considered during the treatment and the storage conditions. A total of 77 volunteers, 38 of whom were Australian and 39 were English, were shown OTC labels and their opinions were received. The designs were generally understood and accepted by the patients. Participants

thought that the large and readable type font and simple and understandable label would contribute positively to their treatment. However, some patients have stated that although the label is nice and understandable in the first place, it may cause confusion during the treatment and it may be difficult to differentiate the medicines because it is given the same format in each drug and all the prescriptions are with the same design. Some participants preferred the pictograms to be colored rather than black and white, so they thought that when using more than one drug at the same time, the color differences will be noticeable. Some patients also thought that having an information label on each drug in the same size and appearance would look the same, thus reducing the awareness and attractiveness of the drugs. It is also suggested that important information should be emphasized with bold font and enriched with pictograms rather than using the same font. As a result of the study, the researchers accepted that the labels were generally accepted by the participants, but should be taken into consideration in their negative opinions; and concluded that it is necessary to make some improvements reorganizing the information so that the labels can be understood and used by everyone, using different colors, highlighting significant points about warning information and supporting the message to be given with pictograms<sup>11</sup>.

In 2001, a study was carried out on the Eastern Cape, one of the nine provinces in South Africa, which is mainly underdeveloped, has a high unemployment rate and is economically poor. 23 pictograms were shown in two sets at two different times to 46 people who agreed to participate in the study and received less than 7 years of education. While the first set consists of pictograms accepted by the USP, the images have been modified in the second set and arranged in a way that the local people can understand. The time taken for each initial interview varied between 35-60 minutes. First, a short literacy test, consisting of an exemplary drug label and an explanatory paragraph, was conducted to assess participants' ability to read. As a result, 57% of the participants stated that they could not read the labels or did not understand adequately the labels they read. Only 7% of the participants had fully understood the written instructions and it was found that the level of understanding increased as the level of education increased. When the proportion of correct predictions of the pictograms were analyzed, it has been determined that the pictograms modified in a way that the local people can understand are understood at a higher level compared to the USP pictograms. In the second interview that followed, there was an increase in the understanding rates of both USP pictograms and local pictograms. Following the study, the patients positively reacted to pictograms and thought that it may play an important role in helping them remember because it contains information about the use of their medication<sup>12</sup>.

A study at Sharjah University in the United Arab Emirates was conducted by Suleiman Ibrahim Sharif *et al.* In this study, 300 volunteer students, 150 of whom were studying in the Faculty of Pharmacy, were shown 28 pictograms in the USP during the 2013-2014 academic year and asked if they understood them. It was found that the proportion of correct predictions of the pictograms by pharmacy students varies between 2.7% and 98%, with an average of 73.5%; and the proportion of correct predictions by other students varied between 10.7% and 92.7%, with an average of 60.07%. Primary pictograms that students have difficulty in understanding are the descriptions starting with the Rx symbol. It was concluded that 75.3% of pharmacy students and 57.3% of other students pay attention to the warnings on the pillboxes and information labels. As a result of the study, 96% of pharmacy students and 86% of other students expressed positive opinions regarding the use of pictograms in drug prescribing information. According to the study, it was concluded that if pharmacists correctly understand and interpret the pictograms, it could play a significant role in the treatment process of the patients. In order to expand awareness on this subject, researchers suggested that

courses about the subject should be included in the curriculum of both the faculties of pharmacy and other faculties<sup>13</sup>.

A study was conducted at Dehradun University Faculty of Pharmacy, in India. The aim of the study was to determine how pictograms are understood by illiterate patients and whether pictograms will have a positive effect on treatment. Within the scope of the study, 10 pictograms were asked to 200 illiterate patients who were hospitalized at Shri Mahant Indresh Hospital and their answers were examined. The rate of correct answers given by patients to pictograms varied between 12% and 64%. The use of drugs was explained to the patients through pictograms and the study was repeated afterwards. While only 1% of the patients correctly estimated all of the pictograms before the explanation, this rate increased to 9.5% after the explanation. Since illiterate patients cannot read the warnings on the drug prescribing information, it becomes difficult to achieve the treatment compliance and reach the desired target in the treatment. In this study, it has been concluded that the use of pictograms in addition to written and verbal instructions in drugs will help patients to use drugs correctly and has the potential to increase treatment compliance and eliminate the problems especially in illiterate patients<sup>14</sup>.

In 2012, a study was carried out with 116 patients at Sergipe Federal University in Brazil. In this study a total of 15 pictograms, which were included in the USP but validated for better understanding by the study group aged between 60 to 90 years old and were asked to guess their meaning. Responses were coded as "correct", "wrong" and "do not know". While 25.8% of the patients who participated in the study gave correct answers about the meanings of pictograms, 59.48% gave the wrong answer and 14.72% gave the answer "I don't know". As a result of the study, the rate of understanding the pictograms by the patients was found very low by the researchers; and it has been concluded that pictograms can be used as a supportive of verbal expression to elderly patients during counseling by making simpler and more understandable after organizing for the use of the target population in Brazil<sup>15</sup>.

