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## Improving post-hospital medication management in a Danish municipality

*A process evaluation*

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## **Abstract**

**Aims and objectives:** This study evaluates an intervention developed to improve patient safety in post-hospital medication management carried out by visiting nurses working in a municipality in Denmark. The intervention consisted of three elements: an initial interdisciplinary home visit by nurses, two subsequent scheduled visits, and the use of an organising tool.

**Background:** As a consequence of specialised treatment plans and new treatment possibilities, patients with complex care needs can now be discharged from hospital more rapidly – and in greater numbers – than previously. Medication management is identified as the most challenging component of a discharge from the hospital to the home, in which discrepancies have been found in up to 94% of medication lists.

**Design:** A process evaluation inspired by the UK Medical Research Council's guidance.

**Methods:** The process evaluation was conducted for three months in a visiting nurses department. Data consisted of visiting nurses' self-reports of performance of the intervention and group interviews (n=4) with visiting nurses (n=14). Self-reports were analysed to evaluate implementation performance and elaborated with interview data to illuminate mechanisms of impact and contextual factors.

**Results:** The implementation of the intervention highlighted the importance of the nurse-patient relationship, nursing assessment and logistics, and professional values in post-hospital medication management. Complex care needs were a mediator in the high implementation rate, which involved 31 out of the 38 patients in the target group.

**Conclusion:** For patients with complex care needs, post-hospital medication management may be improved by a reconsideration of the activity-based funding of home healthcare, a recognition of the importance of organising work and a critical consideration of standard systems.

**Relevance to clinical practice:** An increase in the number of patients with complex care needs in home healthcare is an international issue that affects many healthcare systems. This paper points at contextual challenges and possible methods for facilitating the future development of post-hospital care for these patients.

**Keywords:** Home Visits, Medication Management, Nursing, Nursing Assessment, Nursing Home Care, Clinical Judgement, Evaluation Research

**Impact statement: What does this paper contribute to the wider global clinical community?**

- This paper provides in-depth knowledge about the influence of contextual issues on post-hospital medication management by visiting nurses in a Scandinavian context.

- This paper offers an example of the systematic application of behaviour change theory in the planning of an intervention.
- This paper adds to existing knowledge about the application of the UK Medical Research Council's framework for process evaluations of complex interventions.

## **Introduction**

Medication management in patients' homes after hospital discharge is a complex intervention that involves several actors and processes (Setter, FAU, & Neumiller, 2012). Descriptive studies have outlined the types and extent of the problems (Corbett et al., 2010; Runganga, Peel, & Hubbard, 2014), but few intervention studies have tested possible interventions in different healthcare contexts (Costa, Poe, & Lee, 2011; Setter et al., 2009). Local development of interventions and detailed description of the context and intervention may enhance acceptability and feasibility of interventions and enable adjustments to other healthcare settings (Medical Research Council, 2008). This study is based on previous research that has explored visiting nurses' post-hospital medication management and the development of interventions (Kollerup, Curtis, & Laursen, 2017a; Kollerup, Curtis, & Laursen, 2017b). The study involved a process evaluation of the implementation of an intervention developed to improve patient safety in post-hospital medication management.

## **Background**

Medication management is the most challenging component in a patient's transition from the hospital to the home. Discrepancies have been found in up to 94% of medication lists after hospital discharge, with an average of three discrepancies per patient (Corbett et al., 2010). Patients with complex care needs are discharged with complex medication regimes because of the explosion in treatment possibilities and increasingly accelerated and specialised hospital treatment plans (Foust et al., 2005; Setter et al., 2009). When the patient requires nursing assistance to manage post-hospital medication, the task is even more complex because of the many actors and processes involved. First, hospital doctors, specialists, and general practitioners prescribe the medications. Second, hospital- and visiting nurses dispense medications. Third, home healthcare professionals in the home perform the daily administration. Patients' and families' roles in these processes vary according to their

resources and values. As a previous study showed, this requires an individualised process of ordering, delivering, storing, monitoring, and adjusting medications in each patient's home (Kollerup et al., 2017b).

Health authorities have addressed these well-known post-hospital medication management problems by outlining rules, regulations and collaboration agreements, and by initiating quality improvement projects (Danish Health Authority, 2011; Danish Patient Safety Organisation, 2014; Ministry of Health, 2015). The research literature includes descriptive studies that have documented the number and types of medication problems (Corbett et al., 2010; Runganga et al., 2014). In addition, intervention studies have documented that visiting nurses' post-hospital home visits can solve medication discrepancies and reduce the number of planned and unplanned physician visits (Costa et al., 2011; Setter et al., 2009).

