

# A Study of the Drug Bag Design

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## Abstract

As the numbers of the elderly people is increasing rapidly, Taiwan has become an aging society since 1993. It is important and urgent to design appropriate products for elderly people. Because of physical and mental function degradation, the elderly have more difficulty in medicine-taking than the general adult, the problems also effect their medication compliance. There're more than half of the elderly people suffered many diseases, so they have to take multiple medicines. There are too many things to recall for the elderly people, for example, they pay attention to complex medication-taking notes and they also have to remember taking medicines several times a day, these also increasing the risk of medication errors. As we know, the information on drug bag has been important information after seeing a doctor; therefore, if we can design an appropriate drug bag, it would help the elderly people to identify drug categories, and indicate when to take medicine. A good design for drug bag will help the elderly prevent from some risk of medication errors.

For the purpose, observation and interview to the elderly are carried out in this study, to explore the issue during medication process of the elderly; According to the results of interview, the universal design is regarded as the main concept to practically design drug bag. This idea will enhance the medicine-taking compliance of the elderly people. Some topics were redesigned for the elderly, such as under lining subtitle on the patient's name and diagnosis, and providing icons to help the elderly remember to take medicines on time.

The medicine bag of this study was not only designed to improve the medication compliance of the elderly, but also improve the medication safety for senior citizens. The findings of the study refer to the application of related research, while expanding more users, the concept of universal design will make different groups in a more safety and more convenient environment.

**Keywords: Universal Design/Inclusive Design, The elderly, medication compliance, drug bag**

## 1. Introduction

### 1.1 Background of the Research

The problem of aging population is the trend all over the world [1] [2].Some countries, such as the western countries and Japan, have to deal with the aging phenomenon from the opinion of normalization and social well-being. It has become an aging society in Taiwan since 1993. If the senior citizens can take care themselves well in the daily living, it will be able to lower the care burden among younger generation; even if younger generation dedicated labor and production, they could maintain the productivity of whole society. If we can improve the compliance of medicine- taking, it will promote the physical and mental health of the senior citizens and assist them to live independently [3].

With the aging process is often accompanied by the occurrence of chronic diseases, there are more than half of the older people suffered from different diseases in Taiwan [4]. Since the physical functions decline of the elderly people, it is easier affected their health by misuse the drugs; however, the elders are also more vulnerable to improper use of drugs. The behavior of non-compliance not only affects the disease, but also seriously endangers their health and security [5~7]. The conduct of non-compliance with medication often happens to the elderly.

Compliance can be defined as the extent to which a patient's behavior corresponds to the physician's therapeutic recommendations. Improvement of the medicine taking compliance would increase cost-effectiveness. Studies have demonstrated the prevalence of poor adherence across all types of regimens and diseases, including life threatening illnesses. For this reason, often caused by medication non-compliance with more discussion and concern [8].

The non-compliance behavior of the elderly often cause from forgotten or misunderstanding; they probably do not know how to take medicine and they may also forgotten the right time to take medicine. Whether from large hospitals or small clinics in Taiwan, the patients would get a prescription drug bag after medical treatment, which includes the time and manner of medicine taking on the cover. Although the elderly will be able to find the information of the medicine by the bag, some details are still causing difficulties for their understanding. Such as the font is too small for the elders to read or the graphics are not appropriate for their reading abilities.

## **1.2 Purposes of the Research**

There are much more information to be presented on the drug bag, however, there is no accurate way to be understood by all users. We would like to analyze the existing layout of the drug bag by collecting samples in this study and checking the improvable tips through the concept of universal design.

Universal design is a process intended to promote the development of products or environments that can be used effectively by all without adaptation or stigmatization [9]. The UD concept is very similar to human factors engineering that it attempts to consider the abilities and limitations of users when developing a product or building an environment. To put it simply, describes universal design as "design for people of all ages and abilities" [10].

All we need to do is to provide some suggestions or ideas, which can improve the compliance of the elderly by supplying a more friendly medicine bag to more patients by the concept of universal design.

