



A review on Electronic Medicine Dispenser: Patient medication management using smart dispenser

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ABSTRACT

Medicines are one of lifesaving pillars, serving as direct therapies for diseases as well as ensuring that some medical conditions remain stable. In today's world, it's impossible for family members to be available all of the time to care for the elderly, as most families in our society are nuclear. In developing countries, caring for the elderly is a major concern. Despite their greatest efforts, the elderly sometimes forgets to take their prescription on time. There are concerns about the ability of elders to remember to take and manage their medications on their own. One answer to this problem is an Electronic Medicine Dispenser. It delivers medications according to the schedule and notifies the caregiver. There are a variety of medicine dispensers available, each with similar functionality but differing dispensing mechanisms and designs. In this review paper we will discuss about the different type of electronic medicine dispensers according to the need of elder peoples

1. INTRODUCTION

The success of public health and modern medicine has resulted in unprecedented levels of life expectancy and demographic segments of older persons, posing issues for how to efficiently care for older adults around the world.

Population aging is a global issue that affects many developing countries such as Taiwan. The natural decline in physical function with aging leads to an increase in incidences of various chronic diseases in elderly individuals; most patients with chronic diseases need to take medications over a prolonged period of time in order to stabilize their conditions. Ensuring that the patients consume the right medication at the appropriate time becomes crucial. This paper proposes a smart pill box equipped with a camera and based on the medicine bag concept. The matrix bar codes printed on the

medicine bags are used to interact with the pill box in order to perform pill remind and confirm functions (Huai-Kuei Wu et.al, 2015).

Many medical blunders occur as a result of those in charge of a patient's or elder's medicine having to sort large quantities of tablets every day. This study focuses on the development, design, and creation of a pillbox prototype that aims to address this gap in the medical field by sorting pills on its own and offering a variety of other advanced capabilities, with the gadget intended for usage in hospitals or senior homes. This pharmaceutical pill box is designed for patients who take medications or vitamin supplements on a regular basis, as well as caregivers who work with the elderly.

The way caretakers and healthcare professionals manage prescriptions has changed thanks to smart pill boxes. It's handy and safe to keep multiple prescriptions

in one spot. Even if a person only takes one drug, pill boxes keep the correct quantity in sufficient quantities to last several days. Smart pill boxes can help caregivers stay connected to their loved ones and enhance several areas of medication administration.

The majority of people nowadays are unaware of the need of taking their prescriptions on a regular basis. Only half of the people are aware that medication is administered in an irregular manner. Most of these flaws occur in older patients as a result of progressive memory loss, and normal people also forget to take medicine due to their hectic work schedules, resulting in treatment failure. Many attempts are being made to build a smart medicine box. We propose a smart medication box in this technology, with some capabilities such as monitoring the patient's heart rate and temperature, sending an emergency alert to the patient, and sending an SMS alert to the caregiver and doctors (Prasath et.al 2021).

The care of the elderly is a vital matter for everyone. The care and management of the elderly is the responsibility of family members. It is difficult for family members to be around all of the time to support the elderly in today's world. It is vital to administer medication to the elderly on a timely basis.

Non-professional users can choose from a wide range of medicine administration aid devices. The majority of them are manual, with various sections known as pill trays. There are several sections in the pill tray that can be filled with medication. Each compartment can house a variety of drugs of various sizes and combinations. For a maximum of 28 days, the user must take medicine from each tray every day. It doesn't have an alarm to let you know when it's time to take your medicine. The Pill-Mate-Medicine Reminder is a device that reminds the user using both visual and audio signals. It reminds you to take your medications or attend certain events at a predetermined time. Patients can use a smart phone application to help them avoid making mistakes. It reminds users to take their medications on time and keeps track of their intake patterns for subsequent review by healthcare providers (Kini et.al, 2021).

Customers that utilise this device have high expectations for performance, serviceability, dependability, cost, and safety. Lightweight, easy to use for both the caregiver and the patient, good construction to prevent tampering, a bright warning LED, 70+ decibel audio alerts, and a nice display unit are all

requirements. Electronic medicine dispenser is a long-lasting and simple-to-repair product. Mechanical devices are encased for safety and longevity, and the software is trustworthy. Lightweight, modest dimensions and the ability to reset the system are the major benefits. In many circumstances, a locking mechanism is essential to prevent the device from being misused. Electrical components, such as the SMPS and motors, must be encased for safety reasons (Wang 2009). Basically, the electronic medicine dispenser device simplifies the complex task of medication management with the aim of reducing medication errors and improving communication with providers. To achieve the bigger goals of improved outcomes in older adult health status, rates of hospitalization, rates of nursing home admission, total costs of care, and expenditures per quality adjusted life year, medication error reduction and better communication are critical. The drug dispensing system is rated as dependable, easy to use, and helpful in coordinating personal medication management by older persons. This review suggests that technology-assisted drug dispensers could be useful aids for older individuals in managing their care.

2. REVIEW OF LITERATURE

Acharya et.al. (2021) explained that to the older person who discharged from a home health care programme should give a prescription delivery device as a medication management intervention. Medication management is a difficult task, and older folks have distinct vision, cognitive capacity, and physical function difficulties than their younger counterparts. The medication dispensing device was created to make the complicated work of drug management easier to manage, with the goal of minimising medication errors and enhancing provider communication. To achieve the bigger goals of improved outcomes in older adult health status, rates of hospitalisation, rates of nursing home admission, total costs of care, and expenditures per quality adjusted life year, medication error reduction and better communication are critical.

