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Analysis of the Design of Household First Aid Kits

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Abstract: In the post-epidemic era today, people are increasingly concerned about health issues and have a newer understanding of home health, which in turn is accompanied by the expansion of home healthcare needs. As an important household healthcare device, the demand for first aid kits is also gradually rising, further highlighting the need for them. Although it plays an important role as a home medical care device, deficiencies such as simple structure, lack of function, and lack of intelligence are also presented. Based on this the first aid kit will be transformed and upgraded, innovating the design of its internal and external structure, overall function, and other aspects, to create a set of diverse functions and an intelligent medical care system, so that the family health care can better integrated into people's lives.

Keywords: Home medical care; Modernization; Hierarchical; Information sharing

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1. Project background

After years of the outbreak of the new coronary pneumonia epidemic that caused losses of lives and property, people's lives and behavioral habits have changed. This epidemic has changed the stereotypical impression that people believe that home health care is not important, with people gradually forming the desire to reduce the likelihood of the recurrence of such an event, by being prepared for it and paying more attention to home personal hygiene and protection.

2. Importance of first aid kits

With the arrival of the post-epidemic era, people's awareness of self-protection gradually increased, as well as the popularization of health care knowledge, so the demand for home health care increased. The first aid kit is the first choice of home health care items. According to research and analysis, the role of the first aid kit medical kit is mainly in situations, such as in the case of a fall at home, serious scratches, and so on, so that first aid can be carried out on time. Simple bandages and stopping bleeding will not only relieve the patient's injuries but also most importantly, provide valuable time for the professional medical personnel. Secondly, in the epidemic period, the disinfectant, antibacterial ointment, and other items in the first aid kit can help prevent wound infections, and pathogens can be disinfected and sterilized to reduce the probability of illness.

Once again, it can provide drug classification and storage space, to a certain extent, saving the user's time to find medication. People can just open the box for immediate use, whether at home or traveling, as there are corresponding items to protect their safety and peace of mind.

In short, in the post-epidemic era, people are more concerned about health and focus on practicality, so a fully functional first aid kit will also become a must-have for family supplies [1]. Specifically speaking, the importance of first aid kits is reflected in their specific role, first aid kits can provide people with symptomatic relief, prevention of infection, storage, and other protection aspects. Although the trend is outdated from the current point of view, it still has a certain importance in family health care.

3. The current situation and problems of first aid kits

As people are familiar with first aid kits, the demand increases at the same time, which will also lead to the inadequacy of household medicine. First aid kits have not completely withdrawn from the stage of household medicine, the reason is that the contribution of medical kits is still recognized by everyone. It is regrettable that the current function of first aid kits is too limited, and cannot meet people's needs. "When the imbalance between supply and demand forms a gap, it will certainly promote the upgrade of the product", based on this, the first aid kit is improved to meet the needs of people's daily lives.

At present, most people are aware that the home should and need to be equipped with first aid kits, but not many people are willing to pay for it. After analyzing the survey data, this study found that there are the following problems with the current first aid kits.

3.1. Over simple structure and improper storage of drugs

From the viewpoint of the overall structure of the current first aid kits, there are the following problems. Firstly, the layering is simple, and the stored items are divided into two layers, the upper layer contains scattered and fragile items, such as iodine, 75% ethanol, cotton swabs, flashlights, batteries, thermometers, and so on, while the lower layer is not divided into space, and it stores medical trays and large packages of scattered items, such as 0.9% sodium chloride injections, transfusion sets, transfusion devices, syringes, catheterization kits, oral care kits, dressing change kits, suture kits, and so on [2]. Secondly, there is a low utilization rate of internal space, because some items are irregular, small, precise, and cannot be stacked and bent when stored, which can easily lead to the situation that the items are difficult to store back in the box after use. Thirdly, because of the irrational division of the area, irregular storage leads to chaos inside the medical box, mixing the items. Coupled with the lack of a buffer protection device, some of the liquid items are prone to leakage, the drugs mixed with each other, resulting in changes in drug efficacy, drug failure or even poisoning phenomenon. The simple internal structure of the medical box is one of the important reasons for limiting its development.