## **2. Method**

For the purpose, the content of this study includes three aspects: literature review, expert interview and observation and interview to the elderly are carried out to primarily explore the issue about the medicine-taking compliance of the senior citizens; Semi-structured interviews were conducted with the elder interviewees in the Taiwan area for their long-term medication uses. With the expert interviews and literature review, we first got the reasons of medication non-compliance and the difficulties on medicine-taking process for the elderly. Secondly, we summarized a variety of drug information on drug bag by collecting medicine bags all over the Taiwan area. Lastly, according to the results of interview and investigation, the universal design is regarded as the main concept to inspect the existing drug bag design.

## 2.1 Drug bag collection and literature review

In this study, we collected some drug bag from the health-related treatment organization in Taiwan, including large-scale teaching hospitals, small and medium-sized clinics, and private pharmacies; provided medicine bag free of charge by volunteers. The ways of sampling are simple random sampling and convenience sampling, received a total of 98 samples. Containing 64 smaller plastic bags with folder chain packaging, and 34 paper drug bag. These samples will be used as data based on the following study.

According to the “13 medicine bags marked items” by National Health Insurance medical approach in Taiwan, each sample is recorded and compared with the items.



Figure 1. The main drug bag forms in Taiwan

## 2.2 Expert interviews

This part includes a total of 4 experts, each belonging to 4 different fields. By different points of view, to discuss the design can be improved. Digital voice recorder recorded procedures for one-on-one and face-to-face interviews. The main contents were then organized and put into writing.

This study consists two aspects of expert interviews, one is health care level, and the other is the design level. Health care is divided into the nursing care and the Pharmacist prescription; the main idea is getting their points of view on clinical medical care by interviews. On the other hand, the design level is also divided into a Gerontechnology scholar and a Graphic designer; we visit the experts to get the suggestion of drug bag layout, which is suitable for the elderly to understand and read.

## 2.3 User observation and interviews

In this study, we selected 2 senior citizens and 1 foreign nurse to observe their behavior on medicine-taking process. Our purpose was to record the experiences of the users through observation and interviews. It also indicated the problems on using drug bag.

At this stage, from the elderly remove the drug bag till taking medicine, the process was recorded by photograph and words. We also recorded the care steps of the foreign nurse in the same way. After observation, we asked questions about what we saw during the process. The users evaluated the drug bag design according to the UD 7 principles.

### 3. Results

According to the results of sample collection, this study has made analysis of the following:

Consideration of user requirements and regulations, the drug bag was classified into three parts of characteristics, regulations, and functional operation.

Characteristics: Material, size, layout - fields, text, images, color.

Regulations: the “13 drug bags marked items” by National Health Insurance medical approach in Taiwan- Patient personal information, drug information, medical institutions, and warning.

Functional operation: Additional features and behavior - reading, memory, open-and-close, pick-and-place.

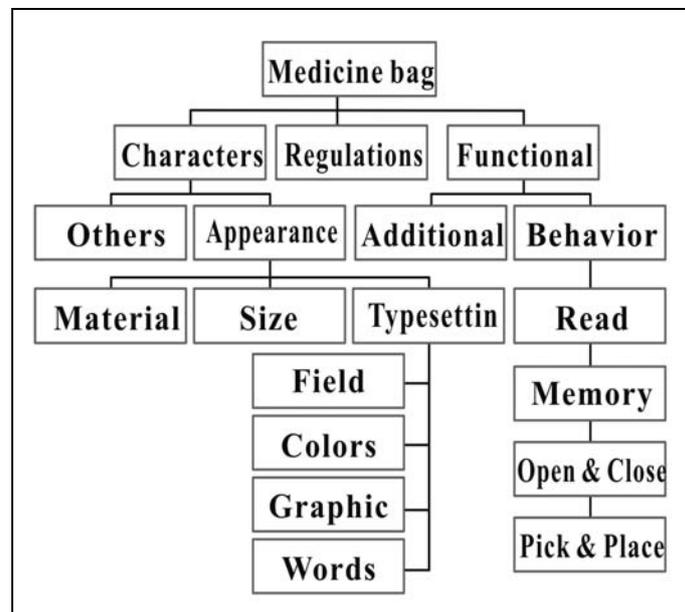


Figure 2. The skeletons of drug bag study

#### 3.1 Analysis of the medicine bag

This study will be in accordance with the medical sources of the drug bag is divided into large-scale hospitals, medium-sized clinics, and private pharmacies three categories. Different types of medical institutions have their own different material and size of the bag. As the size of drug bags will impact user’s behavior, the functions was based on the length and width; for example, the actions of pick-and-place by human fingers would need a wider drug bag, the categories of drugs would put into different bags. Research and collation as the following table:

Table 1. Research and collation of drug bags.

