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The Everyday Hassles of Managing Medication Changes in Long-Term Care: A Nursing Perspective on Data Fragmentation and Delayed Recording

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Abstract. Nursing homes, home care, and other institutions for long-term care (LTC) manage many frail and elderly citizens' medication. If changes to their medication are not handled meticulously, these patients' health may suffer. This study investigates the everyday work involved in managing medication changes for LTC patients. Because nurses are pivotal to medication management in LTC, the study adopts a nursing perspective. Empirically, the study is based on interviews with LTC nurses in Norway. We find that the management of medication changes is cumbersome for the nurses because of data fragmentation across multiple systems and delays in the recording of new prescriptions. The data fragmentation and delayed recording result from poor system integration and lax documentation practices. To keep the infrastructure for medication management in working order, the nurses assume an intermediary role, in which they coordinate that changes to medication happen as prescribed.

Introduction

Frail and elderly citizens who can no longer live unassisted are dependent on long-term care (LTC), such as nursing homes, home care, and support from relatives (Becker and Reinhard, 2018; Harris-Kojetin et al., 2019; Lum, 2012). With the world's aging population, LTC has become an extensive task in present-

day healthcare (WHO, 2015). A safety-critical part of this task is the management of LTC patients' medication (Swanson et al., 2023). Poor management can lead to serious health consequences. In nursing homes and home-care services, nurses are pivotal to medication management. They are at the center of an interorganizational infrastructure that includes physicians who prescribe the medication, pharmacists who deliver it, and the nurses who dispense it, administer it, and bind the process together. The work involved in binding the process together is particularly prominent when a patient's medication changes. This study investigates *the everyday work nurses do to manage changes to LTC patients' medication*.

Medication management in home care (Dionisi et al., 2021; Norlyk et al., 2020), nursing homes (Alftberg, 2022; Olsson et al., 2013), and LTC in general (Kruse et al., 2021; Qian et al., 2019) is a demanding task performed under conditions that challenge orderly procedures. Recurrent challenges include the lack of time to act safely (Bengtsson et al., 2021; Ellis et al., 2012), the fragmented coordination of care (Daliri et al., 2019; Tariq et al., 2013), and the struggle to access needed information in complex information infrastructures (Bielsten et al., 2022; Sarzynski et al., 2019). In spite of the challenges, nurses in LTC have a key role in preventing medication errors (Karttunen et al., 2020; Kollerup et al., 2018). This role often involves that they act as 'vigilant intermediaries' who continuously follow up on the work of others and mediate among them (Johansson-Pajala et al., 2016). As intermediaries, they contact hospitals about newly discharged patients' medication (Kollerup et al., 2018), instruct assistant nurses about medication changes (Bielsten et al., 2022), phone general practitioners (GPs) for medical assessments (Norlyk et al., 2020), obtain current medication lists from pharmacies (Qian et al., 2019), and negotiate with patients who resist their medication (Alftberg, 2022). To be available to others, all these interactions must be documented in the electronic health record (EHR) of the LTC institution. However, the documentation is often incomplete (Hertzum, 2021), thereby triggering further intermediary work.

The infrastructure for medication management spans people, processes, systems, and data in multiple organizations. For example, the organizations in the studied Norwegian setting each have their own EHR. These multiple EHRs favor intraorganizational coordination over interorganizational coordination and, thereby, increase the complexity of the combined infrastructure for medication management (Hertzum and Ellingsen, 2023). In recognition of the importance of interorganizational coordination to patient health, Norway adopted the strategy 'one citizen – one record' in 2012 (Norwegian Directorate of eHealth, 2018). This strategy announced the goal of establishing a nationwide EHR that spans hospitals (which currently use EHRs from DIPS and EPIC), LTC institutions (which currently use DIPS FRONT, GERICA, and PROFIL), and GPs (which currently use CGM, INFODOC, PRIDOK, SYSTEM X, and others).

Method

This study is based on interviews with six nurses in LTC institutions in a municipality in Norway. We chose this study setting because it represents how LTC is done in a country with an advanced healthcare system, but we acknowledge that more interviews would have strengthened the study. The interviewed nurses (four female, two male) were recruited through our network and orally consented to take part in the study. They worked in home care (Nurse#1, Nurse#2) and nursing homes (Nurse#3, Nurse#4, Nurse#5, Nurse#6). In Norway, LTC is a municipal responsibility. Thus, the interviewees were employed by the municipality, located in the northern part of Norway. However, they worked in different home-care districts and nursing homes. Each interview lasted about an hour and followed a semi-structured interview guide with questions that revolved around the process of medication management and the electronic systems used for documenting medication and care. All interviews were conducted online, audio-recorded, and transcribed in full.

