

Patients' Perspectives on Automated Multi-dose Drug Dispensing

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Abstract

Background: More studies on automated multi-dose drug dispensing (ADD) are needed to ensure the quality of drug treatment among those receiving their medicines packed in sachets.

Objectives: The aim of this study was to assess preferences and experiences among patients', who handle their medicines themselves without assistance from primary care in relation to drugs being automated dispensed in sachets in an outpatient community care setting.

Methods: A sample of every sixth municipality was drawn from the sampling frame of all Swedish municipalities, resulting in 40 (14%) municipalities. A total of 4,655 questionnaires were distributed through the pharmacies that distributed ADD in the selected municipalities. The data were collected during September and October 2012.

Results: The response rate was 33%. Sixty-four percent of the respondents were 65 years or older.

The patients reported that ADD helps them to correct dosing, to recognize the medicine, and allows them to become more involved in decisions about treatment. Nineteen percent, however, found it confusing to have medicines in both sachets and in manufacturers' packaging. More than one-third of the patients reported that generic substitution made it more difficult to identify the various medicines available in the sachets.

Forty percent of the patient called for better information about the purpose and goal of their treatment, and 25% called for better information on changes in their drug treatment. They also asked for information focusing on which pills are which, preferably with pictures and a written description.

Conclusion: In general, the patients expressed that they were satisfied and felt secure with ADDs, but called for better information about the purpose and goal of their treatment and treatment related changes. Adherence and safety issues, as well as, information about sachets contents need to be further looked into. Pick-up and delivery options of the sachets from the pharmacy and other distributors could be more individualized according to the users' preferences.

Keywords: Automated drug dispensing; ADD; Multi-dose medication; Adherence; Patient satisfaction

Background

Medication errors and non-adherence to prescribed treatment are common and generate suboptimal treatment effects, much suffering, and high costs. In 2012 the Swedish government mandated the Medical Products Agency to investigate (ADD) service in relation to patient safety and non-adherence. In Scandinavia, this service is offered as an alternative to ordinary prescription dispensing for people, mostly elderly, with regular medication use combined with difficulties in handling and administering their drugs. With ADD, solid medications (tablets and capsules) are machine-dispensed together into disposable sachets for each scheduled administration occasion. The sachets are individually labelled with patient data (name and identification number), dispensed medication in the sachet (name,

strength and number of doses), and date and scheduled time for administration [1-4]. Related to ADD is unit-dose drug distribution in hospitals in which drugs are individually packaged and labelled for specific patients and supplied from the pharmacy, but this is not the focus in this study. Neither is the administration of ADD sachets by staff in a home-care delivery setting.

During the 1980s, manual repackaging of multi-dose medications from the pharmacy was successively substituted with ADD in Sweden. The demand for the service was based on safety and time-saving issues. The common experience was that errors in medication delivery and administration were more common when medicines were repackaged by ward staff from a common ward stock from department medicine storage. However, formal studies on the issue were absent and have only been published recently [5,6].

In 1992 the administrative and financial responsibility for the former nursing homes was transferred to the municipalities and

included in the municipalities' portfolio for "special housing for the elderly" in Sweden. The municipalities were offered three alternatives for medicine handling. They could either continue preparing or repackaging medicines into dosage administration aids from a medicine stock, with generic packaging used at the department; or have the medicines individually prescribed and dispensed in packs as supplied by the manufacturers; or use ADD.

Individually prescribed medicines (using prescription forms) were reimbursed and included in the Swedish Pharmacy Benefit. The costs for reimbursed medicines were borne by the government at a national level. However, the municipalities would have to cover all costs for the medications if they prepared and/or repacked medicines into dosage administration aids from a medicine stock using generic packaging. Deliveries of multi-dose drugs, using ADDs, from the pharmacies implied time and cost saving among ward staff. As a consequence, almost all municipalities in Sweden, in order to cut labour costs for nursing staff, increasingly ordered ADDs from pharmacies. On 1 January 1997 the cost for the Swedish Pharmacy Benefit was transferred from the national, government level to the county councils.

Multi-dose drug dispensing can only be prescribed by a physician, most often a general practitioner, often following the suggestion or recommendation of a municipal district nurse. The patient's total medication (including over-the-counter medication the patient may have along with prescribed medicines) is then transferred to (and thereafter prescribed in) a separate national prescribing database which is accessible to all prescribers and pharmacies. The information in the database may also be presented on a special list with all of the patient's current medications. The list is distributed to the nurse responsible for handling of the ADD medications at nursing homes and to patients living at home in need of this service. A renewal of the prescribed medications in the database is mandatory every 12 months.