3.2. Lack of functionality and practicality is not strong

At this stage, the function of the medical box is mainly based on storage, far from being able to meet the current needs in the modern multifunctional era. If only storage is required, then a simple box can meet this need, which is also cheaper compared to the cost of the medical box. Therefore, the main use of the first aid kit is not as a simple storage box, but it should be able to improve people's living standards in daily life and enhance their sense of well-being. Moreover, the current medical box in daily life is often placed in a corner and forgotten, so it cannot perform its job properly. In this post-epidemic era, people are more concerned about the state of health and are more inclined to "save for a rainy day." As people are living a fast-paced life, they do not have the time to pay attention and fully understand the current health knowledge, so the current medical box cannot

meet these functions. In this era of the pursuit of functionality and practicality, people gradually reduce the recognition of these "storage supplies."

3.3. The lack of intelligent system and humanized design is insufficient

The intelligence of the medical box has gradually emerged in recent years, and the future development space is immeasurable. This is due to the continuous upgrading of intelligent technology, and the application of these technologies in a large number of the service industry. The main reason why the intelligent promotion of the first aid box is not adopted is because technological improvement is not sufficient. At present, most of the household medicines are stored in ordinary medicine boxes, storage drawers, refrigerators, or semi-intelligent medicine boxes [3]. The so-called "intelligent medicine cabinet" on the market, for example, requires the user to manually dispense the medicine, which cannot meet the user's modern needs [4]. There is also a drug safety issue in the current design, such as the medicine can be taken easily with no drug information prompts, which can lead to children accidentally ingesting the drugs, or the elderly unable to recognize the drugs properly, leading to irreversible events [5]. So a first aid box with an intelligent system does not completely solve such problems. At this stage, what people need is more real-time physical testing data, common sense advice on healthy living, and intelligent drug distribution and collection.

4. Innovative design of first aid kits

The basis of innovation is by observing and designing depending on the user, letting the user's experience shape the design of the product [6]. With the continuous application of high-tech and 5G Internet development, to improve the application of household medicine, modernization is essential, as it is the future development trend of household health care, whether it is about the medical system or the first aid kit, the field is developing in the direction of technological advancement [7]. The first aid kit should undergo continuous innovation to increase its performance and improve its ability to protect the users. Continuous innovation of the first aid kit can allow it to adapt to today's post-epidemic era development and become an important household medical device.

4.1. Design concept

Based on the big data, field research data, and the analysis of specific needs of home medical care, the first aid kit is comprehensively renovated and upgraded. It is transformed from internal and external structures, integrating intelligence, function-oriented, and promoting better integration of medical treatment into people's lives. This multi-level structural transformation design of the first aid kit is a product that integrates the functions of on-time distribution of medicines, data analysis and processing, and the promotion of common sense in life. The specific redesigning contents are as follows.

4.2. Structural and functional upgrade

In the process of medical box transformation, the structure and overall shape of the medical box storage are redesigned to solve the low space utilization and unreasonable regional division problems (**Figure 1**). The medical box is part of three layers, the first layer is for the storage of commonly used medical items, such as masks, cotton swabs, disinfectant alcohol, iodophor, heart pills, and so on. When an emergency arises, it is easy to take. The second layer is for commonly used home medical electronic instruments, such as blood pressure meters, thermometers, heart monitors, and so on. The third layer will be following the needs of special groups, the drugs will be stored according to the needs of the corresponding transmission of the layer of compartments, timed to push, and set up a reminder to take medication. Family members will be notified by text message if the

medicine is not taken after a certain period or if the first aid kit has abnormalities. Video monitoring functions can also be applied for real-time understanding of the situation, and so on.

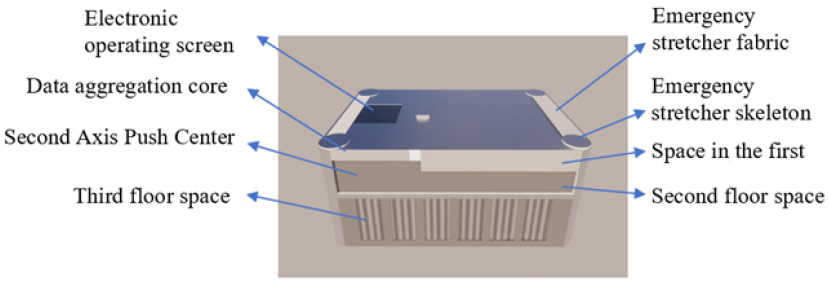

Figure 1. Composition of the main body

The medical box is divided into three layers according to the different functions, and a small mezzanine is set between the internal items to reasonably divide the space. The division material is plasticized silicone, which plays the role of anti-collision, chemical resistance, and insulation. It solves the problem of clutter, collision, and damage caused by many items. The second and third layers are set up with rollers to push to guarantee safety. The slot is tailored to the size of the space for the corresponding device and drug, effectively improving the utilization of space and avoiding space wastage (**Figure 2**).