The analysis of the interviews followed an interpretive approach (Walsham, 2006). We considered the studied phenomenon – medication management – from the interviewed nurses' perspective. Initially, we read the interview transcripts to become sensitized to their content. The analysis proceeded by annotating the transcripts with codes generated through qualitative meaning condensation (Kvale and Brinkmann, 2009). The codes condensated the meaning of long interviewee statements into short phrases that were extracted and grouped. This way, themes emerged in an inductive manner. The focus on managing changes to patients' medication emerged early and gradually became the overarching theme. The other themes concerned different parts of the information flow involved in managing medication changes. These other themes were organized into four subthemes: prescription, discharge, ordering, and dispensing and administering.

Results

The management of medication changes in LTC in Norway involves many electronic systems and manual processes. Figure 1 gives an up-front overview.

Prescription

At the nursing homes, a supervising physician regularly assesses the patients' medication in collaboration with the nurses. The supervising physician works at each nursing home one day a week and is, thus, dependent on information from the nurses, who have daily contact with the patients. It is the physician's responsibility to record any change to the patients' medication in the nursing-home EHR. However, medication changes are sometimes prescribed by the

physician but recorded by a nurse. On these occasions, a second nurse must verify the recording in the EHR:

> We [i.e., the nurses] enter the patients' medication in the EHR. We must be two, so one can verify the entry. It is not always the right information, though, because we sometimes get an out-of-date list from the physician. (Nurse#2)

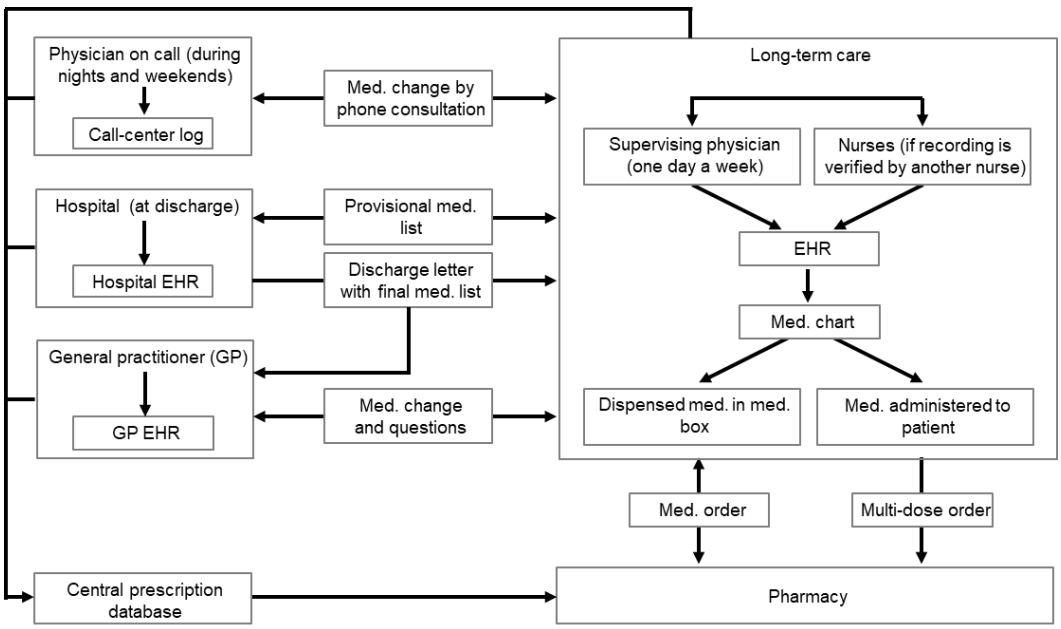

Figure 1. A nursing perspective on managing medication (med.) changes in Norwegian long-term care. The figure shows the information flow for prescription (top and left), discharge (middle left), ordering (bottom right), and dispensing and administering (middle right).

The option that nurses can record the prescriptions in the EHR provides increased flexibility on the days when the supervising physician is not at the nursing home. However, it also adds to the nurses' work, especially because the physician sometimes forwards medication lists for recording without first ensuring that they are up to date. For patients with multiple medications, it may be difficult to create a complete and up-to-date list. When the nurses later receive the right version of the list, they must reenter and reverify the medication information. In addition to these changes, medication changes for LTC patients can have several other origins, each with its distinct information flow (Figure 1).