Usually, a delivery contains medication for 2 weeks. Medicines that cannot be dispensed into sachets (solid medicines that are not licensed to be repackaged, as well as liquids, and parenteral or topical formulations) are delivered in their original packaging from the manufacturer (i.e. the pharmaceutical company) in a quantity agreed with the patient (maximum 3 months' treatment).

Until 2010 all the Swedish pharmacies were own and managed by the National Corporation of Swedish Pharmacies. In 2010, two-thirds of the pharmacies were sold out to private enterprises. However, until the beginning of 2013 only the National Corporation of Swedish Pharmacies offered ADD. Since the spring of 2013, other companies in Sweden have also been offering this service.

Today ADDs are increasingly used in the US and through Europe e.g., in Sweden, Denmark, Finland, Germany, The Netherlands and Norway. The European Directorate for the Quality of Medicines and HealthCare (EDQM) (Council of Europe) is currently drafting guidance on "Best practices for ADD - assuring added value for patient safety, associated care and process quality".

Evaluation of medicine dispensing aids for ADDs is limited. However a few studies have outlined some potential factors contributing to dispensing errors [7-11]. Inadequate communication amongst members of the health care team, illegible medicine records, and concentration lapses or fatigue experienced during preparation has been suggested [8-11]. To the best of our knowledge there are no conclusive studies with regard to patient safety and adherence using ADD. However, some Swedish studies have indicated an association between poor quality of drug treatment among the elderly using ADD compared with medicines prescribed and dispensed individually in the manufacturers' packs from pharmacies [7,12-14]. Comprehensive

literature reviews show that studies comparing ADD from pharmacies with medicines prescribed and dispensed individually in manufacturers' packs from pharmacies are few and inconclusive [8,9]. In Norway, different health care professionals have been surveyed to obtain information about confidence in ADD [10,11]. In a study from the Netherlands, it was reported that community-dwelling recipients of ADD have better medication adherence but poorer medication knowledge compared with age- and sex-matched recipients of manual medication dispensing [15]. Other studies have examined the economic benefits and the time saved by health care personnel in connection with ADD use [16].

More studies on ADD are needed to ensure the quality of drug treatment among those receiving their medicines packed in sachets. The aim of this study was to assess preferences and experiences among patients, who handle their medicines themselves without assistance from primary care in relation to drugs being automated dispensed in sachets in an outpatient community care setting.

Method and Study Population

A questionnaire was developed based on review of the literature and pilot testing of the questions in the intended target group i.e., patients with ADD who handle their medicine by themselves without assistance from primary care. The questionnaires were distributed through the pharmacies that delivered ADD.

The survey included both questions, as well as different statements about ADD. The question "Does it happen that you forget to take your medicines?" was followed by the statements "No, never", "Yes, sometimes", and "Yes, often". The respondents could select one or several alternatives from a list following the questions "Does it happen that you fail to take your medicines for reasons other than forgetfulness?" and "Does it happen that you take more or less medication than prescribed?". They could also add comments to the questions.

The respondents stated whether they "fully agree", "largely agree", "partly agree", "disagree" or "do not know" on the following statements: "ADD helps me to take correct dosage", "I feel secure with ADD", "the sachets are easy to open", "the sachets do not help me to recognize my medicine", "ADD allows me to become more involved in decisions about my treatment", "generic substitution makes it more difficult to identify the various medicines available in sachets", "it is confusing to have medicines in both sachets and other packages", "it is difficult to read the text on the sachets", "the sachets do not make it easier to remember to take the medication", and "I am displeased with receiving my medication in sachets". In the analyses the statements were classified into "fully agree/largely agree", "partly agree", "disagree" or "do not know".

Data collection

Information on municipal sizes was collected from Statistics Sweden. A sampling frame was set up including all Swedish municipalities (sorted by population size). A systematic sample (every sixth municipality) was drawn from the sampling frame, resulting in 40 municipalities. Five of these were "medium-sized" (55,000–200,000 inhabitants) and 25 were "small" (7,000–10,000 inhabitants). The number of patients with ADD in these municipalities was 5,343 (figures according to The Swedish Corporation of Pharmacies, 2012).

A total of 4,566 questionnaires were together with a cover letter with information about the study and an invitation to participate, distributed through the pharmacies that delivered ADD to the patients

in the municipalities. One reminder was sent, after two weeks. The data were collected during September and October 2012.