Because these interventions were not transferable directly to other healthcare settings, an intervention to improve patient safety in post-hospital medication management was developed (Kollerup et al., 2017a). This local development corroborated the UK Medical Research Council's (MRC) guidance in developing and evaluating complex interventions in healthcare (Medical Research Council, 2008), which recommends tailored interventions that provide answers to the questions: what works, for whom, and under which circumstances?

Recently, the UK MRC provided guidance for process evaluation of complex interventions (Moore, 2017). Process evaluation enables examination of the implementation's performance (resources, quantity and quality of the intervention), mechanisms of impact (the way in which intervention activities, and participants' interactions with them, trigger change) and context (the way in which external factors influence the delivery and function of interventions (Moore, 2017).

Context has been shown to be an important factor in the implementation of interventions in healthcare (Damschroder et al., 2009; Kitson, Harvey, & McCormack, 1998). Important contextual elements in implementation are, for example, values, power, and capacity for

change (Damschroder et al., 2009; McCormack et al., 2002). The Behaviour change wheel (BCW) (Michie, Atkins, & West, 2014) is an evidence-based tool used to design interventions tailored to a specific context. Systematic analysis of the context and subsequent application of specific tailored techniques promote professionals' behaviour change (Michie et al., 2014). Because the techniques depend on the context, others will be more suitable in different contexts. Thus, transparent reporting of the context and the implementation techniques applied allow them to be adjusted to other healthcare settings. Similarly, the findings from a process evaluation may guide future studies in adjusting the intervention, the procedure for delivery, and the methods applied (Hallberg & Richards, 2015).

The aim of this study was to perform a process evaluation of the implementation of an intervention developed to improve visiting nurses' post-hospital medication management. In accordance with Moore (Moore, 2017), the term 'implementation' is used for small-scale studies. In this study, a clear description of the intervention (Hoffmann et al., 2014), as well as the mechanisms of impact and important contextual factors revealed in the implementation process are provided. This may enhance the likelihood of adjustment, and subsequent implementation in other healthcare settings, and inform future implementation of interventions to improve patient safety in post-hospital medication management.

## **Methods**

The study was inspired by the UK MRC's guidance for planning, conducting, and analysing process evaluations of complex interventions (Moore, 2017). The study was based on previous studies of visiting nurses' post-hospital medication management and their development of suggestions for interventions (Kollerup et al., 2017a; Kollerup et al., 2017b).

### *Context and Participants*

In Denmark, municipalities are primarily responsible for providing home healthcare, which is tax-financed and free of charge for every citizen with care needs. As such, central government plays a relatively limited role in home healthcare. In typical cases of post-

hospital medication management, nurses visit the patient's home to administer prescribed medications and home healthcare professionals take care of their basic needs.

This study was conducted in one of five districts in a Danish municipality with a total of approximately 200,000 inhabitants. The municipality's healthcare consisted of several departments, including a visiting nurses department and a home healthcare department. In the visiting nurses department, the employees were nurses with an undergraduate higher education (bachelor's degree). In the home health care department, employees were qualified home healthcare professionals who had undergone 2-3 years of vocational training. In this particular municipality, these two departments had separate managers and budgets, as well as different physical locations, and colleagues did not meet on a daily basis. As a consequence, communication between colleagues was primarily via electronic messaging.

In the district under examination, two head nurses and 20 registered nurses worked in teams to perform direct patient care, as well as develop and manage care planning. The visiting nurses collaborated with patients, home care professionals, hospitals and different general practitioners depending on the patient's health condition. Two coordinating nurses received messages from hospitals concerning patients scheduled for discharge, and appointed the visiting nurses. Because of problems in post-hospital medication management experienced by visiting nurses, an intervention was developed to improve patient safety.

#### *The intervention*

The intervention contained three elements: the performance of an inter-disciplinary home visit, performance of two subsequent scheduled visits, and the use of an organising tool. The target group was all patients discharged from the hospital to their own home who required visiting nurses' assistance in medication management.



To perform the interdisciplinary home visit, the visiting nurse met the home healthcare professional in the patient's home within 24 hours of discharge from the hospital. This first visit was intended to include a shared assessment of the patient's needs and agreement about care plans and observations. In addition, the visiting nurse ensured medication reconciliation, ordered and delivered missing medications, and organised the medications in the home. The element of two scheduled visits allowed a second visit during which the nurse dispensed medications and reassessed the patient's needs, to adjust medications and care plans as necessary. The use of an 'organising tool' was intended to facilitate medication administration by uniform storage of medications in the patients' homes. The tool consisted of coloured plastic bags for each medication category: 'medications for dispensing', 'daily, but not dispensed medications', 'medications for use as needed', and 'medications not in use'.