When a patient's condition deteriorates during the night or weekend, then the nurses consult the physician on call rather than the supervising physician. The physician on call is a call center that serves the general population, including LTC institutions. On the basis of a phone consultation, this physician can change a patient's medication. However, the physician on call records the consultation in the call-center log, which is unconnected to the nursing-home EHR, and in the

central prescription database, which makes the prescription available to pharmacies. The nurses must manually enter the prescription in their EHR, along with an indication that it is made by the physician on call. This process is cumbersome and potentially error-prone:

> When the physician on call has prescribed a medication and treatment, then I must repeat this information and document it. I find that somewhat demanding - are we certain it is done right? I would prefer that the physician on call had access [to our EHR] and could look up my patient and write the documentation after the phone consultation. (Nurse#5)

Home-care patients' medication is changed by their GP. The GPs record the change in their EHR, send an electronic message to the home-care service about the change, and update the patient's prescriptions in the central prescription database, thereby making the change available to the pharmacy. Because the GPs' EHR is unconnected to the home-care EHR, the home-care nurses must manually update their EHR and order the new medication from the pharmacy. When they visit their patients, the nurses bring a tablet to have access to their work list and information about the patients' medication. However, insufficient network access often precludes the use of the tablet ('*You can go 2-3 days without being able to access the work lists on the iPad*', Nurse#2). Therefore, paper notes are needed. The paper notes must be made in advance without knowing whether they will be needed or the tablet will be online:

> We must make paper copies of many things in the event of network outages. We keep a card with the most important person information and an updated medication list. (Nurse#6)

Discharge

LTC patients' medication can also change when they are discharged from hospital. Upon discharge, patients receive a paper copy of their medication list. This paper copy is also used by LTC nurses, who cannot access the hospital EHR, which contains the electronic version of the medication list. If the LTC nurses have questions about the medication, they cannot contact the hospital department through the secure messaging system for communication among healthcare institutions. It allows for contacting the hospital only, not a specific department:

> We cannot send a message to a specific department at the hospital. We can only send a message to the hospital, period. For example, we cannot ask a question directly to gastro surgery. This means that when we have questions about something they have written, then we need to phone and those who pick up will often not know the patient. So that is cumbersome. (Nurse#1)

The restriction that messages cannot be sent to specific hospital departments means that the nurses cannot reply to received messages in a convenient manner because a reply goes to the hospital, not to the person or department that sent the initial message. In addition, the paper copy of the medication list is merely provisional because the hospital, for in-house reasons, often does not finalize the checking of the patient's medication until after discharge. The final medication

list is included in the discharge letter, which typically arrives a couple of days after the patient has been discharged. Because it is instantly available, the paper copy is much used despite its provisional status. Without the paper copy, the changed prescriptions would not take effect until the discharge letter arrived. Thus, the nurses update their EHR on the basis of the paper copy and use it for ordering the patient's medication from the pharmacy. This preemptive use of the paper copy accelerates the transfer to the new medication but creates additional work. When the discharge letter arrives, the nurses must compare the final medication list with the provisional paper copy and, if they differ, change the EHR and the pharmacy order. Furthermore, the nurses reconcile the final medication list by comparing it with the patient's medication list from before the hospital admission. It is not uncommon that some medication has disappeared from the list and must be discussed with the supervising physician:

> We often find that some medication has been stopped by the hospital, without providing a reason. Then we need to go back and check: Should the medication be discontinued, or has it merely been paused [for the duration of the hospital admission]? We see that on a number of occasions. (Nurse#4)

When LTC patients are discharged from hospital back to home care, then the nurses initiate a loop of phone calls and mail messages to communicate medication changes to the GP and pharmacy ('*We continuously go via the GP, then GP to pharmacy, and then pharmacy to us*', Nurse#1). With this loop, the nurses aim to ensure that the GP has issued a prescription for the new medication when the nurses order it from the pharmacy.

Ordering

Medication is delivered from local pharmacies, so all medication changes require communication with a pharmacy. However, the nurses cannot order medication directly from their EHR because it does not have an interface to the pharmacy. Instead, the nurses go through multiple manual steps ('*It is terribly cumbersome because there are so many steps*', Nurse#6). These steps include that the nurses type the EHR information into an email to the pharmacy. Then the pharmacy manually checks that the ordered medication corresponds to a prescription in the central prescription database. This check ensures that patients do not get medication unless it has been prescribed by a physician, but it also means that delayed recording of new prescriptions prevents the delivery of new medication:

> When the prescription has not yet arrived, then we must wait because the pharmacy cannot deliver to us until they have received the prescription. They may not receive it until the day after. Then we must often go to the pharmacy to collect the medication because they only deliver to us two days a week. As a result, the patient may not get the medication until one or two days after they were supposed to start. This happens several times a month. (Nurse#2)

Because delayed recording is common, the nurses often phone the pharmacy to inform them that a prescription is underway and ask them to prepare the

medication for delivery. If the pharmacy agrees to do so, the medication can be delivered as soon as the prescription arrives, thereby shortening the period until the patient gets the new medication. Delays in the recording of new prescriptions are especially pronounced when patients are discharged from hospital because the patient's prescriptions in the central prescription database are updated on the basis of the final medication list, not the provisional paper copy.

