

# Innovation of Usability for Family Medical Product

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**Abstract** Usability, as the theoretical foundation, is based on ergonomics, psychology, and human-emotion, and leads to psychological emotional changes when we use a product. Today family medical device also develop product's usability which is getting our attention. From the nature viewpoint, the product design is based on usability. The current usability is mostly used in computer interface or software, it gradually become important standard to evaluate a product, and it also becomes a key element for designers to consider. The usability of the product will be concerned in a wide range. As a part of family medical device design, simply constructed operating is the elements and must exist. While the overly complex functions and mode of operation are not suitable for this particular crowd. In this paper, We illustrate significance of the usability in product design, by analyzing the usability of simply constructed medical products designing case. And we elaborate that the ergonomic plays an important role in the product design. China's future product design must be based on creativity and innovation of the first importance, and should make the usability truly reflect the people's respect and concern. The most cutting-edge trends is not only a manifestation of human spirit, but also a perfect harmony between man and product combination.

**Key words** Usability design; Family medical products; Product innovation; Ergonomics

## 1 Introduction

Today science and technology develop continuously. The operation mode of product produced a huge change. Previously manual operation interface are now converted into electronic visual operation, resulting in a lot of problem of use. For example, how to choose what products, how to operate the product, how to correct and effective use of the product and so on. The family medical device was also developed well today, so the product's usability is getting people's attention. From the nature point of view, usability of the product design is on the basis of usefulness. If a product can not guarantee even the usefulness basically, it can no longer talk about its usability.

In this paper, We illustrate significance of the usability in product design, by analyzing the usability of simply constructed medical products designing case. And we elaborate that the ergonomic plays an important role in the product design. China Future product design must be based on creativity and innovation firstly. Ergonomic, and usability, in the design work truly reflects the people's respect and concern. The three principles of usability restrict the direction of product design and the considering direction of designers.

## 2 The Concept and Principles of Usability

Usability is a concept of user-centered design, and after it let product design to be able to achieve the functional requirements. It is more easy and efficient to adapt to the user's needs and habits. It includes elements such as effectiveness, efficiency, practicality, safety, easy to learn, and ease of memory, and so on.

Usability have three clear principles. They are visibility, mapping and feedback. We will analyze the following three principles of existence is necessary.

### 2.1 Visibility

The simplest example is on the door. There are many doors that I have no way to determine what actions I can do. Push or pull? There are many doors adorned with "push" or "pull". In fact, when the design needs a label to indicate something, the design itself has failed. Design about fire are usually higher than any other item usability requirements. Such as fire hydrant, all know that when individuals are aware of a fire we should use small hammer to break the glass, and turn on the water fire-fighting. Another example is the cupping in medical products. A simple glass jar, if not professional, no one knows how he got to use. If it is used at home, it is more difficult to use, and may also cause unnecessary loss.

### 2.2 Mapping

Water dispenser has two water taps. Without thinking most people know that the red tap implies hot water and the blue one implies cold water. So the product design and our minds have been mapped that

fire is red and water is blue. This simple mapping, enabling us to acceptance of a product increased significantly. If I put cold water into the red and hot water into blue, paste a cold water label on the red tap and paste a hot water label on the blue one. People will still inadvertently use it wrong. So it is the feeling that color would cause us. For another example, there is a suction-type screw cupping. everyone saw it knows that the way he is drawn out the air by rotating the tank, because it has a screw spiral, and it has a handle for the tap switching to direct us to rotate it.

### 2.3 Feedback

For usability, feedback on product design has a crucial role, because only users get more feedback, they will get more improvements, and make products more usable. Windows, applying that "hourglass" of the mouse, is to let the user aware of the need to wait, rather than wave their fists to smash keyboard. Product's "Being..., Please wait." hang on much better than the same one that do not move a little such as break out. Only feedback can make our products more perfect. It is not only the most critical aspect of the usability, but also the window of human-machine communication.

