

Study on the General Design of the Manipulation Interface of the Household Physiotherapy Instrument for the Elderly

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Keywords: universal design; elderly; household physiotherapy instrument; manipulation interface.

Abstract: By the middle of this century, Chinese elderly population will exceed 400 million, and the problem of population aging is becoming a major social issue. At present, the majority of domestic home physiotherapy products have a one-sided emphasis on the use of functions. There are problems in the design of the product, especially the humanized design of the operation interface. A considerable number of elderly users have problems with incorrect operation and reading. This article combines the physiological and psychological characteristics of the elderly, applies the general design theory to the humanized design of the manipulation interface of home physiotherapy device, points out the design focus and direction for the interface design of household physiotherapy instrument for the elderly, and provides reference for the design of similar products.

1. Introduction

An aging society refers to a population structure model in which the elderly population accounts for a certain proportion of the total population. The United Nations defines a country as an aging society in which the proportion of the population over 65 years of age exceeds 7%. On January 22, 2016, Zhong Li, a spokesperson for the Ministry of Human Resources and Social Affairs, pointed out that China has gradually entered an aging society. As of 2014, the number of elderly people over 60 years old reached 210 million, accounting for 15.5% of the total population. According to predictions from relevant departments, the elderly population will reach 400 million by 2035.[1] The aging of the population has become an irreversible trend in the world. China is one of the developing countries that entered the aging society earlier. The medical care for the elderly has gradually become the focus of society. From the perspective of the development of the health care market in developed countries, due to market demand, home medical devices have a broad market prospect. Some industry experts predict that home medical and health care projects will become the focus of future investment by ordinary families in China. At present, most of domestic electronic physiotherapy products have major problems in the humanized design of the manipulation interface. A considerable number of middle-aged and elderly users have problems with inability to operate and read correctly. The general design is integrated into the design of the manipulation interface It helps consumers to use it, and it also helps to expand the market for enterprises.

2. Definition and physical and psychological characteristics of the elderly

What is the elderly? There are more than a dozen views on the definition of the elderly at home and abroad. China stipulates in Article 2 of the Law on the Protection of the Rights and Interests of the Elderly: "The elderly in this law refer to citizens who are over 60 years and above."

2.1 Changes in physiology of the elderly

As the age increases, the physical characteristics and behavioral ability of the elderly will change greatly, [2] mainly in the following aspects.

(1) Changes in motor function

As you get older, although some motor skills may be maintained because of good health or through practice, most motor skills decline to varying degrees.

(2) Changes in nervous system function

With the increase of age, the time of physiological reaction and the time of psychological reaction increase, and the function of nervous system decreases gradually. As age increases, both sensory and perceptual organ functions decline, and the tactile sensitivity of the skin is greatly reduced.

(3) Changes in visual function

Clarity will be lower. As we get older, visual function will gradually decline in terms of anatomy, physiology and psychology. The visual clarity of the eye also decreases, especially for fast moving objects.

(4) Changes in auditory function

The hearing ability of the elderly will decrease sharply with the increase of age. First, the elderly will lost hearing to the high collar rate sound, from 20 to 10 kHz, and then slowly reduced to 8 kHz, this decline in auditory function is called senile deafness. As you get older, you lose hearing about low-frequency sounds and noise-laced sounds.

2.2 Psychological changes in the elderly

As the age increases, the physical characteristics of the elderly are changed, and there are also significant psychological changes:

(1) Memory loss. The memory of the elderly with the aging of the body organs at a very slow rate of decline, this is a natural law, and also a normal phenomenon. To slow memory decline and improve memory, the most important thing is the elderly can not lose confidence in their own memory.

(2) Anxiety. Depression with aging, mental and emotional changes are more and more obvious, manifested in the inner emptiness, prone to anxiety and depression emotional reaction, often accompanied by self-blame. There are often alarmist feelings of worry, nervousness, or depression, lack of enterprising attitude when faced with problems.

(3) Changeable moods. When brain tissue is aging or accompanied by certain brain diseases, there are often obvious emotional changes, often out of self-control, prone to rage, difficult to calm down, the degree of emotional excitement does not correspond to the extent of things that are not going right.

(4) Suspected illness. Over 60 years of age, half of the elderly may have symptoms of suspected illness, because the psychological characteristics of the elderly have shifted from concern for external things to their own body, plus these concerns can be strengthened by certain subjective feelings, and because of stubborn, obstinate personality, more prone to symptoms of suspected disease.

(5) Suspicion and jealousy. It is generally believed that when people enter old age, they become more distrustful and self-esteem of the people around them.

3. Current Situation of household physiotherapy instrument and problems in interface design

At present, the household physiotherapy instruments sold on the market are divided into the following two categories. The first category is massage: electric massager, manual massager, massage hammer, massage shoes, foot bath, qi and blood health machine; the second category is household treatment: far infrared physiotherapy instrument, big god lamp, haci five-line needle, meridian general therapy instrument, sleep instrument, hypotensive instrument, tranquilizing pillow and so on.

3.1 Market prospects for household physiotherapists

From the development of the health market in developed countries, because of the market demand, even in the general depression of various industries, home physiotherapists can show off. Statistics show that the average consumption of health products in Europe and the United States accounts for more than 25% of the total expenditure, while our country is now only 0.07%, of which the per capita consumption of health products is only 31 Yuan, which is 1/17 for the United States and 1/12 for

Japan. The health products, including the household physiotherapists, still have great market potential in our country. Therefore, some industry experts predict that the family health care and health care project will become the focus of future investment of ordinary families in China.

