

# Moving towards a Comprehensive Medication Dispensing Service for Patients in Transition from Hospital to Primary Care

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**Abstract.** In primary health care it is often challenging to obtain a supply of drugs when a patient is discharged to their home or to a nursing institution. Both access to updated information about the (new) medication, and the practical organization per se, present obstacles. The need for early information in the receiving units is in conflict with the hospitals' need to make decisions regarding treatment up until the point of discharge. The practical handling is affected by e.g. distance to the local pharmacy and the accessibility of certified health care workers. We aim to design and implement a medication dispensing service to ensure that the patients who are discharged to primary health care (home care services or nursing homes) are supplied with medication in the transition period, until regular supply is (re)established. In this paper we describe the complexity of the area, impacting factors to be considered and outline a stepwise approach to design a comprehensive service for enhanced patient safety.

**Keywords:** Medication dispensing service, care transition, multidose drug dispensing, unit dose drug dispensing, clinical pharmacy, medication reconciliation, patient safety.

## 1 Introduction

Ensuring the supply of drugs for a patient in transit between hospital and primary health care is a challenging task, in particular when medication treatment regimens are changed. The challenge consists of two subsequent and interdependent main parts; information transmission with regards to the (changed) medication and the process for acquiring and dispensing the drugs.

The availability of drugs is affected by distance and accessibility of health services, e.g. 168 (39%) of the Norwegian municipalities do not have a local pharmacy [1], which consequently impacts how fast it is possible to acquire drugs. The administration of drugs is a task undertaken by the nurses in public health care services. Other health care professionals may also assist, but in internal protocols the dispensing of drugs is most often described as being a nurse's responsibility to safeguard. Thus, when a nurse is unavailable at the time the patient arrives, a practical

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problem arises. Furthermore, introduction of the multidose drug dispensing system (MDD) has been shown to represent a lack of flexibility within the system [2].

Along with an ageing population and a shift towards increasingly advanced medical treatments outside hospitals, new approaches to ensure patient safety are called for. When elderly patients are transferred between care settings, an average of two drug errors occurs [3]. Errors often occur due to poor communication about the drug use.

The University Hospital in Trondheim, St. Olav's Hospital, has a written cooperation agreement with local municipalities, describing e.g. interaction with regards to the transition of patients between care settings. There are often conflicting interests between the care providers at the time of discharge, affecting the practical handling of the transition and consequently the transit time: The hospital wants the flexibility to alter care regimens and therefore medication lists close to the time of discharge. Whilst the receiving units, on the other hand, need time to prepare, preferably during opening hours, and therefore require early discharge information. Today these challenges are solved more or less ad hoc, e.g. the patient is given a few tablets "in hand" at discharge, but the lack of standardized procedures leads to poor predictability for the receiving units. To reduce the issue, we aim to design a medication dispensing service ensuring patients in transit between hospital and home care are provided with some days' supply of drugs. The targeted patient group is typically dependent on care support to be able to return home, and represent approximately 200 of the weekly discharges from St. Olav's Hospital.

Complex interventions – consisting of multiple behavioral, technological, and organizational components – are common and important features of health care practice and research [4]. Designing a medication dispensing service within the hospital for patients in the discharge phase falls within the definition of complex interventions. As an example, the financing of medicines in Norway is complex in itself; covered in part by the patient itself and in part by the Government, split between hospital-, municipality- and insurance budgets [5].

This paper presents an approach for developing a service and discusses different conditions that need to be met. Since the project is in a very early phase, no results are reported in this current paper.

## 2 Dispensing of drugs

In primary care, dispensing of drugs is primarily done by using two different approaches; conventional, manual dispensing from tablet boxes undertaken by a nurse or an assistant, or multidose drug dispensing (MDD). MDD (Figure 1) are drugs that are machine-packed into dose unit bags for each time of administration [6].