Results

A total of 1,610 patients responded to the questionnaires. One hundred forty-five questionnaires were excluded because the respondents didn't handle their medicine by themselves without assistance from primary care, giving a remaining 1,465 responses and a response rate of 33%. Among the respondents, 53% were women and 47% men. Sixty-four percent of the respondents were 65 years or older.

The majority of the patients (58%) have had ADD for 2 years or longer. More than 90% collected their ADDs every second week at the pharmacy, which most also desired. One third wanted to collect less often. Half of the patients (51%) handled their drugs themselves without help, while the rest had help sometimes (17%) or always (32%) (mostly from a close relative) to collect the ADDs from the pharmacy, to read dosage instructions, to remember to take the medicine and/or to open the sachets or to take out the medicines dispensed in the manufacturer's original packaging.

ADD in relation to medication adherence and patient safety

Sixty-nine percent of the patient responded that they never forget to take their medicine. One-third forget sometimes and a minority often. Twelve percent said that they fail to take their medicines for reasons other than forgetfulness such as not being at home and unable to take the medication, not wanting to take medicines every day, feeling better, feeling worse, only the most important of the drugs are taken, and/or the number of times a day when the medicines should be taken are too many. Eleven percent responded that they take more or less medication than prescribed.

The patients in general were satisfied to have ADD and felt secure with the system (Table 1). They answered that ADD helps them to correct dosing, to recognize the medicine, and allows them to become more involved in decisions about treatment. They also agreed that the sachets are easy to open.

Statement	"Fully agree/largely agree"	Partly agree	Disagree	Don't know
	N (%)	N (%)	N (%)	
ADD helps me to take correct dosage	1,327 (93)	38 (3)	24 (2)	41 (3)
I feel secure with ADD	1,293 (90)	52 (4)	58 (4)	22 (2)
The sachets are easy to open	1,110 (78)	180 (13)	104 (7)	26 (2)
The sachets do not help me to recognize my medicine	174 (21)	185 (14)	603 (46)	260 (20)
ADD allows me to become more involved in decisions about my treatment	684 (49)	153 (11)	217 (16)	334 (24)
Generic substitution makes it more difficult to identify the various medicines available in sachets	520 (37)	218 (16)	326 (23)	332 (24)
It is confusing to have medicines in both sachets and manufactures' packages	260 (19)	232 (17)	611 (45)	263 (19)
It is difficult to read the text on the sachets	151 (11)	106 (8)	979 (74)	85 (6)
The sachets do not make it easier to remember to take the medication	129 (9)	73 (5)	960 (70)	207 (15)
I am displeased with receiving my medication in sachets	66 (4)	46 (3)	1,203 (87)	8 (5)

Table 1: Number and percentage of respondents who responded to listed statements about automated multi-dose drug dispensing (ADD). Those who did not respond to the statement are not presented in the table.

More than one-third of the patients fully or largely agreed with the statement that generic substitution makes it more difficult to identify the various medicines in the sachets. Nineteen percent thought that it is confusing to have medicines in both sachets and in manufactures' packages. Eleven percent considered it to be difficult to read the text on the sachets. About the same proportion reported that the sachets did not make it easier to remember to take the medication. A minority of the patients were displeased with receiving medication in sachets (Table 1). A majority (83%) of the respondents would recommend ADD to others.

How can multi-dose drug dispensing be improved?

Forty percent of the patient called for better information from prescribers about the purpose and goal of treatment, and twenty-five percent called for better information on changes in drug treatment. Thirty-five percent commented on the importance of there being only

one medication list shared between health-care, pharmacies, and ADD distributors. They highlighted the importance of attached or otherwise available information focusing on which pills are which, preferably with a picture and/or description. Twenty-four percent of the patients reported that the opportunity to communicate with the pharmacies could be improved. Twelve percent called for expanded pharmacy opening hours for collection of sachets. Twenty-six percent expressed a desire to collect at any pharmacy. Some commented that they would like to have the sachets sent home.

Discussion

In general, the patients expressed that they were satisfied and felt secure with ADD, but called for better information about the purpose and goal of treatment and changes in drug treatment. A majority would recommend ADD to others. In a previous study we found that health care professionals had a positive attitude towards ADD

regarding the system's contribution to improved medication adherence and patient safety [17].