A detailed description of the intervention, inspired by the TIDieR framework recommended for guiding reports of interventions (Hoffmann et al., 2014) is provided in Table 1. The implementation process was promoted through the systematic application of behaviour change theory. For example, an initial analysis of capability, opportunity, and motivation in the visiting nurses department (Michie et al., 2014) revealed that 'reflective motivation' and 'social opportunity' in this department were important aspects to address, and thus guided the choice of techniques. For example, regular morning meetings with visiting nurses, as well as the use of flyers and posters, served as the techniques 'education' and 'environmental restructuring' that supported 'reflective motivation'. Similarly, logs used to self-monitoring served as the technique 'enablement' and supported 'social opportunity' (Michie et al., 2014). Administering complex medication regimes in home healthcare is an international issue. Although this intervention was tailored to a Danish context, the detailed description and systematic application of behaviour change theory should enable similar interventions to be applied to other healthcare settings.

### *Data collection*

Data were collected during the three months of implementation. The visiting nurses self-monitored their performance of the implementation by filling out a log consisting of a number of yes-no questions, such as, ‘Are the medications needed present in the home?’ and ‘Have you performed an interdisciplinary home visit with a home healthcare professional?’. The questions reflected the plan intended for the intervention. ‘Regular feedback’ (Michie et al., 2014) in a weekly newsletter, based on logs continuously collected during the implementation, helped to inform the implementation process and maintain motivation. To enable behaviour change, ‘social support’ (Michie et al., 2014) was provided at regular informal meetings with the nurses and by help filling out logs.

During the last two weeks of the implementation, four group interviews with visiting nurses (n = 14) were conducted. Table 2 shows participants’ demographics and clinical experience. The group interviews (Morgan, 1997) were intended to expand the understanding of visiting nurses’ experiences and perceptions of performing the intervention by applying a funnel strategy that progressed from broader to narrower questions concerning each element in the intervention (Moore, 2017; Morgan, 1997). A broad starting question, such as, ‘What are your experiences in performing joint visit?’ was, dependent on the answers provided, followed by more focused follow-up questions, such as, ‘How was the relationship with the patient affected?’ This funnel strategy provided insight about visiting nurses’ experiences and enabled elaboration of details and examples. All interviews took place in a separate room near the visiting nurses’ offices during the last two weeks of the implementation. The interviews lasted from 55 to 65 minutes and were audio-recorded and transcribed verbatim.

### *Analysis*

Data consisted of visiting nurses’ self-monitored logs (n = 38) of performance of the intervention and 73 pages of audio recordings transcribed from group interviews. The analysis involved evaluation of implementation, mechanisms of impact, and contextual factors (Moore, 2017). Implementation was explored first in a descriptive analysis of the logs concerning whether the intervention was delivered as intended (*fidelity*), whether the target group was reached (*reach*), and whether the patients received the intervention intended (*dose*)

(Moore, 2017). These quantitative process measures were expanded thereafter with qualitative interview data to understand the mechanisms of impact and contextual factors, for example, the way in which the participants' interaction with activities triggered change and depended on the context (Moore, 2017). This analysis provided a deeper and more nuanced understanding of the way in which the intervention functioned on a small scale in this specific context (Moore, 2017). A deductive data analysis with a low level of interpretation was performed (Graneheim, Lindgren, & Lundman, 2017). The categories consisted of 'mechanisms of impact', including mediators and unexpected pathways, as well as 'contextual factors' (Moore, 2017), for each element in the intervention. The analysis ended at the descriptive level, and the categories for each element were presented as the findings (Graneheim et al., 2017).

#### *Ethical considerations*

The study was approved by the Danish Data Protection Agency (journ.nr. 2015-55-0585), and the participating nurses provided informed consent. The nurses' time spent in the study was balanced with patient care duties in collaboration with nurse leaders. By careful clinical judgement, the participants ensured protection of the patients' safety during the implementation. All participants were anonymised in the reporting.

#### **Findings**

The implementation of the intervention highlighted the importance of the nurse-patient-relationship, nursing assessment and logistics, and ethical considerations in post-hospital medication management. One or more of these elements was applicable in 31 out of the 38 cases in the target group. In this section, the implementation of each element is described more closely to illuminate mechanisms of impact and contextual factors.