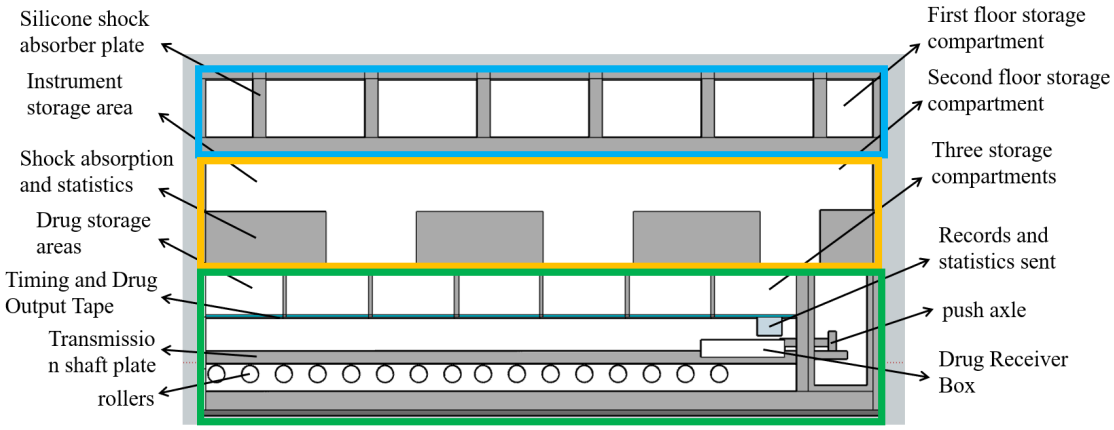

Figure 2. Schematic diagram of the internal structure

In addition to the comprehensive upgrading of the internal function and structure, the exterior of the medical box has also been remodeled (**Figure 3**). Based on unexpected accidents such as falling at home, the corners of the medical box contain cylinders, which can be disassembled and assembled into a 0.5 m x 2 m simple stretcher, using a retractable skeleton, by passing rivets through the holes of the skeleton and riveting them together. The riveted joint has high strength and stability and has a large load-bearing capacity. The simple stretcher has great use in emergency rescue.

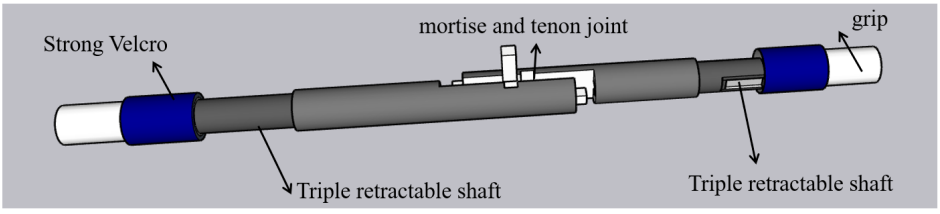

Figure 3. Stretcher skeleton structure

After the structural transformation and upgrading of the first aid kit, it will change the traditional image and comply with the future development trend of medical kit product design, such as mobile Internet, medical cloud services, emotional interaction, and the organic combination of multiple materials and functions [8]. The first aid kit can thus become a commonly used intelligent product that improves the happiness of people's lives.

4.3. Intelligent upgrade

According to market research, intelligent products are more attractive to people as their functions are more comprehensive, and their use is more convenient and safer. Based on this, the intelligent upgrading of the medical box will be according to the cell phone application-based setup connecting the electronic touch screen, real-time monitoring system, and data processing system process in several aspects as shown in **Figure 4**. The intelligent upgrading of each layer will be described in detail below.