## 3 Factors Conflicting Product Usability

Factors which affect product usability, include the "User factor" and the "Product factor" two major factors.

### 3.1 User

The main factors are start at the "biological" and "social" two points, "biological" is mainly the application of ergonomics. Of course, ergonomics is the foundation of the product usability, such as a person's height and weight determining the size of a product. While the needs of each individual are different and different environments demand different product. For example, medical equipment for hospitals which are operated by professionals, because what they have learned is to control it. And if a family member or a traveler use medical equipment, it must be easy to use. After all, not everyone would understand medicine, and their demands to medical devices are not high. Just for fitness, or health-care use, as the living environment of this population are usually more casual, and do not understand how these medical equipment work. If they are serious illness they will directly choose to hospital, not self convalescence at home. So if we design medical equipment for such users, it is necessary to consider design problems as a simple, easy and effective small health care equipment.

### 3.2 Product

Product usability, aiming at different psychological characteristics, behavioral habits, cognitive abilities, hobbies tend of different user groups, do targeted design. Product is an important carrier of design expression, and reflects the awareness of user needs and understanding in design process. For a family medical devices, such people at home can be said all people, because everyone has a family. In this small group inside, the usual psychological special that is as simple as possible. The normal behavior is also a leisure class, sports or health care operations, and they are not very understanding medical devices. After all, these machines are highly specialized, and is not so easy to learn. The color of their demands will be more active not be too rigid. For the psychological, once referred to hospital, people do not like to go in, so the home use of medical devices can not let people have such a feeling in hospital. They should give people the feeling of relax and comfort. Therefore, products must meet the person's physical and psychological demands, and we should solve the following questions:

- A. Does the product smoothly and convenient operation?
- B. Does the product give the operational errors which could cause injuries or accident?
- C. Does the product meet certain population size, shape and force fitting?
- D. Are the products easy to clean?
- E. Does all parts of the product play their own roles?

Family medical equipment are those relatively simply constructed health care products, such as blood pressure devices, cervical physiotherapy instrument, stethoscope, thermometer, etc. People take care health and physiotherapy at their leisure time. Taking our cupping in traditional Chinese medicine, for example it is the use of heat or vacuum tank pressure to exclude air, and the use of negative pressure to sorption in the skin, causing bleeding as a treatment method. Chinese medicine treatment method is very practical and obvious effective, and many families are also available in this device, which is usually a simply constructed glass jar. Although many families equip it, but most people can not use it freely. If we design a cup which is easy to use, and easy to be accepted, it would be more convenient. Currently the only types of cupping on the market are exhaust type and ignition type, which are difficult to use or easy to damage for their poor seal quality.

## **4 Difference Between Usefulness and Usability**

We often inadvertently confuse usefulness and usability when designing, and generally ignores usability which plays the important role for the users.

Usefulness, which means you can use, can also achieve some desired effect. But it is not means easy to operate. For example, machine is very easy to use but does not solve practical problems, which is obviously not the usefulness. If this machine can solve practical problems, complicate to operate, and it must be operated by a dedicated technical staff, it also means that the machine is of usefulness.

Usability, refers to the level of effective, easy to learn, efficient, easy to remember, fewer mistakes and satisfactory for product user groups. It means whether users can complete his mission with the product, how efficient, what subjective feelings. It is actually the product quality which is seen by user's viewpoint. For example, if the machine can complete the task excellently and efficiently without enough or even one person attending, we should say that it belongs to usability.

It is not difficult to understand that usefulness and usability are essentially different, and usability follows principles such as easy to see, easy to learn, and easy to use. These three principles actually conflict to each other, but only if we achieve the balance we can achieve the proper effect. So, we will inevitably encounter some these kinds of problems when using a product. Some products simply difficult to use, or not ergonomic. It inevitably will give us some trouble, sometimes because of no clear instructions, while sometimes because of product function is indeed very rich but the operation is relatively more complicated. Product design is a trade-off problem. Usability and functionality are of conflict. More features may allow users do not know what to do. Therefore, if the product is designed to be able to achieve functional requirements, it is more easy and efficient to adapt to the user's needs and habits. Make the elements together, such as the effectiveness, efficiency, practicality, safety, ease of memory, and easy to learn, and it is the design what we really need.