Category	Large-scale hospitals	Medium-sized clinics	Private pharmacies
Pictures			
Size	186x304 mm	100x138 mm	70x104 mm
	216x254 mm	120x205 mm	178x254 mm
Function	Chronic prescription drugs	Normal medicine	Herbal medicine Eye drops Small medicine tablet
The 13 item pass rate	91%	83%	74%
Cause Analysis	Larger, there is enough space	Smaller, some information can't be presented	By case, Not all have the same
Blind identification	No	No	No
Graphic information	43%	0%	16%
Grip	No	Some	No
Material	Most are unclosed paper bag	Most are plastic zip-lock bag	Some are paper, some are plastic

### 3.2 Organization of the interviews with experts and users

The smallest drug bag is 70x104 mm, be used to incorporate a smaller pill or eye drops; the large drug bag up to about 210x297 mm, equivalent to A4 size. In addition to incorporating more drugs (prescription drugs such as chronic diseases), the larger drug bag was also used for Chinese herbal medicines.

The information transfer of a drug bag depends on the main characters, some hospitals have their own graphic design (or icon), which will help people to know the medicine information, such as medicine-taking frequency, medicine dose, drug ways. Because of the limited space, the icon design is not universal information in drug bag.

### 3.3 The seven principals of the Universal Design

According to the results of the collection and analysis, this research makes a comparison with the existing regulations and studies. We will get a better design of drug bag to suit the elderly; Going through the observation and interviews, we will have the evaluations of existing drug bag by the user and designer. To summarize the

above results, we check and take an aspect of the seven principles of universal design, after on, then suggest some projects to improve and redesign for the drug bags.

**3.3.1. Equitable use:** The design is useful and marketable to any group of users.

Regarding the physical degradation of the elderly, light color contrast with the yellow color and the small font will result in reading difficulties; italics and underline text is also the reason for reading difficulties.

According to an interview with a foreign caregiver, if they do not have a complete description in English on the drug bag, the language problems may also caused the difficult care process, because the languages in different countries cannot all be show on the drug bag.

**3.3.2. Flexibility in Use:** The design accommodates a wider range of individual preferences and abilities.

There are some original texts and colors printing on the drug bags. In order to suit for the patient's diversity, extra information will be printed or hand-written in some color, while the original printing-color and handwriting-color was similar to the later attached ones. The similar colors make people difficult to read, especially in the zip-lock bag.

While interview with professional pharmacist and nurse, when they have to deal with a large numbers of drug bags, lack of special personnel and contrast will be affected by the use and operation, thus increasing the user's burden.

For some clinics drug bags, the writing-style on the horizontal and vertical portion is a staggered layout. It will easily lead to user's frustration; likewise, the elderly in the cognitive process will be confused.

**3.3.3. Simple and Intuitive Use:** Use of the design is easy to understand, regardless of the users' experience, knowledge, language skills, or current concentration level.

It is easier for senior citizens suffering from chronic disease, they also suffered from a wide variety of diseases. It is difficult to check medicine with its appearance for a variety of drugs in the medicine bag for senior citizens. Moreover, owing to the differences between trade names and scientific name of the same medicine, it also leads to misunderstanding.

It is difficult to identify the effects only by drug's appearance, or to distinguish such tablets from Cypriot agent, the eye ointment from cream.

Whether the original icon design is friendly or not, owing to the icon concept is fuzzy or unclear, it will cause confusion for the elderly and other users.

**3.3.4. Perceptible Information:** The design should present all necessary information effectively to the user, regardless of ambient conditions or the users' sensory abilities.

The layout of a medicine bag is various, there are many types in "one" bag, for example, word arrangement in straight or horizontal, the font are also different. if the elderly are change their hospitals or clinics, they have to learn the new layout of a new drug bag.