Home-care nurses often consult a patient's GP to discuss deteriorations in the patient's health. The GP may ask the nurse to perform specified examinations and, depending on the results, prescribe new medication. It is then the nurses' responsibility to order the medication from the pharmacy and bring it to the patient. This seemingly simple task can evolve into a series of phone calls:

> The GP may inform me that a patient has a urinary tract infection and needs antibiotics. Then I order antibiotics from the pharmacy, but they phone me back because the patient does not have a prescription for antibiotics. Then I must phone the GP clinic to remind the GP to write a prescription or have a secretary at the GP clinic remind the GP for me. Then I phone the pharmacy again to inform them that the GP promises to write the prescription later in the day. I also ask the pharmacist to prepare the medication and be alert to whether the prescription arrives. Otherwise, the pharmacists will not repeatedly check whether a prescription arrives for this patient. If it does not arrive, they usually call me back. (Nurse#2)

For patients who need multiple medications several times a day, the pharmacies offer to deliver the medication in multi-dose bags, that is, to package the patient's daily morning, evening, and night medication in separate bags each containing the tablets to be taken at that point in time. Requests for medication to be delivered in multi-dose bags are handled separately and involve a paper form. So, when these patients' medication changes, the nurses must send another email to the pharmacy to specify the change in the contents of the multi-dose bags:

> In addition, you must fill in a change request for the multi-dose packaging on a paper form from the pharmacy. Then you scan the paper form and send it to the pharmacy. (Nurse#3)

Dispensing and administration

When a patient's medication has been changed in the nursing-home EHR or home-care EHR, then an updated medication card is printed. While all prescription changes are recorded in the EHR, the nurses access the medication card for information about a patient's current medication. On the basis of the information on the card, the nurses dispense seven days of medication into a dosage box with labelled compartments for each day's morning, evening, and night medication. When a new medication card is printed because the patient's medication has changed, then the nurse must also go through the contents of the dosage box to add the new medication and remove discontinued medication. Until new multi-dose bags are delivered from the pharmacy, this process includes opening and changing the content of previously delivered multi-dose bags.

Every change in a patient's medication causes considerable work for the nurses. This work is particularly frustrating when the change has been tried before but a physician remains unaware of the previous failed attempt and tries the same change again – with the same result. Such repeated mistakes are not uncommon. To avoid them and in general improve the information flow, several of the interviewees propose the introduction of a common EHR, or at least a shared medication list, across all institutions involved in treating LTC patients (e.g., '*I would be so happy if we had a shared electronic medication list*', Nurse#4).

Discussion

We discuss the reasons why LTC nurses experience the management of patients' medication as cumbersome and the possibilities for improving the infrastructure for medication management.

Everyday hassles

A lot of manual work, performed by nurses, is necessary for the medication-management infrastructure to function. This overarching finding accords with previous studies, which report that LTC nurses have an intermediary role in which they not only dispense and administer medication but also serve as controllers, coordinators, executers, facilitators, initiators, messengers, sparring partners, and supervisors (Johansson-Pajala et al., 2016; Norlyk et al., 2020; Olsson et al., 2013). In this intermediary role, LTC nurses assume expanded responsibilities that inevitably involve hassle because the nurses intentionally attend to the aspects of the medication-management infrastructure that are in disarray. To compensate for infrastructural deficits, they perform tasks that are poorly supported by current systems, left unfinished by other healthcare providers, or otherwise necessary to bind medication management together. That is, they attend to the tasks that do not run smoothly. While this work is cumbersome, it is a key contribution to keeping things in working order (Bielsten et al., 2022; Johansson-Pajala et al., 2016). The present study complements previous studies of LTC nurses' intermediary role by emphasizing the role aspects that involve relaying information among healthcare providers. These aspects are pervasive and experienced as cumbersome by the interviewed nurses, for two primary reasons:

First, *data fragmentation creates a continual need for bridging across multiple EHRs as well as across electronic, paper, and oral information*. While many components in the infrastructure for medication management are electronic, they are poorly integrated. Most notably, the EHRs used by LTC institutions, hospitals, and GPs are not electronically connected. Consequently, the nurses repeatedly type medication lists that already exist electronically into their EHR,

they message the hospital but cannot message specific hospital departments, they compare versions of a patient's medication list to identify any differences, they phone other healthcare providers to obtain information missing in electronic and paper records, they print medication lists from the EHR whenever a patient's medication changes, they copy EHR information into emails to the pharmacy, they fill in and scan paper forms for requesting changes in multi-dose packages, and so forth. This bridging work is prone to errors and must be performed diligently to avoid adverse drug events and fragmented care (Daliri et al., 2019; Tariq et al., 2013). The risk of errors increases with more degrees of separation among the involved healthcare providers, such as separation in professional background, healthcare sector, physical location, and proximity to the patient (Hertzum, 2010). For example, the interviewed nurses worry that their phone conversations with the physician on call may lead to inaccurate EHR entries.

Second, *delayed recording creates a continual need for repairing lax documentation practices*. The management of LTC patients' medication is a boundary-crossing activity. Any within-boundary process is merely a component in the combined infrastructure for medication management. Nevertheless, GPs often postpone the documentation of new prescriptions, and hospital physicians discharge patients without first finalizing their medication list. While there may be good within-boundary reasons for these practices, they have undesirable interorganizational consequences. LTC nurses face these consequences and need to repair the delayed recording to transfer patients to their new medication on time. Though the nurses spend considerable time phoning GPs, hospitals, and pharmacies to expedite the process, it is not uncommon that patients do not get a new medication until one or two days after they were supposed to start getting it. This is frustrating for the nurses, who assume expanded responsibilities to compensate for interorganizational deficits (Johansson-Pajala et al., 2016). From a nursing perspective, the delayed recording is caused by lax documentation practices among physicians. The frustrations are aggravated by the hassle these practices generate for the nurses. For example, repeated phone calls may be needed because people are unavailable (Tariq et al., 2013), but these phone calls are difficult to fit into the nurses' tight schedule (Norlyk et al., 2020).

Possibilities for improvement

The hassles identified in this study resemble those reported in previous studies, thereby strengthening the need for improvement. This study shows that changes to LTC patients' medication mean that their EHR data are often inaccurate, at least temporarily. To combat this problem, a shared medication list is underway in Norway (Hertzum and Ellingsen, 2023). It will contribute to realizing the 'one citizen – one record' strategy by making all citizens' full medication list available across healthcare institutions. While the interviewed nurses desire a shared

medication list, it is important to note that shared does not equal accurate. A shared medication list will not do away with delayed recording, provisional paper copies, and similar sources of inaccuracy. It will, however, relieve LTC nurses of some of the manual copying of information from one system to another.

The work of bridging across systems is not simply redundant; it also introduces occasions for checking the accuracy of the medication information. These repeated quality checks are part of the nurses' intermediary role and important to the discovery and correction of errors. The value of some amount of redundancy to quality checking is well-recognized (Cabitza et al., 2019; MacMillan et al., 2016). Removing this redundancy might appear more efficient but in effect make the intermediary role less effective by removing occasions for quality checking. However, the nurses are more concerned about the time they spend on redundant work and the risk of it introducing errors rather than leading to their correction.

The value of interprofessional collaboration is recognized in LTC (Alpay et al., 2023; Squires et al., 2020) and, more generally, in research on boundary spanning (Levina and Vaast, 2005) but requires a shift from intra- toward interorganizational work. This shift accentuates that LTC spans current boundaries, which constitute separations that complicate communication and information exchange. The complications include professional vocabularies that impede interprofessional communication and proximity issues that make within-boundary issues more readily visible. In addition, the technological infrastructure for medication management assigns primacy to intraorganizational collaboration and treats interorganizational collaboration as an add-on. While the complications present many areas for improvement, they are not easily solved.

The simplest way to support the nurses' intermediary role may be improved means of communication. For example, the system for secure messaging among healthcare institutions could be improved by enabling the nurses to contact specific hospital departments. Furthermore, other Norwegian municipalities have a chat-like system for LTC nurses to communicate with GPs in a quick manner rather than struggle to catch them on the phone. The GPs are, however, concerned that this system overburdens them with minor questions (Ellingsen et al., 2022), thereby illustrating the frictions between the GPs' mainly intraorganizational perspective and the LTC nurses' interorganizational perspective.

Conclusion

The management of changes to LTC patients' medication is cumbersome for LTC nurses because of data fragmentation across multiple EHRs and delays in the recording of new prescriptions. To compensate for the fragmentation and delays, the nurses assume an intermediary role, in which they coordinate across GPs, hospitals, pharmacies, and patients. This role is demanding, important, and deserving of improved support.

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