

Safe Home Medicine Delivery

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INTRODUCTION

Medicines are an integral and often central part of modern healthcare. In many cases, they are the cheapest, easiest and most efficient way to tackle diseases. Yet their consumption and delivery is prone to errors, which risk the safety of their usage. If prescribed medicines are not consumed, the expected care results might be left unrealized. Furthermore, both the conditions of the over- and underuse of medicines pertain at the same time. Delivery and distribution is difficult, even in settings where healthcare professionals, such as nurses or pharmacists, take command. However, even more problems occur in settings where these professionals are not available, such as homes. Nevertheless, the trend is to try to keep elderly people living at home as long as possible, putting pressure on the practices of the delivery of medicine in home settings. This article introduces the problem area to the reader and presents a possible solution.

BACKGROUND

The medicine delivery chain from consumption outlet point (hospital, care-taking home, pharmacy) to the final usage by the patient is full of difficulties and prone to the possibility of error. Many prescriptions never end up being consumed. On the other hand, many patients, of their own volition, consume excess amounts of medicines that are either harmful or not beneficial.

Medicine delivery is not only difficult in home settings, even professional organizations, such as nursing homes (van den Bemt, Idzinga, Robertz, Kormelink, & Pels, 2009) and hospitals (Keers, Williams, Cooke, & Ashcroft, 2013), are error-prone in the medicine administration process.

The problems in the delivery of medicines are many. Polypharmacy – the simultaneous use of several medicines – compounds risks, such as the use of expired medications. Furthermore, the large number of prescribers and dispensers for medications found in the home, plus medication hoarding, multiple storage locations for medication, the lack of medication administration routines, the presence of discontinued medication repeats, and the lack of an understanding of generic versus trade names (Sorensen, Stokes, Purdie, Woodward, & Robers, 2005) lead to health implications if they are realized.

DOI: 10.4018/978-1-4666-9978-6.ch029

Among the many problems, an important one is that of a patient's inability to come to terms with the practical operation of the medicines delivered to them in a home setting (Kwint, Faber, Gussekloo, & Bouvy, 2011). There may be too many medicines and they might resemble each other too much. The small size of the pills and tablets might cause problems and the timing of their taking might be problematic. Currently, relatively wealthy, elderly people might suffer from these problems of excess and similarity, but memory diseases, such as Alzheimer's as well as visual impairments and poor motoric capabilities when handling small items will add to the problem area.

Patient adherence is a key starting point for the delivery of the proper medication. Patient adherence (Martin, Williams, Haskard, & DiMatteo, 2005), sometimes called patient compliance, refers to the willingness of patients to follow the medical treatments prescribed. Without adherence, even the best medicine delivery solutions, technical or otherwise, cannot be successfully implemented because patients can seldom be medicated against their will. The results are that in the US alone the lack of adherence is costing the healthcare system approximately \$300 billion yearly (Foo, Chua, & Ng, 2011).

The ability to manage, control and consume medication is a key component of proper medication and as the number of required medicines grows, their management becomes more complicated. In this article, we discuss this problem field in detail, presenting an innovative solution for medicine distribution at home: based on the automated distribution of the blistered medicines according to a set time-plan. Medicines can be collected from an automatic dispenser only at the specified time, not before and not after. Furthermore, the automatic dispenser notifies a predefined service center if the medicines are not taken at the specified time.

THE MEDICINE DELIVERY PROCESS AT HOME SETTINGS

Forms of Medicine Packaging

A standard solution to these problems is that of prepackaging the medicines into the amounts specific to the patient and the consumption time. The huge masses of medicines are still delivered manually for end consumption. Nurses and other carers manually distribute the medicines to be consumed to time-specific containers, such as normal plastic mugs or specially designed dispenser boxes, which typically have a compartment for every possible medicine usage time, for example, three times a day in a weekly rhythm.

To support these manual arrangements, modern information technology has several ways to remind patients that it is time to take their medicine, for example, notifications via e-mails, text messages, or electronic calendars.

Medicines can be delivered for use in standard packages that are similar for all customers, or in individually-tailored packages, which are assembled according to the individual defined patient needs. In the individually-tailored packaging, the idea is to provide the exact medication needed at every time-point defined in the prescription process. On the package, the patient name, the medicines to be consumed, and the intended consumption time are typically displayed.

A typical solution for individually tailored industrial packaging is that of blistering, in which medicines are packaged into blisters, where one side consists of transparent or non-transparent plastics and the other side metal folio that can be easily broken in order to extract the medicine. Such packages are typically standard packaging for medicines but they might also be made of other substances, such as carton. The blister compartments can contain an individual medicine or several medicines meant for simultaneous consumption.

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