As per Hasrath et.al (2021), automatic medicine dispenser can help doctors to maintain track of a huge number of patients', their medicinal doses and also monitor their health more efficiently. This medication box is an active assistive project that goes beyond

standard passive techniques of supporting and monitoring a patient's health.

Mukund and Srinath (2012), discussed the importance of an electronic medicine dispenser, noting that it can accommodate pills and capsules of any size. The dispenser has been discovered to be capable of being programmed for 31 days and 21 different drugs. It has the ability to send four daily alarms. It is programmable to adjust the number of times and the number of tablets to be picked dynamically as needed.

Mrityunjaya et.al (2007) suggested that elderly people rely on their medications to keep them healthy, but complex medication schedules can lead to mistakes like missing doses, taking incorrect amounts, or taking medicines at the wrong times. These mistakes could lead to unnecessary doctor or hospital visits, illness and even death. Hence there is a need to design a Medication Dispensing Device that can help Geriatrics to take medication on schedule. This would prevent unplanned hospital or doctor visits related to incorrect medication use. This paper proposes a design of a smart device which dispenses the medications on the prescribed schedule.

Following are the different advancements in electronic medicine dispensers according to the need of every class of the society.

1. Smart medicine reminder

A first thing which comes in our mind is that elderly people will take medicine only if they remember to take medicine. That's why the most important dispenser is inbuilt reminder of medicine. The smart drug reminder system is intended to assist elderly persons in taking care of themselves by reminding them to take their prescriptions on time and in the correct dose. It has been discovered that people generally disregard their health and prioritise other activities over taking their medications. They also fail to take their prescriptions on time because of this. Many health maintenance organisations, health practitioners, and medical researchers have noticed that increasing the use of patient reminders can improve chronic illness treatment and medical service delivery to those who need it. However, many patients, particularly the elderly, do not take their medications in the recommended dosage. They either overdose on drugs in the hopes of healing faster, or they undergo on medicines because they are afraid the doctor has prescribed a larger quantity than necessary.

The former has a number of negative health consequences, whilst the latter delays the patient's therapy and, in some situations, permits the sickness to progress further, necessitating additional treatment. Because of their deteriorating memory, the elderly is particularly vulnerable to this problem, and in severe situations, they may forget that they have already taken their prescription and retake the same medicine two or three times in the same time period. This may not be detrimental in the case of lighter medicines, but it can be hazardous to the body in the case of stronger and concentrated medicines. To eradicate this medication reminder system comes in the picture. Smart medicine reminder collects prescription information from the user, such as the prescription's duration, the names of the drugs, when they should be taken, and how much of each medicine should be taken.

2. Low-cost automatic pill dispensing unit

Elderly people generally prefer to take cost-effective things as they find it unreasonable to spend on themselves. Mugisha et.al (2017) worked on it; they explained that pill storage unit and the passageway make up the pill chamber. The pill storage device is constructed up of simple plastic canisters that sit on a motor-driven flipper. The flipper releases single pills from the canisters onto the pathway, which is protected by a magnetic cap that opens only when the flipper opens. The overt goal is to control the frequency and pace with which tablets are released from the dispensing device. A stopper prevents the motors from turning in a circular path, and the pills fall into the troughs from the canisters by gravity.

3. Smart electronic medicine dispenser

Today is the era of smart gadgets and for those who can afford expensive gadgets Othman and Ek (2016) suggested the use of smart electronic medicine dispenser. This type of medicine dispenser has three compartments, each of which is designed to hold three distinct types of pills. The vibration motor and IR sensor will turn on once the button is pressed. The vibration motor vibrates the compartment where the pills were previously stored until the pills fall out through a pipeline from the compartment to the drawer. The IR-sensor will begin counting the number of pills that fall out based on the number of pills that were set at the start. When the number of pills that fall out meets the medication's threshold, the process will come to an end.

3. CONCLUSION

In developing countries, caring for the elderly is a major concern and it increases especially after the COVID 19 pandemic, when the children could not reach for the care of their parents due to lockdown. Generally family members are in charge of the elderly's care and management. It is difficult for family members to be available all of the time to help the elderly in today's world. In today's society, the majority of families are nuclear. Although the elderly wish to be self-sufficient, their desire for independence is understandable, it is a source of concern for their children. Despite their greatest efforts, the elderly sometimes forgets to take their prescription on time. One method for assisting them in taking their medications effectively is to use an automatic medication dispenser.

As the life getting busier these days, elderly people tend to forget to take their medicines at prescribed schedule. Hence a device or a system is to be designed in such a way that it can dispense the pills at preset time. Since the target audience of the device are the elderly people, it must be user friendly, handy, safe to use, light in weight. It is suggested to develop the prototype of electronic dispenser as per the feedback of target group.

The automatic medicine dispenser is must for users who take pills without the assistance of family members in mind. It relieves the user of the error-prone task of giving the wrong drug at the wrong time. As the expense of in-home medical care rises, it has become increasingly important for people to choose a device that can efficiently manage their drugs. It gives the elderly the proper drugs at the right time. It also helps the elderly take medicines more easily by providing them with water.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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