*'Inter-disciplinary home visit' revealed the importance of the nurse-patient relationship.*

An inter-disciplinary home visit was implemented in 23 out of the 38 cases (*logs*). Exceptions were seen in cases not associated with home healthcare and in visits during the weekends.

Mediators in performing the visit were patients with complex care needs who had difficulties in maintaining or expressing their basic needs, and patients the healthcare professionals knew before hospital admission. A nurse expressed the benefit of knowing the patient in the quote, *'The home healthcare professional knew the patient from before and could immediately spot the care problems.'* In patients with complex care needs and difficulties expressing their basic needs, the nurses perceived that the interdisciplinary visit was a good opportunity to reach agreements with the home healthcare professionals. The agreements could, as one nurse expressed, *'Increase the responsibility, because you have participated'* rather than just *'being foisted'* (*interview 3*). The agreements could concern the way in which to administer medications not dispensed, such as powders, mixtures, or inhalers. Agreements also could concern observations required, for example, the effects of painkillers, laxatives, or diuretics. In these cases, both parties could acquire missing information regarding a patient's habitual and actual condition or the reasons for observations. The interdisciplinary visit demonstrated unity, which a nurse expressed in the quote, *'He was completely confident that we could manage this together'* (*interview 1*). This meant that the interdisciplinary visit made it clear to the patient that municipal healthcare was unified despite the different health professionals involved.

An unexpected pathway was that the interdisciplinary visit was perceived as a potential barrier in establishing a relationship with the patient. For example, patients could be confused by too many persons in the home at the same time: *'A patient with brain damage, she was very confused, inter-disciplinary visit didn't work, it got worse'* (*interview 2*). Several nurses reflected on the demands required to establish a relationship: *'Establishing a relation requires presence and trust'* (*interview 4*), or *'You can only talk to one person at a time'* (*interview 3*). When the patient was not associated with municipal healthcare before hospital admission, a nurse stated that the inter-disciplinary visit might be experienced as *'overwhelming, we just walk in and ask a lot of questions'* (*interview 4*). Another nurse indicated that several professionals in the home might *'Disturb each other in seeing the small signs'* (*interview 2*). Some nurses handled this dilemma by meeting the patient before the

home healthcare professional arrived. This implied that the first relationship was established and the nurse understood the care needs and uncertainties.

A contextual factor important in the implementation of the interdisciplinary visit was whether it was most beneficial on the first or second day after hospital discharge. Several nurses suggested performing the visit the second day after the patient's hospital discharge with the argument: *'When returning from hospital, the patient is tired and confused, it is chaos'* (interview 2). At the same time, they did not expect to prioritise the interdisciplinary visit the second day if there were no instrumental tasks, such as medication management or wound care, to perform. Other contextual factors were the challenges in arriving at the home at a fixed time and performing the joint visit on weekends, as expressed in the quote: *'The home healthcare professional was quickly out of the door again'* (interview 1), which also indicated different expectations of the joint visit.

In summary, the mediators for the interdisciplinary visit were patients with complex care needs that the health professionals knew before hospital admission. An unexpected pathway was a compromised nurse-patient relationship. Contextual factors were preference to instrumental tasks and different expectations of the interdisciplinary visit. Nurses perceived that this visit could establish a common understanding of care activities that were expected to facilitate improved patient safety.

*Two scheduled visits revealed the importance of nursing assessment and logistics.*

A mediator for the two scheduled visits was that the medications needed were unavailable in the home at the first interdisciplinary visit, which occurred in 18 out of the 38 cases (*logs*). This required the nurse to perform a careful medication reconciliation, which was a mediator because it implied reflections that could promote the important nursing assessment, for example: *'If she has started diuretics, we need to observe the blood pressure'* (interview 2) or *'If she is getting laxatives, you need to ask about her elimination functions'* (interview 4). A nurse concluded: *'The medication list tells me a lot about the patient and what to expect and ask about'* (interview 4).

Nurses raised great concerns regarding the workload involved in reconciling prescriptions and the ordering and delivery of medications, which they referred to as 'logistics'. Other mediators for implementation of two scheduled visits were perceptions of relief and pride. Nurses felt relieved because the two scheduled visits were perceived as a recognition and acceptance of the workload involved: *'It made me calm down instead of being frustrated'* (interview 3). The nurses felt proud and talked with joy about sorting things out: *'I could see the prescription of Prednisolone was wrong, it could just have gone on and on'* (interview 4), indicating that the nurse saved the patient from negative consequences by avoiding potential medication errors. The nurses felt compelled to address problems to ensure the patient's safety, as illustrated in the quote: *'We need to make sure, otherwise the patient[s] do not get proper medication'* (interview 2).