**3.3.5. Tolerance for Error:** The design minimizes hazards and the adverse consequences of accidental or unintended actions.

The drug warning information is insufficient, most of the medicine bag only provides telephone number, it could not provide emergency treatment, the elderly or their family may miss the golden time of rescue.

It may be due to the disease itself, or the physical decline caused by aging, the elderly could not recognize their uncomfortable feeling were came from drug effects or illness, so they need some notes of drug side effects on the drug bag.

**3.3.6. Low Physical Effort:** The design can be used efficiently and comfortably and with a minimal effort.

Because visual degradation and the decline in the capacity of muscle coordination, senior citizens may not be able to finish successfully in the mission of open-or-closed the zip bags.

**3.3.7. Size and Space for Approach and Use:** Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the users' body size, posture, or mobility.

Our fingers cannot be placed in the small-size bag completely, causing the inconvenience for taking out the medicine. There is muscle degradation on the elderly, so their fine motion is more difficult to maintain. If the medicine bag were too small to use, it would have a more serious effect for the elderly.

## **4. Discussions**

Through the collection and analysis of this study, we examined the existing design of the medicine bag in Taiwan. Through the seven principles of universal design into the comparison.

Also summarize evaluation and demand of the medicine bag from the senior citizens and the general users; the following paragraph will show some discussion for this study.

### **4.1 Significant graphic presentation**

With the declining vision causes by aging, the senior citizens' ability to read is not so good as the past. The appropriate icon will help to assist senior citizens to obtain medical information from the medicine bag. There has been the study of a suitable medicine bag layout to senior citizens for the graphic and words should be mixed, and the icon should be designed of Semi-abstract; at a certain part of information convey, it should only show the necessary icon on the bag [11] [12]. However, it is not very common to use icon representation on the existing drug bag and the graphic designs also cannot achieve consensus. In addition, one study shows that the icon suitable for the elderly to read should be at least the size of 100x100 dpi, but they are often smaller. It is pity for small icons to the elderly, because the elderly only can "see" but "read"; once they don't receive the information from graphics, simply be a waste of good intentions of the original icon. The idea of how to show the appropriate graphic layout within a limited space should be applied and modified in the further study.

### **4.2 Pocket hole and store of the medicine bag**

According to the interview results, it is not convenient for the elderly to use a smaller medicine bag and it is also not suitable to store a big drug bag; both problems will indirectly affect medication compliance.

In comparison with the current specifications of the drug bag, there are large gap of the size, but there has not any study or notion to clarify the appropriate size of the medicine bag until now. It should be corresponded to the needs of medical institutions and under a reasonable extent, to adjust the size of the drug bag, so as to achieve the targets of convenient collection and easy to pick-and-place.

In addition, based on the degeneration of the fine motion and coordination capacity, the elderly can't open a small bag easily or close the zip-lock bags smoothly as before. However, although a large unsealed paper bag is out of the open-and-close problem, because there is no shelter, they still have the drug-lost or drug-falling problems. In order to eliminate these problems, we should utilize the concept of universal design, consider more ethnic groups and a wider range of circumstances, to study the subject of pocket and redesign the drug bag.

## **5. Conclusions**

Through the concept of universal design, it can help designers in the planning process be able to consider the wider needs of different users. As a result of the physiological and cognitive changes, the elderly are challenged in daily life. One of which is derived from the use of drugs. Bad designs on the drug bag make the elderly to be easily confused. It also result in the non-compliance of medicine-taking. In this study, we try to explore the design of the drug bag by the preliminary data collection and interviews. A modified drug bag would be more appropriate to a wider range of user groups and improve the medicine compliance of the elderly. Through the seven principles of universal design, we hope to study the original medicine bag design and try to suggest more appropriate amendments to improve the drug bag.

## **6. The directions of future research**

1. Continuation of this study has yet to be completed, such as the size of drug bag, the formatting, the pocket design ... etc.

2. Because of the racial difference and lifestyle, the cognitive and demands to drug bag are diversity. Based on the concept of universal design, it is necessary to add other messages or new functions on the drug bag to help users; in order to fit more people, the follow-up study will try to enhance the design concept.

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