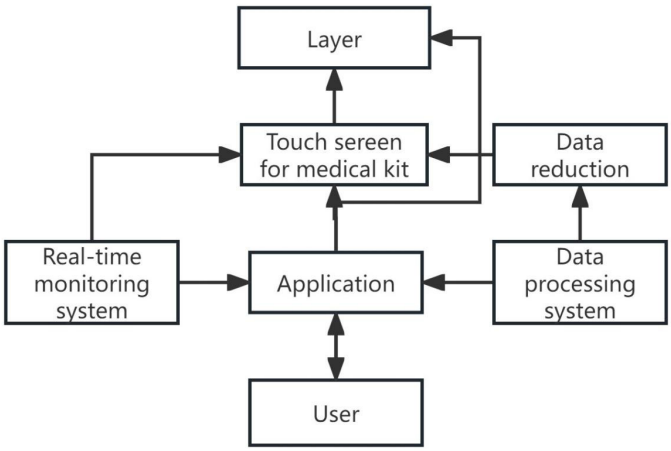

Figure 4. Intelligent flow chart

The first layer is mainly for emergency medication and frequently used and commonly used medication in daily life. Therefore, further in-depth consideration of the space on this layer has more contact with the outside world, so small ultraviolet sterilization lamps are set up in the internal space to sterilize the drugs regularly after each use, to ensure the cleanliness and hygiene of the remaining items. Secondly, due to the storage of daily necessities for commonly used drugs, storage will be equipped with a temperature and humidity detection system, which allows real-time monitoring of the interior, to ensure that the drugs have a better preservation environment.

The second layer is the family medical electronic instrument storage. Each time after the use of the instrument, the cloud storage data from the internal chip will be automatically transferred to the cell phone application for data analysis, regular testing, and long-term analysis, and give the user life advice based on the results, such as high blood pressure, heart rate irregularities, and other diseases, thus allowing early detection and early treatment.

In addition, the drug control system can be designed according to the user's specific requirements, such as regular and quantitative drug release to remind the user to take medication, and notifying the family members through the application if the user took the wrong medication and other abnormal behaviors, to ensure the safety of the medication.

In addition to the external structure, the top design of the slanting touch electronic sensor screen controls

the entire medical box drug storage, allowing replacement and drug delivery dose design. The medicine dose release will be set by scanning the prescription documents issued by the hospital to confirm and reasonable intake, such as cold medicine will follow the patient's age and situation. A timed reminder can also be set to remind the user to take medication on time and inform the drug dosage. The case can also vibrate to remind the elderly with poor hearing to ensure medication safety [9]. The daily medication intake information will be recorded on the application to ensure that the medication situation is known to all family members. In addition to this, as the application is the core of the entire smart medical box, the Internet-of-Things technology can acquire key data, promote data sharing, and realize remote control interaction [10]. The system will give life advice based on the user's location, such as weather conditions, humidity, and so on, to create a better, healthier life (**Figure 5**).

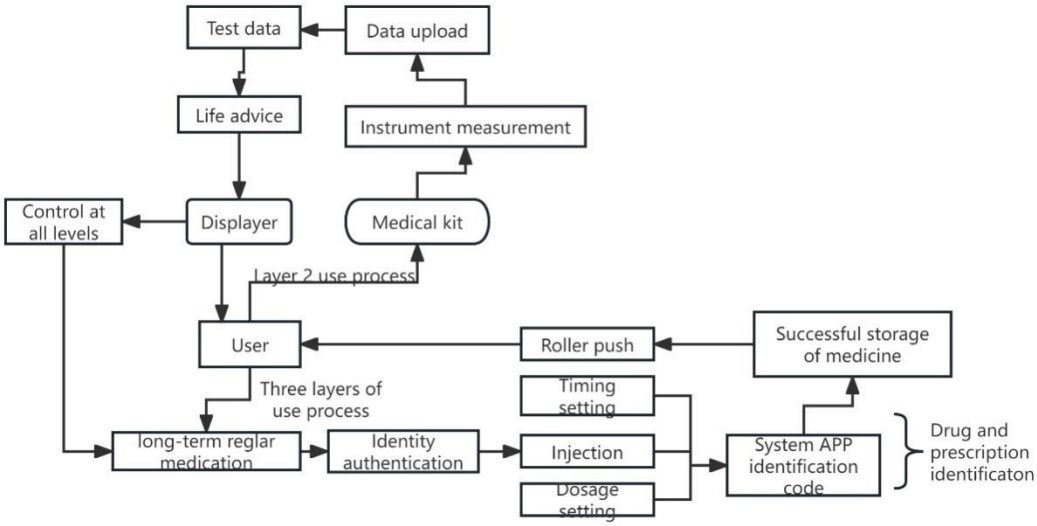

Figure 5. Simple operating diagram of the third/fourth layer

5. Summary

To ensure and adapt to the family medical and health needs in the post-epidemic era, this project aims at the inadequacy of the existing technology of the household first aid kit, further upgrading the structure and function, and on this basis, integrating the online intelligent systematic upgrading, set more convenient storage, allowing diverse performance and ease of use of the first aid kit. Utilizing the power of design to improve the shortcomings of traditional first aid kits can change people's lives, improve the sense of well-being and sense of access, and further promote the progress of the medical industry.

Disclosure statement

The authors declare no conflict of interest.

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