Giving an example of user interface, since Microsoft launched a formal Windows system, they really began to explore the significant impact of usability on the software interface. Windows menu interface is unified discovery of the population, through a simple copy and paste on the Edit menu the user is very easy to learn and use, while the previous DOS, only through a manual or books to discover and learn. So the operation is not so simple. If every copy and paste go through the "Edit" menu, though easy to learn, but it is not easy to use. So the design Ctrl + C and Ctrl + V shortcut, which makes it more convenient to operate and use. This is only a small case for interface operation. While in other areas, in the professional field, users can give up easy to learn and turn to easy to use. Bank's counter terminals does not apply to only a small keyboard, not mouse. It is also for convenience, so specific areas have special requirements, and it is also feasible.

From the above examples, we can easily find two aspects of the problem. Firstly, usability is built on the base of the usefulness, Secondly, usability is indispensable to the future of design, and it is the design trend.

## **5 Usability Design of Family Medical Products**

### **5.1 Functionality**

It mainly refers to the product functional information, manipulation and control information, as well as materials use and the use of science and technology. Usability of functionality primarily to meet the basic functional requirements of products. As a medical device, it is best not to use the fragile, and short-life materials.

### **5.2 Emotionality**

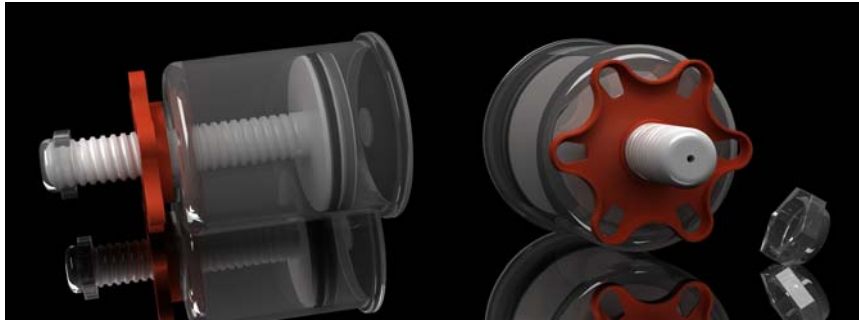
It refers to what product should transmit to humans, and achieve resonance with people's feelings. Medical equipment from beginning to end did not give the people a good impression, because it is always linked with hospitals. But, the family medical products, usually are related to health, physical, and fitness effect, so it is still very easily be accepted.

### **5.3 Environmentality**

It mainly refers to the transmission of external environmental factors, users, and product information. For family medical products, it is clear that the environment in the home. It gives us the impression that the home is warm and casual place, so it is not suitable for appearing machines or complex medical devices and products.

Usability design, which is usually based on functionality of product, promise environmentality, and center emotionality. Product design is based on usability, psychology and ergonomous. So asto establish a new research method about usability.

Figure 1 shows a home (travel) simply constructed magnetic cupping case after redesigned by using usability principles.



**Figure 1 An Improved Design of Household Simply Constructed Cupping**

A. More exaggerated style of thread conveys the screwing operation products semantics. And users could use this product correctly for the first time.

B. Transparent shell provides good visibility. So users can see the status inside it.

C. Red spiral suction handle can give people a warning role. And it can prevent damage due to excessive operation.

D. The reaction force of operation can give them suitable feedback when users screw the rotating handle.

## 6 Conclusion

If we make full use of usability to family medical products design, it would be more convenient for people to use. Usability in family medical equipment research is the current and future direction of medical devices design. And we can discover usability applications in this particular users group. It gradually becomes an important bargaining chip for product design evolution, and it is also an important factor to consider for designers in the future. The family medical device are also developed well today. It is important that the usability of product should be concerned to all of us.

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