At St. Olav's Hospital unit dose drugs (UDD) (Figure 2) dispensed at the local Hospital Pharmacy are used. UDD is more flexible than MDD since the single dose unit bags are labeled with drug content data only, and not with patient data and time for intake. In primary care the changes in medicines are less frequent than in hospitals, and most often multidose drugs are dispensed for a period of two week for patients in home care services, and one week for patients in nursing homes.



**Figure 1: Multidose dispensed drugs packed for two weeks' use for a patient in home care services**



**Figure 2: One tablet unit dose dispensed drug packed for a patient in hospital**

### **2.1 Obstacles within the multidose drug dispensing system**

When an intervention presents practical obstacles, or elements of the intervention are considered unnecessary, or not meaningful, in order to complete the work, stakeholders will redesign the work process to minimize the obstacles [7, 8]. It has been reported that a lack of flexibility in prescriptions of drugs when implementing the MDD system, e.g. a temporary change in dosage, was considered problematic in the MDD system [2]. For most patients, some drugs (such as eye drops and inhalers, as well as drugs taken irregularly) have to be maintained manually in parallel with the multidose dispensed drugs, and for other drugs only manual dispensing is suitable. This is an indication that the MDD system is not adequate by itself, and manual dispensing has to be maintained together with the MDD to ensure medications are dispensed. Thus, additional use of manual dispensing is a way to work around an imperfect MDD system.

Although MDD systems have been called an automation of the medicines management chain, there are manual processes within the chain. The patient's

medication list is recorded several times during the process, and all the manual work causes a risk of errors during the different steps of the process. In addition, there will always be a risk of adverse drug events because of errors in the communications between professionals involved in the MDD, i.e. when patients are transferred between various health care settings [9, 10]. Therefore, automation in the processes for updating information between relevant care providers has been called for [11]. On the other hand, it has been emphasized that automated processes in the handling of drugs may threaten the quality of many (hidden) manual work processes [12].

The patients in primary care are primarily elderly and sick people that move between health care providers. Thus, health care providers outside primary care must also act in accordance with the MDD system. There are few studies that look at how health professionals in secondary care experience the MDD system. However, a published paper concluded that when elderly patients are transferred from hospital to community/primary care, the main risk factor seems to be the MDD, or rather the process for using it [10]. More research is needed to learn how best to handle the MDD patient when moving between different care settings.

### **3 Information transfer**

To ensure safe, efficient and seamless patient care, it is essential to have access to correct information regarding patient medication. Reported in one study, only 61% of patients admitted to an emergency ward had updated medicines lists [13]. Furthermore, errors in medication prescription histories at hospital admissions are found in up to 70% of the lists [14].

#### **3.1 Information and communication technology solutions**

Several information and communication technology solutions aim to reduce these problems. However, introduction of new systems are not entirely unproblematic, as new obstacles and new sources of errors may occur [15-17]. In general it could be sensible to handle information transfer electronically with some caution as it could be assumed that a more structural presentation of information could lead to a false sense of security.

Since early 2013, the system for electronic prescribing has gradually been introduced in Norway, and has later been introduced in Norwegian hospitals. Electronic prescribing for the MDD-system is currently under development. In addition, the national core health record is introduced and gathers selected and important information about the patients' health, included medications. This is particularly useful during urgent medical assistance.

Electronic messaging (e-messaging) is commonly used for information transfer between different parts of the health care system, e.g. between primary and specialist care, and between primary care and general practitioners. An evaluation of the integration of e-messaging has been conducted, and both desirable and undesirable effects as well as large variations in the routines for using it, have been found [18].

The Central Norwegian Regional Health Authority is currently, in collaboration with the regional municipalities, evaluating the need and possibility for a new, joint electronic patient health record. This ICT solution will provide care providers across different settings with real time patient information.