More than one-third of the patients considered that generic substitution makes it more difficult to identify the various medicines in the sachets. In a previous study we found that a large proportion of physicians and nurses felt that generic substitution hampers the patient's knowledge of which medicines the sachets contain [17]. In previous studies on patients without ADD, those who claimed to have received information about generic substitution by their doctor or pharmacist were more often positive for an exchange [18,19]. In an attitude study, pharmacists in Swedish pharmacies favour generic substitution and suggested that it reduces the cost of drugs, but they said that it can be confusing for the patient by switching to different pharmaceutical products. They stressed the value of good information about generic substitution in dialogue with the customer [20], which also emerged in other studies [21]. The patient should be informed when the name, colour or other appearance of the tablets are changed. The cost-effectiveness of generic substitution for patients with ADD should be investigated. An alternative could be to exclude generic substitution for patients on ADD. Another option might be that the patient could be given the opportunity to refuse generic substitution.

Twenty percent of the patients found it is confusing to have medicines in both sachets and in other packages. There is a risk of deficiencies when medicines are dispensed in both unit sachets and in manufacturers' packaging. However, there are medicines that cannot be dispensed, named patients' prescriptions, and on-demand medicines that are not suitable to dispense in sachets.

The patients called for better information about the purpose and goal of treatment and changes in drug treatment. They also asked for improvements regarding the delivery routines from the pharmacy. The ability to somehow supplement the information currently available on the sachets with the purpose of the treatment could be tried to improve the safety of medicine handling. The range of pick-up and delivery of the sachets could be individualized according to the users' needs and desires. A previous study resulted in a number of comments on how ADD can be improved. For example, the medical record regarding initiation and cessation of medicines could be improved. Furthermore, there should be an opportunity to evaluate the treatment outcome for each medicine when it is prescribed and there should be a physician with a coordinating responsibility. An overview of the proposed improvements is described in detail in a rapport based on survey from the west of Sweden [22].

There is limited information in the literature on the patients' experience of ADD. This study aims to contribute to fill this gap. However, the study has some limitations. There was a loss of prospective respondents as not all potential respondents received their invitations, because of lack of time at the pharmacy that would distribute the questionnaires together with the medicine delivery. It was not possible to identify whom of the ADD users who actually received the questionnaires. There was no way of knowing whether the respondents match the age and gender distribution in the original 4,566 people and a nonresponse analysis could not be undertaken. We had to use this distribution channel since Swedish law, due to prevailing secrecy, do not allow access to the national list with names and addresses to those patients who get ADD sachets. The only option was to distribute the questionnaires through the pharmacies. These drawbacks might have induced a selection bias which may have influenced the results. Those responding to the survey may also have different opinions compare to those not responding in different ways, which on the other hand always is the case for part-takers compared to

non-responders. The results can therefore not be generalized to represent the views of all patients with regard to ADD.

In 2011 about 180,000 individuals in Sweden received their prescribed medicines via ADD from pharmacies. About 80% of them were 65 years or older, corresponding to 8% of this age group in Sweden, varying from 6% to 11% between counties. About 40% lived in ordinary housing, while about 60% lived in care home for the elderly. Of the recipients living in ordinary housing, the majority (~50,000) had assistance with delivery of medicines from the pharmacy from municipal professionals (elderly care/social care or primary health care). Because of impaired physical or cognitive function and difficulties in handling the medication, the majority of these elderly also had assistance with medicine handling figures according to The Swedish Corporation of Pharmacies, 2013. The recipients of ADD living in ordinary housing (i.e., the target group for this study) receive ADD because they have difficulties in handling the medicine for one or several reasons. They are a selection of vulnerable patients. Hence patient safety aspects are challenging to assess. Changes in drug elimination capacities as well as difficulties remembering and handling drug administration should ideally be taken into account. However we do think that this study contributes with new information about patient' views of ADD.

Further research is warranted with regard to the follow-up and evaluation of effects and safety as well satisfaction for patients using ADD. It is also important to study subgroups of current and potential future ADD users. Since the spring of 2013, other companies in Sweden have also been offering this service. Taking the development of e-health and the Internet of things future interesting solutions are likely to be seen.

Conclusion

In general, the patients expressed that they were satisfied and felt secure with ADDs, but called for better information about the purpose and goal of their treatment and treatment related changes. Adherence and safety issues, as well as, information about sachets contents need to be further looked into. Pick-up and delivery options of the sachets from the pharmacy and other distributors could be more individualized according to the users' preferences.

Ethical Approval

This study has been approved by the regional board for ethical vetting of research in Uppsala, Sweden (No. 2012/289).

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