An unexpected pathway was that the workload in logistics could overshadow the nurse's assessment of the patient's needs, which a nurse expressed in the quote: *'First day is surviving for all of us'* (interview 2). Another nurse reported, *'Logistics change the focus from the most important: How is the patient doing'* (interview 3), indicating that the first day might be so chaotic that the nurse's assessment of the patient's needs was dismissed. Another unexpected pathway was that two scheduled subsequent visits were unnecessary in half of the cases, because it was possible to dispense the medications during the first visit. This contradicted nurses' initial perception, that *'Two visits are always necessary'* (interview 3), and *'Prescriptions never fit the actual situation'* (interview 1).

Contextual factors, such as IT systems or different professional perspectives in municipal healthcare and hospital healthcare, were raised as causes for the heavy workload. For example, IT systems increased the workload: *'The delivery place has not been updated in the doctor's IT system'* (interview 1); *'Medication orders lay on a computer server and were not delivered to the patient'* (interview 3), or *'The drugstore only deliver[s] the last ordered medications and not those previously prescribed'* (interview 3). All of these factors required the nurse to manage the delivery of the medications needed. Other quotes expressed the way in which different perspectives affected the workload, for example different judgements of the patient's abilities: *'If a respiratory deprived patient claims she can pick up medications on her own'* (interview 3). Many quotes expressed differences in hospital- and municipal

nurses' time-perspectives: *'Digoxin was suspended because of a blood test, but should be given again after discharge'* (interview 1). *'Dementia medications were suspended, because they are not available at this ward'* (interview 2). *'Prednisolone went on continuously instead of in decreasing doses (taper regimen)'* (interview 4); *'Treatment of chronic illnesses is not decided by the specialised hospital ward'* (interview 1). In these cases, continuing to administer the prescriptions from the hospital would harm the patient, and the visiting nurses were urged to contact a medical doctor to discuss a changed prescription. Because they expected the hospital to handle prescriptions, this created frustration with the extra workload involved. However, at the same time, nurses were proud to have worked towards the patient's best interests.

In summary, mediators for two scheduled visits were that the medication needed was unavailable at the first visit, and a feeling of relief. An unexpected pathway was that logistics could delay the important nursing assessment. Contextual factors were different perspectives of hospital and municipal healthcare. The visiting nurses perceived two scheduled visits as a recognition of the workload involved in post-hospital medication management. This sheds light on the important process of comprehensive nursing assessment, in which discrepancies were solved that were expected to improve patient safety.

*'Use of an organising tool' revealed professional values.*

The organising tool was used in 12 of the 38 cases (*logs*). A mediator in using the tool was perceptions of clarity. Sometimes medications were stored chaotically in the home, and in these cases, the organising system was perceived as beneficial: *'With no organising system, when you have to go through maybe 20 medications, and you only need 10, it takes time'* (interview 4). Hence, chaotic storage of medications in the home was also a mediator for using the organising tool, because it could promote clarity. Clarity was explained in the quote: *'It is effective; you grasp that bag, you do not have to search for anything and it is much easier'* (interview 3). Another mediator was that home healthcare professionals performed the daily administration of medications: *'Regularly not dispensed medications are much more visible for the home healthcare professionals'* (interview 3). The clarity and

effectiveness of the organising system thus depended on the number of medications and the home conditions.

An unexpected pathway was that the organising systems in 26 out of 38 of the cases were not perceived to be beneficial. The nurses argued for example, *'I tried the organising system out, but in fact, it got worse'* (interview 2). Sometimes, the organising tool was perceived to compromise clarity, especially in cases in which there were many medications, or where a better system of organisation existed in homes beforehand. Another unexpected pathway was that the organising tool was not applicable for patients who self-administered their medications. In these cases, storing medications in bags made administration more cumbersome. For example, inhalers should be readily accessible rather than stored in a bag. This meant that the patients' functional level also influenced the implementation rate.

A contextual factor was ethical concerns because the context for municipal healthcare was the patient's private home. The visiting nurses raised concerns about the risk of stigmatising patients by using a visible organising tool. In addition, they raised concerns regarding the level of intrusion in the patient's private sphere. This was expressed in the quote: *'We walk into the patients' own domains. If they have an organising system, I do not feel entitled to decide a lot; we must respect their own ideas'* (interview 2), or *'I could lock the medications up, but it is a bit paternalistic'* (interview 3), which was said regarding a couple suffering from dementia. These quotes illustrate considerations of the patients' privacy and autonomy.