### **3.2 Quality assurance of information about medicines**

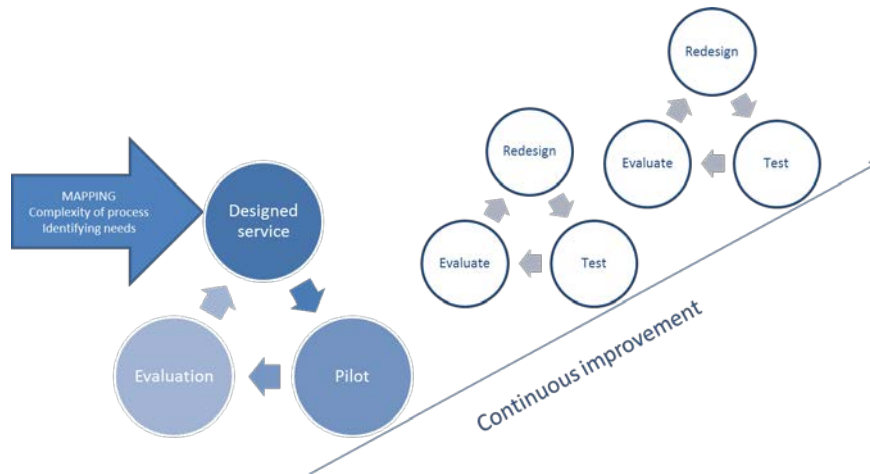
Clinical pharmacist in Norway most commonly use the method of Integrated Medicines Management (IMM) when involved in patient care [19]. The method follows the patient care through three main phases: medication reconciliation at admission, medications review during the stay, and medication reconciliation at discharge [20]. The method is described as systematic and seamless, the latter referring to the exchange of information across different care settings.

During the period 2014-2015 there has been a considerable increase from 11 to 25 clinical pharmacists in hospital wards within the Central Norwegian Regional Health Authority. The clinical pharmacists are integrated in multidisciplinary teams, and are advisors to the responsible doctors. Hopefully this initiative will drive quality improvements in our hospitals as seen in Sweden, where systems supported by clinical pharmacists resulted in a reduction in the frequency of errors when patients were transferred from hospital to primary care [10].

Still, quality assurance may be done by different measures and by different health workers. Thus, it is essential that the responsibility is clearly assigned to ensure a systematic approach. Regardless, to ensure a medication dispensing service that enhances patient safety, it is a prerequisite that the basis for the dispensing is a correct medication list. Together with the dispensed medications, the drug information following the patient at discharge should be good and coherent [21].

## **4 Practical approach for designing a medication dispensing service**

Complex interventions might need complex solutions, and therefore it is of importance that the process leading to a proposed solution for medication supply is carried out in several steps, as depicted in Figure 3: First, a thorough mapping of factors influencing the design of the service will be done. The complexity of the area and the questions needed to be addressed are outlined in further detail in section 4.1 and Table 1. A thorough identification of the needs of the different users, i.e. health care workers in both care settings, the hospital pharmacy and last but not least the patients, form the basis for an initial design of the service. A small pilot study is then conducted with patient discharged from one hospital ward. Finally, the service will be evaluated for further adjustment (redesign) and implementation in more wards, which then again needs to be tested and evaluated in a circle of continuous improvement.



**Figure 3: Stepwise approach and continuous improvement for design and implementation of the medication dispensing service**

A new service must safeguard different considerations for the service to fulfil quite some critical needs, and it can be assumed that “one size fits all” will not apply. Nevertheless, the service must be of such uniformity that predictability is ensured, which in turn will allow the receiving units to plan and restructure how they handle patient flow. Thus, it is of critical importance to collaborate closely with the municipalities when designing the service, to ensure commitment and beneficial outcome for all parties. This collaboration will start by identifying needs through work-shops and interviews with central persons from one or two included municipalities.

The timing of the dispensing in the discharge process should be as late as possible in order to avoid errors in the dispensing caused by changes made at a late stage of the hospital stay. Likewise, the prescription source for the dispensing must be defined. This depends on the location of the dispensing; at the hospital ward or in the hospital pharmacy, and by whom the work is undertaken; by nurses or pharmacists.

