

Nationally Shared Medication Lists – Describing Systems in the Nordic Countries

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Abstract. This paper provides an overview of shared medication lists (SMLs) in four Nordic countries (Denmark, Finland, Norway and Sweden) with a focus on the type of information the list is based on. This is a structured comparison conducted in stages using an expert group, grey papers, unpublished materials, web pages, as well as scientific papers. Denmark and Finland have implemented their solutions for an SML and Norway and Sweden are working on the implementation of their solution. Denmark and Norway have or are aiming at a list based on medication orders, while Finland and Sweden have lists based on prescriptions.

Keywords. shared medication list, medication, informatics, e-prescription

1. Introduction

Drug-related problems can often be linked to information management issues such as discrepancies between medication lists for the same patient [1-3]. Having an electronically shared medication list (SML) can facilitate safe and efficient medication management and there have been several initiatives to implement such lists [4-6]. Implementing an SML is highly complex, and there is limited knowledge about whether such solutions will have the expected benefits [7]. Four Nordic countries, Denmark, Finland, Norway and Sweden, are all implementing an SML [8-11]. The aim of this paper is to provide an overview of SML solutions in these countries with a focus on what information the list is based on. Increased knowledge about the SML solutions using common terminology can facilitate learning possibilities and future studies comparing effects and identify barriers and facilitators for the implementation of SMLs.

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2. Materials and Method

This structured comparison was conducted in the following stages: (1) Meetings and workshops between authors (i.e. expert group) from all four countries to understand the SML in each country; (2) deciding on questions about the SML through an iterative process to describe similarities and differences between the systems; (3) answering the questions in each country using information from sources such as experts, grey papers, unpublished materials, web pages and scientific papers. The answers were discussed among the researchers and checked with other experts in each country.

3. Results

All four countries have had e-prescribing and electronic storing of prescriptions for many years (Table 1). Denmark and Finland have implemented their solutions for a national SML, and Norway and Sweden are working on the implementation of their solution. The goal of the SML is similar in all countries: having one updated and correct medication list for all patients accessible for all health professionals can reduce the prevalence of medication errors, save time for health care professionals and increase patient safety (8-12). However, the information the SML is based on differs between the countries. The SML in Denmark and Norway is based on medication orders while Finland and Sweden have lists based on prescriptions (Figure 1).

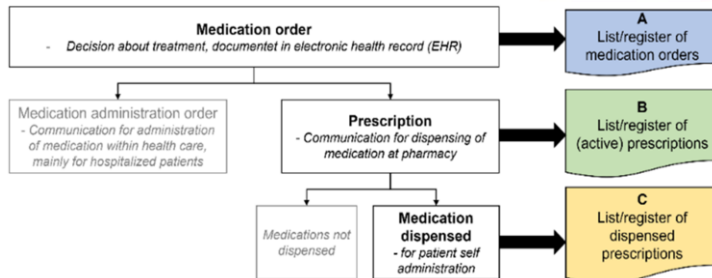


Figure 1. Overview of the different types of medication lists. The SML in Denmark and Norway is based on medication orders (A) but combined with information from active and dispensed prescriptions (B and C). The SML in Finland and Sweden are based on active prescriptions (B) combined with a record of dispensed prescriptions (C). Active/valid prescriptions are the basis for dispensing medications in all countries.

3.1. Shared medication list in Denmark

Denmark uses an electronic prescribing system called *Fælles Medicinkort* (FMK), a nationwide mandatory platform for communicating prescriptions. It is integrated with around 40 local solutions distributed in hospitals, general practices, municipalities, and others, meaning health professionals can see all medicines registered for every citizen directly through their local system (12). Physicians can also add, change and remove prescriptions in the FMK via their local systems or online. When a registration has been made, the medication will subsequently be synchronized with the central FMK. For inpatient care, the FMK is imported when the patient is admitted to the hospital, and the attending physician will manually transfer the hospital medication list to FMK when the patient is discharged (9). The FMK contains a list of all medication orders and prescription medications redeemed at the pharmacy within the last two years [9]. Over-the-counter (OTC) medications and dietary supplements that are not prescribed by a

physician, are not registered in the FMK [9]. Citizens have access to their FMK at www.sundhed.dk or the app "Medicinkortet", but cannot change the content [9]. The FMK was introduced in 2011 after four years of pilot testing. In 2014 it was fully implemented in general practice and hospitals, followed by a stepwise implementation up until 2019, when it was implemented in pharmacies.

3.2. Shared medication list in Finland

Finland has the Kanta services which are nationwide electronic healthcare services for healthcare professionals, community pharmacies, and citizens [13]. Kanta contains a centralized database called the Prescription Centre (ePC), where all issued prescriptions (both active and expired) and dispensing records are stored. The physician's EHR are integrated with the ePC so that all issued e-prescriptions are sent to the ePC [8]. The prescriber can also retrieve the patient's prescriptions from the ePC to view, renew, cancel or make changes to them. Pharmacy data systems search for prescriptions in the ePC, and the pharmacists can dispense them, request prescription renewal, and cancel and make corrections in some situations. Citizens have access to their prescriptions through the portal My Kanta [13]. The ePC has been introduced stepwise since 2010, and since 2017 it has been obligatory for all healthcare providers to use [13]. Even though all prescriptions are stored in the ePC, the information may not be up to date, e.g., the ePC may include prescriptions for medicines that the patient no longer takes or prescriptions that has undergone modifications, but where the changes have not been entered into the ePC. Therefore, Finland will introduce a national up-to-date Kanta medication list by the end of 2025 [8], including information on dose adjustments and discontinuations of medication. During 2027–2030 the Kanta medication list will also cover e.g. hospital medication and OTC medicines.