In summary, mediators for using the organising tool were patients associated with home healthcare and chaotic storage of medications in the home. An unexpected pathway was that the tool was not applicable in patients who administered their own medications. Contextual factors were ethical considerations in working in the patient's private home. The visiting nurses perceived that clarity in the organisation of medications could improve patient safety, but the system proposed did not apply to all patients.



## Discussion

The process evaluation of the implementation of an intervention in visiting nurses' post-hospital medication management showed that a mediator for implementation was patients with complex care needs associated with both home healthcare and visiting nurses' care. This mediator promoted the implementation of all elements in the intervention: the interdisciplinary visit, two subsequent scheduled visits, and the use of an organising tool. Unexpected pathways were a compromised nurse-patient relationship and issues about harming patient autonomy. Contextual factors were the number of health professionals involved in care, different perspectives in hospital and municipal healthcare, and the patient's private home as the healthcare context. The visiting nurses perceived that health professionals' common understanding of patient needs, the performance of comprehensive nursing assessments, and clarity in the organisation of medications could potentially improve patient safety. In this section, the mechanisms of impact and contextual factors revealed for each element in the intervention are discussed to inform future implementation.

### *The effects of municipal healthcare organisation on the nurse-patient relationship*

A mediator for implementation of the interdisciplinary home visit was patients with complex care needs and difficulties expressing their needs and wishes. This indicates that the current organisation of municipal healthcare does not promote sufficient care for these patients, which may be an important contextual factor. Another mediator was that the health professionals knew the patient before hospital admission. As a consequence, an unexpected pathway was that the interdisciplinary home visit with several health professionals conducted in the home occasionally made it difficult to build a trusting relationship. This corroborates Allen's (2014) claim, that 'knowing the patient' is central to nurses' professional identity. The increasing specialisation and acceleration of treatment plans in the hospital sector necessitates changes in municipal healthcare in order for municipal healthcare services to match patients' needs after being discharged (Allen, 2014). The number of different municipal healthcare professionals in the home depends on contextual factors, such as the healthcare system's organisation. The separate and activity-based funded organisation in this municipality reflects organisational changes to divide purchasers and providers (Vabø, 2012). This organisation is the consequence of healthcare reforms that value accountability and transparency, also known as New Public Management reforms (Vabø, 2012). Because of this

organisation, several health professionals enter the patient's home to perform different tasks. Vabø (2012) explored the way in which these reforms affect the relationship between healthcare professionals and patients and concluded that steps taken to make municipal healthcare more transparent and reliable have made it less sensitive to patients' particular needs. This is particularly crucial in post-hospital care for patients with unstable health conditions and complex care needs. Increasingly, caring for frail patients in their own home is an international issue due to the growing number of older persons with chronic illnesses, together with a greater prevalence of accelerated and specialised hospital treatment plans. Therefore, the issue of development of post-hospital care for patients with complex care needs may be an international concern.

*Invisible work is characteristic of nursing assessment and logistics*

A mediator for two scheduled visits was that the required medications were unavailable at the first visit, which was the case in half of the visits. As such, this element was not new: before the implementation of the intervention, nurses also performed two visits if necessary. The novelty was that two visits were scheduled, and therefore were the expectation from the start. Rather than frustration, two scheduled visits induced a feeling of relief and acceptance, which was a mediator in implementing this element.

Another mediator was the promotion of comprehensive nursing assessment, which nurses perceived could improve patient safety by preventing harm caused by potential medication errors. An unexpected pathway was that logistics could hamper the nursing assessment. The workload related to medication reconciliation and logistics might reflect contextual factors, because changes in the hospital sector affect the workload in municipal healthcare (Allen, 2014), including visiting nurses' post-hospital medication management. While hospitals strive to minimise patients' length of stay, the municipal healthcare sector is responsible for a group of patients with demanding needs (Debesay et al., 2014). The term 'logistics' was used by nurses in this study to describe the workload implied in addressing the disambiguation of prescriptions and organising ordering, delivery, and picking up medications. This may corroborate the term 'organising work' introduced by Allen (2014) in her study of non-clinical elements of frontline nurses' practice. Her purpose was to reveal the work nurses

actually do. She stated that organising work accounts for up to 70% of nursing activity and is perceived as the 'dirty work'. Although Allen studied hospital nurses, the issue of organising work also seems to be important in the municipal healthcare sector. The fact that the nurses perceived the inclusion of two visits as a recognition of the workload implied in post-hospital medication management could indicate a shift from perceiving it as dirty work to acceptance of these duties. Acceptance might be important, because even in the best-designed systems, professionals need to find innovative solutions to resolve deficits and gaps (Kodner & Spreeuwenberg, 2002).

