

# A Brief Discussion on Weighing Medicine in Ounces: An Innovative Quantitative Medicine Capsule Device

Ni Lan\*, Keyue Chen, Dan Luo, Ronghong Xu, Jie Zhang

Chongqing Institute of Engineering, Chongqing 400056, China

\*Corresponding author: Ni Lan, 634598874@qq.com

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**Abstract:** According to the main data bulletin of the seventh national census released by the National Bureau of Statistics, the proportion of China's population aged 60 and above reached 18.7%, while the proportion of the population aged 65 and above reached 13.5%. This aging of the society in China continues to exacerbate. Currently, most pharmaceutical packaging bottles are only used to package and store medicines. The existing medicine bottles containing tablets or small granules of Chinese patent medicines have larger lids and do not consider the convenience for patients when taking out medicine pills. Excessive pills will be expelled when pouring out from existing medicine bottles due to the large lids. The pills that exceed the dose need to be put back into the medicine bottle, which poses a risk of contamination and brings inconvenience to life. Hence, a quantitative medicine dispensing device is proposed to solve this issue.

**Keywords:** Aging population; Quantitative medicine collection; Packaging and storage; Medicine protection measures

**Online publication:** April 29, 2024

## 1. Introduction

China is entering an aging society today. According to a survey, 45% of the family structure in China consists of 4 elderly people, 2 middle-aged people, and 1 child <sup>[1]</sup>. Due to global environmental pollution problems, many elderly people are frail and sick so they have to rely on medication to maintain a normal life all year round. The elderly have poor eyesight, which makes it challenging to read medicine instructions and count pill numbers. The elderly have poor memory and cannot remember the complicated names of drugs and the dosage of each drug. This leads to accidents such as overdosing, missing doses, or taking the wrong medicine which could have serious consequences <sup>[2]</sup>. Therefore, this study conducted an investigation and analysis on the bottles of healthcare medicines that are commonly taken and found that most of the packaging bottles for drugs on the market only package and store medicines, which makes it inconvenient for users to take medication. Existing medicine bottles containing tablets or small-granule Chinese patent medicines have enormous openings and do not consider the convenience for patients when taking medicine pills. The medicines are also easily affected by

moisture and contamination. Hence, innovative quantitative medicine dispensing devices are created to solve these problems. With improving living standards, people are increasingly pursuing convenient and efficient lives. The users of quantitative medicine dispensing devices are not only the elderly, as the simple and efficient use also attracts young people<sup>[3]</sup>. Some patients often find it difficult to remember these medication instructions and often forget to take medicine, resulting in poor treatment of the condition. Therefore, a self-service medicine dispensing device is needed to solve this issue. As the name suggests, the doctor puts the medicine the patient wants into the dispensing device and sets a time point, then, the medicine dispensing device will dispense the medicine and remind the patients accordingly<sup>[4]</sup>. This method can reduce the burden of some nurses and improve the treatment effect of patients' diseases. In addition, when large bottles of medicines are purchased and divided into small bags for sale in small hospitals or health centers, the device saves pharmacists the trouble of counting and also eliminates the occurrence of unhygienic hand contact with medicines. This type of innovation fits the people-oriented packaging of modern society.

## **2. Current market situation**

The current domestic situation has just started. With a comprehensive understanding of the rigid market demand, the market will usher in a development boom. This study investigated pharmacies, supermarkets, and e-commerce websites and analyzed products from common brands such as Amway Nutrilite, Centrum, and By-Health. It is learned that the main shapes of healthcare drugs include cylindrical capsules, elliptical soft capsules, tablets, oblong, round, and cherry types. Commonly used medicine caps are mainly screw-closed and flip-top-closed, which do not have the function of quantitative dispensing of medicine. Some users use quantitative boxes to solve this issue by dividing the quantity in advance in a small medicine box. However, this still cannot solve the potential risks of drug and moisture contamination<sup>[5]</sup>. It is impossible to achieve convenience and meet the capacity mentioned above. Therefore, taking the medicine cap as the starting point, this study designed a medicine cap that is simpler and easier to operate and can quantitatively dispense medicine to solve the limitations of the capacity and portability of dispensing medicine.

## **3. Market prospects**

Bottle caps are one of the earlier and more defined parts of pharmaceutical packaging. The competitive landscape in the industry shows the coexistence of large, small, and medium-sized enterprises with decentralized operations<sup>[6]</sup>. The company of this study specializes in quantitatively dispensing medicine bottle caps. Most manufacturing companies have insufficient investment in technology research and development, new product development, environmental protection, and automated production<sup>[7]</sup>. The study company is one of the few in the domestic quantitative medicine bottle cap industry. The company is also one of the producers that possesses technology, talents, automated production, and a complete product system. The new medicine container designed in this study is a medicine bottle that can be taken easily according to the instructions, which is convenient for everyone and allows the elderly and blind people to take medicine accurately. This medicine bottle is suitable for packaging solid tablets, granular, and powdery medicines. A certain amount of medicine can be taken out each time according to the setting. The bottle structure is simple, easy to use, and accurate in drug administration, which is especially suitable for older people. When the elderly take medicine, they only need to know which bottles to take without remembering the name of the medicine and the dosage. It is also convenient for taking medicine at night when it is dark. When taking medicine, the elderly only need to turn the bottle opening downward and the bottle cap once, then the amount of medicine that falls out is what is

prescribed, which prevents overdosing and underdosing issues.