3.3. Shared medication list in Norway

Norway has the Prescription Intermediary, a database accessible to all prescribers and pharmacies in the country. The Prescription Intermediary contains all active prescriptions, but does not necessarily give a complete overview of the prescribed medications of a patient. For example, when a prescription expires (after 1 year) it will no longer be visible in this list, or it might contain outdated prescriptions if physicians do not cancel old prescriptions appropriately. Since 2012 a shared medication list, *pasientens legemiddelliste* (PLL) transmitted via the Prescription Intermediary has been planned. The current version of the PLL is only an overview of the current treatment and is not legally a prescription that can be used to dispense medicines, meaning that there must be e-prescriptions for each item on the PLL in addition to the PLL [11]. Other health care professionals can view, but not edit, the PLL in a portal called the Summary Care Record. Citizens have access to see their PLL through the national portal Helsenorge.no. The PLL system has been pilot tested on patients in home care receiving multidose drug dispensing in 2014 and 2018. Testing of PLL on patients with ordinary prescriptions started in 2021, and a nationwide implementation is planned to start in 2024 [11].

3.4. Shared medication list in Sweden

In Sweden e-prescriptions have been stored electronically in the National prescription repository (NPR) since 2005. Information about valid prescriptions in NPR has been available for pharmacists and patients, but not prescribers, resulting in prescribers

lacking information about prescriptions from other healthcare providers. With a new law in May 2021, the NRP was replaced by an SML called Nationella läkemedelslistan (NLL). The NLL includes valid prescriptions and information about dispensed prescriptions, and health care professionals are now allowed access [10]. The NLL is not yet integrated with healthcare EHR, but all prescriptions are transferred to NLL. The prescriber can use a web-based application called “Förskrivningskollen” to view NLL, prescribe and make changes to prescriptions [10]. However, any change must also be documented in the local EHR. All medication orders should be handled in the EHR, but only changes resulting in new prescriptions are transferred (i.e., not all instances of changed doses or termination of treatment), which can cause discrepancies between the prescriptions in the NLL and the medications the patients should take [1].

Table 1. Summary of the shared medication lists (SML) in Denmark, Finland, Norway and Sweden

Question	Denmark	Finland	Norway	Sweden
E-prescriptions	≥99%	≥99%	≥97%	≥99%
Electronic storing of prescriptions?	Since 2006	Since 2010	Since 2013	Since 2005
Name of the SML	Fælles medicinkort (FMK)	Prescription Service (ePS)	Patientens legemiddelliste (PLL)	Nationella läkemedelslistan (NLL)
Type of information in SML(based on Figure 1)?	A, B and C	B and C	A and B	B and C
When the SML was/will be implemented?	In stages since 2014	In stages from 2010.	Pilot testing since 2021	In stages since 2021.
Can the SML be seen directly in EHR?	Yes	Yes	Yes*	No, not yet***
Are medication changes in the EHR automatically changed in the SML?	Yes	No	Yes*	No ***
Mandatory and available in all sectors and regions?	Yes	Yes	Yes**	Yes ***
Access for citizens?	Yes	Yes	Yes	Yes
Can patients edit the SML?	No	No	No	No
Can the SML be used to administer medications for hospitalized patients?	No	No	No	No

EHR: electronic health record. *only for those piloting the system as the system is not yet fully implemented.

Currently only available in one health region. *the SML is planned to be integrated with the EHR and be mandatory to use, but details about functionality after integration are not clear

The preliminary date for when all systems should finish the integration with the NLL is December 2025. However, it has not been clearly defined how NLL should be integrated with EHR and what fully implemented means. Citizens can access NLL using the web portal “Läkemedelskollen” or the patient portal 1177 “Journalen på nätet”. Because NLL is based on prescriptions and the responsibility for ensuring the information is correct is not clearly defined, it is not intended to be used as a medication list for patients [10].

4. Discussion and Conclusion

Denmark, Finland, Norway and Sweden, are all in different stages of implementing SML systems, the systems are similar but there are also some differences. SML systems has potential to increase access to information and reducing discrepancies between lists, however, the information in the SMLs is still not always up to date (4-6). One reason for

discrepancies is that clinicians do not always update the SML appropriately (3). This can be linked to the integration with EHRs not supporting appropriate working routines due to legal or technical aspects or be related to human factors. Implementing SML systems raises the discussion about responsibility for updating the medication (12). If clinicians do not review the entire medication treatment or are reluctant to delete prescriptions by other physicians this might decrease medication safety (1, 4). In all four countries, citizens can view their SML, but not modify the list or give feedback to prescribers on the actual use of medications. Increased patient involvement will be necessary for having one accurate and complete medication list (2). In this paper, we describe four different solutions which are all referred to as a national SML, and in the literature, other kinds of solutions for a shared medication list are described with different words (7). Using a common terminology to describe the SMLs internationally will ease the comparison of the effects of such systems in the future. Future studies should further develop a thesaurus in this field, explore how new advanced technology could contribute, and investigate the patient perspective and possible privacy issues. All the Nordic countries have an SML solution, but none gives complete, up-to-date information about the medication use during hospital stays. Though citizens have access to view their SML in all countries, none has solutions where the citizens can take an active part, edit or stating their adherence in the SML. Although SMLs do seem to increase access to information about patient's prescribed medications and have the potential to reduce discrepancies, the knowledge about any effects of such system is still limited.

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