A study was carried out by the Department of Biopharmaceutical and Clinical Pharmacy of the Faculty of Pharmacy in Jordan University, with 200 primary school students between the ages of 7-9 in eight different schools between March 2010 and April 2010. In this study, 15 pictograms and 6 dosage forms were selected which were easy to understand by children and determined by USP, students' knowledge and proportion of predictions about drugs were examined. One-on-one interviews were made with the students and 20-30 minutes were allocated for each student. As a result of the study, it was concluded that students' knowledge has increased with age; general knowledge of students is found satisfactory by the researchers; they were especially able to define vaccines and prescriptions correctly. The proportion of correct answers to the questions varied between 54% and 92.5%; it was found the levels of general knowledge were high. The most significant factors affecting children's knowledge of medication were: age (with increasing age of children, the knowledge about medications increases too), school/area of residency, and the presence of a first-degree relative working in a medical job (if having first-degree relative working in a medical job, increases the knowledge about medications). The researchers believes that including local healthcare professionals in the education programs and using learning techniques such as brochures, visual and audio recordings, slides and films while explaining the pictograms containing basic information about health will increase the students' level of knowledge and health literacy, and that rational and correct use of drugs will be provided<sup>16</sup>.

In 2015, the study carried out by Sankar *et al.* in India. In this study, the ability to understand and interpret pictograms of diabetic patients over 18 years of age treated with insulin/oral hypoglycemic drugs was measured. 200 patients with informed consent were

included in the study and the answers of the participants were evaluated on 3 different scales as "correct", "partially correct" and "wrong". As a result of the study, it was determined that when the intended meanings of pictograms are explained and given with a text, they understood well and the participants with sufficient literacy were better able to understand pictograms than participants with insufficient literacy. On the other hand, it was shown that pictograms has increased understanding of information even in a low literacy population. Within this scope, as a result of the study, it is concluded that pictograms will be an important method for educating patients and can be used as an effective counseling especially in a low-literacy group of people<sup>17</sup>.

In another study conducted by Cavaco *et al.*, the understandability level of the pictograms by Hindus living in Portugal was tried to be determined, which are developed by the United States Pharmacopoeia (USP) and (International Pharmaceutical Federation) FIP. Within this scope, face-to-face interviews were made with 50 Hindus of different ages over the age of 18 and of different genders between March 2017 and August 2017, 30 pictograms -15 of are in USP and 15 of are in FIP- were asked. The meaning of each pictogram was asked as a 3- closed-ended test question, and one of these options contained the correct and the other two contained the wrong answers. The proportion of correct answers of pictograms varied between 10% and 70%. Although it was concluded that the accuracy of the answers given by the patients increased with the level of education and the time they lived in Portugal, 76% of the participants think that the pictograms will help to understand the treatment plans correctly<sup>18</sup>.

In the study carried out with 140 undergraduate and graduate students other than students of the Faculty of Pharmacy at Banasthali University in India. In this study, 20 pictograms both used in the USP and locally were asked to the participants and their answers were examined. It was concluded that 61% of pictograms were understood and answered correctly by undergraduate students and 56% by postgraduate students. As a result of the study, the researchers concluded that the pharmaceutical pictograms should be included in the education curriculum not only in the faculties of pharmacy but also in all faculties<sup>19</sup>.

### Conclusion

As can be seen from the reviewed literature, pictograms are signs for easy and accurate description of drug use not only for illiterate patients but also for all patients. Patient counseling and education, which are integral parts of pharmaceutical care, motivate patients for treatment and allows their treatment to be observed. The use of pharmaceutical pictograms increases the patient's understanding capacity, and thus, increases compliance with treatment. It also facilitates the description of the conditions of use and storage of drugs for pharmacists and it allows the patient to leave the pharmacy by removing all the question marks in their mind<sup>20</sup>. In this way, the frequency of the undesired side effects due to misuse is reduced by ensuring that the patients use the drug correctly and effectively; wastage of drug is prevented and a significant contribution to the country's economy can be achieved by reducing health care spending.

In order for the pictograms that can be defined as symbols to be understood, the fact that it or its similar must be seen and recognized should never be ignored. Therefore, if something new will be said and the user will encounter it for the first time, simple designs should be preferred and focus groups should be tested. The success of a pictogram depends on to be primarily well designed, free of eye-straining expressions and symbols as well as complex shapes, and appropriate usage by pharmacists who are healthcare professionals. The message and meaning should be obvious in order to be clear and understandable by the patient. For this purpose, well-designed, randomized, and controlled studies should be conducted in a certain group.

### Conflict of interest

The authors have no conflicts of interest to declare.

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