## 4. Project features

With improving living standards, people are increasingly pursuing convenient and efficient life. In the hospital, doctors often tell patients when to take medicine and how much medicine to take. Some patients often have problems with remembering these trivial things. They even often forget to take medicine or how much medicine to take, resulting in poor treatment conditions <sup>[8]</sup>. Therefore, a device that can automatically quantitatively dispense medicine is needed in response to this issue. As the name suggests, the doctor puts the medicine the patient needs into a specific medicine bottle and sets a certain amount. When it is time to take the medicine, the quantitative medicine dispensing device will dispense the required amount of medicine. The quantity is set in advance by doctors or family members. When it is time to take medicine, the elderly or patients only need to pour it gently, without opening the lid or counting, to obtain the required amount of medicine easily. This method can reduce the burden on some medical staff and family members and greatly improve the treatment effect of patients' conditions.

This study proposed a bottle cap that can quantitatively dispense small pills for the utility model, solving the inconveniences of small-sized medication through simple operations. However, there are still problems with the quantification and convenience of pouring and the problem of clearing remaining medicines <sup>[9]</sup>.

The bottle cap device for quantitative dispensing of medicine mainly includes a lid body. The inner wall edge of the lid body has a threaded screwing area. The lid body also has a pill quantitative dispensing cabin where the capsule is dispersed. The lid body has a hole for placing pills with a hatch. The cover body also has a pressing mechanism for operating the hatch. The pills are stored inside the threaded area. This quantitative medicine-dispensing device can quantitatively dispense the pills that users take daily, which prevents contamination of the remaining medicines in the bottles and helps the elderly take medicine accurately.

The ounce medicine weighing is an innovative quantitative medicine-dispensing capsule based on the combination of quantitative function and medicine cap to achieve the function of the product. This product is more in line with the needs of contemporary people, by improving the functions of the medicine cap from just being a dust-proof cap. The design of this device is mainly based on being people-oriented to focus on serving people, thereby improving the lifestyles of people and helping them <sup>[10]</sup>.

## 5. Product introduction

### 5.1. People-oriented design

The capacity of current medicine bottles is generally larger than the amount that can be taken at one time, so the size of the lid of the medicine bottle is generally large. Each time you take medicine, the amount you pour out is often more than the amount you can take once, and the excess medicine is put back into the medicine bottle, which is troublesome and unsanitary <sup>[11]</sup>. When used by elderly people, their limb flexibility is inevitably not as good as that of young people, so they are prone to pouring too much or causing the pills to fall to the floor from shaky hands. Moreover, elderly people generally take a wide variety of medications, and it is easy for them to lose track of each type of medication. The wrong dosage will be detrimental to their health. Hence, changes need to be made based on the aspects of being people-oriented and caring for elderly and weak people. Although this is only a small change, it can also help many people in need, so this practical new bottle cap that can quantitatively pour pills is launched to serve the people <sup>[12]</sup>.

## 5.2. Structure design

The device bottle cap consists of a cover body with a threaded area and a pouring area. The pouring area is located below the threaded area. The cap has a half-moon-shaped cabin, a push button in the middle, and a reed at the bottom of the push button. There are hatches at both ends of the reed and corresponding chutes at both ends of the half-moon cabin.

## 5.3. Instruction

When in use, the pills are poured into the lid body and allowed to enter the half-moon-shaped cabin. After the pills are full, the button in the center is pressed to extend it through the reed to close the hatch. The remaining pills are poured back into the bottle and the button is released. Pills are poured out of the half-moon capsule. This solves the problem of convenience for people to quantitatively pour out such medicines and the problem of clearing remaining medicines.

## 6. Conclusion

Pharmaceutical packaging has also changed with the diversification of drug types. The packaging of solid pharmaceuticals in China has been updated frequently in recent years. The innovative quantitative medicine device launched has a bottle cap that can quantitatively pour small pills according to the user's needs. Compared with traditional ordinary medicine bottle caps, it has better functions and it is an innovation that meets market demand. Through long-term analysis and research on the elderly products market, this study has an in-depth understanding of their needs. This innovative scientific, professional, and humane quantified medicine-dispensing capsule product is launched to carry forward the Chinese traditional virtues of caring for the well-being of the elderly and the weak. As society develops, people will focus on the practicality and innovation of daily products. Hence, pharmaceutical companies need to develop packaging with a safer and more humanized design for different user groups.

## Funding

Chongqing Municipal Innovation Training Project: Ounce Medicine Weighing Innovative Quantitative Medicine Capsule (No.: S202212608044). School-level project of Chongqing Institute of Technology: Research on urban waterfront landscape design based on the concept of river ecological restoration: taking the Chongqing Institute of Engineering section of Huaxi River as an example (No. 2022xskz02).

## Disclosure statement

The authors declare no conflict of interest.

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