As previously pointed out, thorough consideration of the differences between the receiving units in primary care is important. The service may also be differentiated due to patient characteristics (e.g. multidose drug user) and by the different medications used (providing all medication or just the ones changed? etc.). These and other considerations are listed in Table 1.

**Table 1: Needs and impacting factors to be considered in the mapping process**

<b>Setting/Actor</b>	<b>Need</b>	<b>Questions</b>
Hospital	Right timing of the dispensing	<ul style="list-style-type: none"> <li>• How much time is needed to dispense the drugs?</li> <li>• How close to the point of discharge are changes made in the prescribing?</li> </ul>
Pharmacy/Hospital Hospital/Pharmacy/ Municipality	Detailed and accurate prescription information for dispensing and labeling of the dispensed medication  Information transfer to patient and/or primary care providers	<ul style="list-style-type: none"> <li>• What source of information is used for dispensing?</li> <li>• How should the dispensed drug be labelled, controlled and delivered to the ward/patient</li> <li>• How is information about administration given to the patients along with the dispensed drugs? E.g. labeling of the unit dose bags or on a separate information note.</li> <li>• Should the service include a complete updated medicines list along with the drugs?</li> </ul>
Hospital/ Municipality	Categorization of patients included in the service	<ul style="list-style-type: none"> <li>• What kind of service is the patient discharged to?</li> <li>• Does the patient administer the drug him/herself or with assistance from the health care service?</li> <li>• Is the patient a MDD patient or a patient with ordinary prescribing?</li> <li>• Has there been made (major) changes in the medication list during the hospitalization?</li> </ul>
Pharmacy/Hospital/ Municipality	Categorization of medications included in the service	<ul style="list-style-type: none"> <li>• Are the drugs available as unit dose drugs in the hospital?</li> <li>• Medication by formulation (e.g. tablets, eye drops, and inhalers) or</li> <li>• Medication by dosage (only medication taken regularly, or drugs to be used as required, as well)?</li> <li>• Is the cost of the medication (low-high) a factor to take into account</li> </ul>

Table 1 (cont.)

<b>Setting/Actor</b>	<b>Need</b>	<b>Questions</b>
Municipalities	Optimal period of time (days) with dispensed drugs from the hospital before regular dispensing is reestablished	<ul style="list-style-type: none"> <li>• Are there differences in needs in terms of the length of the dispensing period between municipalities, depending on distance to local pharmacy?</li> <li>• Does the need vary depending on type of health service (nursing home, home care services or rehabilitation institution)?</li> <li>• Does the need vary depending on whether the patient is a MDD user or not?</li> </ul>
Hospital/Pharmacy/ Municipality	Clarification of roles and responsibilities	<ul style="list-style-type: none"> <li>• What are the responsibilities and tasks of the different participants in the medicines management chain? These may be the prescribers at the hospital, the nurse at the hospital, discharge coordinator, the clinical pharmacist, the pharmacist at the hospital pharmacy, the patients GP, the nurse in the municipality and others.</li> <li>• What are the jurisdictional frames regulating these responsibilities?</li> </ul>
Hospital/ Municipality/the patients	Addressing the medication costs	<ul style="list-style-type: none"> <li>• In the phase of moving between care settings; who bears the cost of medicines? And for the associated dispensing?</li> </ul>

## 5 Conclusion

Changing between health care settings presents several challenges. Two of the main obstacles with regards to medications have been discussed; information transfer and medication acquiring. To enhance patient safety, a service for medication dispensing for patients in transit between hospital and primary care is being planned. When designing a new service it is important to understand the needs and how the problems are solved within current conditions. Hence, the complexity of the area and all impacting factors will be mapped out and piloted at a small scale before further implementation. The final aim is a service that is beneficial for all involved parties.



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