3.2 Problems in the manipulation interface of household physiotherapy instrument and improvement direction

The following main problems exist in the manipulation interface design of the existing household physiotherapy products for the elderly: the words on the keys are too small to see clearly; the display of the display screen is not in good condition; the product is not well indicated and easy to cause misoperation; the keys are too small to cause misoperation; the volume is too low to cause operation trouble; the functions of the product are not understood; and the operation sequence is wrong.

In response to the above problems, the improvements of the interface design of physiotherapy products for elderly families are as follows:

(1) Ease to see and timely feedback

Ease to see[3], which means that all instructions for controls and instructions must be visible; feedback, that is every action of the user should be clearly and promptly responded to. For example, we make a phone call, the form of the phone tells us that we should grab the handle part, the keys arranged on the phone panel from 0 to 9, is obviously used for dialing, this is the "easy to see" design.

Fault tolerance

Mistakes are often unpredictable and difficult to prevent. Since errors cannot be completely avoided and may have a great impact on the operation, designers must consider dealing with errors on the issue of "generality ". Error should generally include two aspects, one is to avoid errors before they occur, the other is to detect errors and correct them in time.

(3) Easy to learn

Products, interfaces should enable people to quickly and effectively learn how to use. The unit of measure of the ease of learning of a product is learning time. Increase the guide, reduce the learning: this is the core of the "easy to learn" principle, that is, do not rely on the user's memory and acquired skills, but should ensure that they can get the necessary help, guidance at any time, without learning too much or forming a certain skill.

4. General design points for manipulation interface with household physiotherapy instrument for the elderly

4.1 Concepts and features of Universal Design

Universal Design [2] is the highest development of the design concept of "people-centered" in ergonomics. First proposed by the American Ron Mace in the 1970s, it was developed on the basis of barrier-free design.

The most authoritative and well-established definition in the world is the one proposed by Dr. Gregg C. Vanderheiden, an American expert in general design: Universal Design refers to a design process in which products (in a broad sense, including appliances, environment, systems, processes, etc.) are designed to be as safe and comfortable as possible for users of different abilities (e.g., disabled, elderly, etc.) to be used safely and comfortably under different external conditions, subject to commercial profitability and the conditions of existing production technologies.

The two main features of universal design [2] are:

(1) Under the premise of commercial profit and under the conditions of existing materials, processes and technologies, the universal design product must be sufficiently adjustable to enable users of various capabilities to use the product directly as far as possible without any modification or auxiliary devices;

(2) If the product is not used effectively or comfortably by some users, it must be modified or added, and the modified or added aids must be consistent with the original product in shape and function.

4.2 Key points of manipulation interface design for household physiotherapy instrument for the elderly

According to the characteristics of the physical and psychological changes of the elderly, combined with the general design principles, the manipulation interface design of the household physiotherapy instrument for the elderly should have the following key points:

(1) The design principle of "humanization" is the important guiding content of the manipulation interface design

Most of the domestic household physiotherapy instrument for the elderly only pay attention to the realization of function, ignoring the objective factors of the elderly because of the decline of physical function difficult to operate, resulting in some of the elderly cannot operate alone to use even the psychological resistance to electronic products. Therefore, the following general design principles should be followed in the design of the product interface for the elderly:

Principle 1: to provide the elderly with the use of conditions that can be operated alone.

Principle 2: without affecting the use of other people, to provide the elderly with their own characteristics, easy to use the manipulation interface.

Principle 3: to provide clear operational information for the elderly on the manipulation interface. Information can be timely feedback during and when the operation is completed.

Principle 4: to provide a variety of different information (text, graphic) on the manipulation interface, and reasonably add a voice prompt device to make it easy for visual users to use.[4]

Principle 5: the interface design should have a safety protection device, when there is a wrong operation, a warning should be given, and can easily and timely eliminate the wrong operation.

Principle 6: the layout of the keys in the interface design should conform to the custom pattern of the elderly as far as possible to reduce the repetition of action; the material of the keys should be as soft as possible while maintaining good feedback, and reduce the operating force.

Principle 7: the main keys and monitors on the manipulation interface should be in the clear sight of the elderly, and the size and spacing of the keys should be reasonable and convenient for the elderly to use.

(2) Design principles starting with detail

Because the manipulation interface is generally small, but the design elements are relatively more, the design of the details is particularly important, for example, in the design of the manipulation interface of the elderly products, the diameter of the arc button is 8-18mm, the rectangular button is 10*10*15 or 15*20mm, the distance of the button is not less than 8mm, the voice prompt volume is 70-85 dB, and the font size above 14pt should be used, if the Chinese character is used, clear and easy-to-read imitation song font and bold-face should be used.[5] All of these nuances may not matter to normal adults, but there are huge differences for older users with declining body function. Reducing the spacing of one or two mm keys can greatly increase the risk of misoperation by the elderly users, whose hands often tremble. Therefore, in the design of the elderly manipulation interface, while maintaining the integrity of the interface, pay attention to the details, only in this way can we really design a "humanized" manipulation interface to better serve the elderly.

(3) Learning to listen helps develop products for the elderly

In view of the special use of aging products, in the process of product research and product feedback, a simple questionnaire cannot ensure that the full demand data can be gotten, understand the real needs of the elderly consumers, so the necessary interviews, patient listening, can truly understand the psychological needs of the elderly, the final product can be accepted by the elderly.

5. Conclusion

With the deepening of the aging society, the household physiotherapy instrument for the elderly will have a broad market development prospect, applying the general design to the design of the manipulation interface, taking the elderly consumers as the design center, and truly realizing the

humanized design will help to better protect the health of the people who use it, which will promote the further strengthening of the social security system and the construction of a harmonious society.

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