This study showed that the recognition and acceptance of organising work was important in implementation of two scheduled visits. Thus, in financial distribution and care planning, organising work should be recognised as an activity as important as direct patient care. The unfortunate consequences of an activity-based funded and separated municipal healthcare that has been revealed may be of international relevance in the future development of the organisation of home healthcare.

#### *Standard systems may challenge professional values*

A mediator for using the organising tool was that the patient needed home healthcare professionals' assistance in medication management. Clarity was another mediator, and an unexpected pathway was that the organising tool also could reduce clarity if the patient had a better organising system beforehand. The organising tool chosen, which was coloured plastic bags, probably influenced this.

A contextual factor was that the patient's private home was the context of care. This was evident in the visiting nurses' concerns about protecting the patient's autonomy in storing medications. This corroborates values as an important contextual factor for implementation (Damschroder et al., 2009; Rycroft-Malone et al., 2002). Nurses protected the patient's autonomy by avoiding paternalistic behaviour and respecting individual choices in collecting and storing medications, even when it caused extra work to search for medications or wait for

them to be picked up. Respecting patients' privacy and autonomy are well-established ethical values in healthcare (Ministry of Health, 2014; Sygeplejeetisk råd, 2014).

Using the organising tool raised ethical concerns about the level of intrusion in the patients' private home, which is the context of municipal healthcare. In Denmark, health authorities oversee the quality of municipal healthcare according to the level of adherence to rules and regulations (Styrelsen for Patientsikkerhed, 2017). This study showed the need to be creative and find individual solutions to system level problems. Similarly, Kodner & Spreeuwenberg (2002) found that nurses might avoid standard systems, which also was the case in this study, where nurses were reluctant to apply the standard organising tool. The increasing efforts to 'control' the quality of care in municipal healthcare (Styrelsen for Patientsikkerhed, 2017) may pose further challenges in respecting and protecting patients' privacy and autonomy. Thus, flexibility needs to be addressed in future implementations of an organising tool. In addition, full implementation of a standard system may be unreasonable. Instead, a critical consideration of the benefits of strict adherence to standard systems balanced with considerations of the possible effects on patient safety and health professionals' resource use are suggested. The examination of visiting nurses' ethical considerations indicates that despite working in different organisational systems, nurses share common professional values, such as protecting patients' privacy and autonomy.

### **Discussion of Methods**

Applying the MRC's guidelines for process evaluation (Moore, 2017) revealed mechanisms of impact (mediators and unexpected pathways), as well as contextual factors important in implementing the intervention. The acceptability and feasibility of the intervention was expected to be high because it was developed by the participants in the context of implementation in a previous study (Kollerup et al., 2017a). This assumption was based on the framework for complex interventions in health that stress development of interventions tailored to specific contexts. As expected, the fidelity was high. This may have resulted from the use of the log, which allowed the nurses to judge the possibility of applying the elements in each specific situation. Such a judgment is consistent with an evidence-based practice that

entails the act of balancing evidence, experience, patients' preferences, and resources (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996; Stoltz, 2013).

The level of nurses' behaviour change was high, in that at least one element was applied in 31 out of 38 cases. In comparison, levels of behaviour change in implementation studies are 10% on average (Van Achterberg, Schoonhoven, & Grol, 2008). Although this was a small-scale study with close support, the level of behaviour change might also be enhanced by the systematic application of behaviour change theory in planning and conducting the study. The behaviour change wheel was developed to address the question of selecting strategies or behaviour change techniques targeted to specific groups. Implementation studies have demonstrated that the effectiveness of implementation strategies varies (Van Achterberg et al., 2008). However, these studies have not linked specific strategies to specific target groups. Van Achterberg (2008) stated that the choice of strategies that match determinants of the specific innovation, target group, or context is important for the effectiveness of implementation. The behaviour change wheel provides an analytic tool to perform such analyses of the prominent determinants in a specific context and to link these with evidence-based strategies or techniques (Michie et al., 2014). The detailed description of the context and intervention, as well as application of the theory of behaviour change in planning the implementation facilitated possible adjustments to other healthcare settings.

### **Conclusion**

Addressing complex care needs in home health is an international issue that involves an increasing number of patients across different healthcare systems. The central objective of this study was to carry out a process evaluation of an intervention designed to improve post-hospital medication management consisting of three elements: an interdisciplinary home visit, two scheduled visits, and the use of an organising tool. The paper points at contextual challenges and possible methods to facilitate future development of post-hospital care for these patients.

A mediator for implementation was patients with complex care needs associated with both home healthcare and visiting nurses' care. This mediator promoted the implementation of all elements in the intervention. Unexpected pathways were compromised nurse-patient relationship and patient autonomy. Contextual factors important for implementation were the number of health professionals involved in the care, different perspectives in hospital- and municipal healthcare, and the patient's private home as the healthcare context. Overall, the process evaluation highlighted the importance of the nurse-patient-relationship, the importance of nursing assessment and logistics, as well as the importance of ethical considerations in visiting nurses' post-hospital medication management.

These findings indicate that patient safety in post-hospital medication management is affected by the organisation of municipal healthcare and changes in the hospital sector. As a consequence, the practical implications are that post-hospital medication management in patients with complex care needs may be improved by a reconsideration of the activity-based funding of municipal healthcare, a recognition of the importance of organising work and a critical consideration of standard systems.

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Table 1: Detailed description of the elements in the intervention

<u>Element</u>	<u>Interdisciplinary home visit</u>	<u>Two scheduled visits</u>	<u>Use of an organising tool</u>
What	Interdisciplinary visit by a visiting nurse and a home healthcare professional in the patient's home	First day: Nursing assessment of patient's needs. Medication reconciliation, including contact with hospital/general practitioner, ordering and delivering medications.  Second day: Dispensing medications, nursing assessment of patient's needs	Organising medications in the home, separating medications in coloured bags: 'medications not in use,'  'medications to be dispensed,' 'medications for use after need,' and  'daily medications not dispensed'
Why	Enables shared knowledge of the patient's needs to inform care plans, observations, and medication adjustments	Prevents harm attributable to symptoms overlooked or potential medication errors. Enables continuous assessment to inform care plans and observations that allow medication adjustments. Adjusts visiting nurses' expectations of the possibility to dispense medications at the first visit.	Uniform storage of medications in the home and proper administration of daily medications.
Who, How, Where	Coordinating nurse plans the visit. Visiting nurse and home healthcare professional visit all patients discharged from hospital who need visiting nurses' assistance in medication management	Coordinating nurse schedules the visits with the visiting nurses work list. Visiting nurse visits patient's home	Visiting nurse brings coloured plastic bags to the home at the first visit, and organises the storage of medications in the patient's home
When and How much	Within 24 hours after hospital discharge. All patients are included in the study. The visit is scheduled at the time for home healthcare professional's visit.	First visit is performed within 24 hours after hospital discharge. All patients receive first visit	At the first visit in the patient's home within 24 hours after hospital discharge.  All patients discharged from the hospital to the home who need visiting nurses' assistance in medication management
Tailoring/modifications	Mediators: Patients with complex care needs associated with home healthcare. Patients known before hospital admission.  Unexpected pathways: compromised nurse-patient relationship.  Contextual factors: Many health professionals in the home	Mediators: Possibility to promote nursing assessment  Unexpected pathways: Not prioritised if no instrumental tasks.  Contextual factors: Different perspectives in hospital and municipal healthcare, IT systems	Mediators: Patients associated with home healthcare and chaotic storing of medications in the home.  Unexpected pathways: cumbersome for self-administrating patients, risk of compromising patient autonomy.  Contextual factors: Patient's private home as the context of care.
How well	Implemented in two-thirds of the cases.	Dispensing at first visit possible in half of the cases. Second visit performed in half of the cases	Implemented in one-third of the cases

Table 2: Participants in group interviews

<u>Participant</u>	<u>Age</u>	<u>Experience as registered nurse (years)</u>	<u>Experience as visiting nurse (years)</u>	<u>Number of performance of the intervention</u>
Interview 1				
1	62	36	24	5
2	34	7	1	4
3	50	26	23	2
4	50	28	12	1
Interview 2				
1	59	36	16	1
2	53	24	21	0
3	38	1	1,5	1
4	40	7	5	4
5	60	39	18	2
Interview 3				
1	53	6	5	3
2	24	2	1,5	3
Interview 4				
1	27	4	1,5	0
2	40	14	14	1
3	51	27	20	2
Mean	46 (24-62)	18 (1-39)	12 (1-24)	1,5 (0-5)