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A conceptual model for implementing pharmacist services in primary care settings

Exploring a novel healthcare service in a Norwegian Home Care Setting.

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Summary

Background

Global aging is a phenomenon with significant implications for health and social systems. This demographic transformation increases both the number and proportion of multimorbid patients, necessitating more frequent and comprehensive healthcare services. Consequently, primary care providers face an escalating burden of complex issues, including the combination of age-related frailty and polypharmacy.

Pharmacists are recognized as vital contributors to patient-centered care and are increasingly integrated into interprofessional health teams. However, due to the complexity of pharmacist services and the diverse structures of healthcare organizations, effectively translating these interventions across different settings remains challenging.

Aim

This dissertation aimed to develop a conceptual framework to implement pharmacist services in Norwegian primary care settings. The research investigated a novel and local initiative to improve healthcare services within a Norwegian Municipality, the Home Care Pharmacist project.

Methods

Three research projects were conducted to identify determinants of implementation. Paper 1 applied implementation theories and frameworks to conduct a needs assessment in the host setting of the pharmacist services. Data were collected using semi-structured interviews. Paper 2 applied the Normalization Process Theory (NPT) to investigate how collective knowledge and work influence the integration of pharmacists and pharmacist services within an interprofessional team. Data were collected using semi-structured interviews. Paper 3 was a knowledge synthesis, investigating the intervention description of pharmacist-facilitated medication reviews in Nordic primary care settings. The research followed Arksey and O'Malley's framework for scoping studies. Informed by the Active Implementation Framework (AIF), it applied the Template for Intervention Description and Replication (TIDieR) to assess items of intervention reporting of 16 Nordic studies.

Results

Papers 1-2 identified barriers to implementation such as high workload, lack of role clarities, and lack of front-line staff empowerment. These findings have implications for whether the setting will decide to adopt, implement, and sustain pharmacist services. Paper 3 identified the complexity of medication reviews and how they tend to be insufficiently described to be replicated. In most of the included studies, information concerning the pharmacists' competencies, intervention cost, and intervention fidelity was not reported.

Conclusion

The results of Papers 1-3 provide a starting point for developing tailored implementation strategies for the Home Care Pharmacist project. Moreover, the dissertation has developed a conceptual model for advancing pharmacist services in Norwegian primary care settings, suggesting a methodology to assess determinants, develop implementation strategies, and assign change objectives to stakeholders within a healthcare improvement project.

Scientific environment:

The research presented in the three papers included in this dissertation was undertaken at the IPSUM (Identification and Prevention of Suboptimal Use of Medication) research group at the department of Pharmacy, at UiT The Arctic University of Norway.

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List of abbreviations

WHO	World Health Organization
CIHR	Canadian Institutes of Health Research
EMB	Evidence-Based Medicine
GP	General practitioner.
ADE	Adverse Drug Event
MedRev	Medication Review
ADL	Activities of Daily Living
PLCS	Pharmacist-Led Cognitive Services
CFIR	Consolidated Framework for Implementation Research
AIF	Active Implementation Framework
QIF	Quality Implementation Framework
TIDieR	Template for Intervention Description and Replication
NPT	Normalization Process Theory
AIF	Active Implementation Framework
EMBASE	Excerpta Medica Database
CINAHL	Cumulative Index to Nursing and Allied Health
PRISMA	Preferred Reporting Items for Systematic reviews and meta-analysis
PRISMA-ScR	PRISMA Extension for Scoping Reviews
PCNE	Pharmaceutical Care Network Europe

Definitions of Key Concepts

Aging

The increase in numbers and proportion of people who are aged 65 years and over.

Adverse drug-reaction

A response to a drug that is noxious and unintended and that occurs at doses used in humans for prophylaxis, diagnosis or therapy of diseases, or modification of physiological function. (WHO)

Adverse drug-events

Any injury resulting from medical interventions related to a drug. This includes both adverse drug reactions in which no error occurred, and complications resulting from medication errors. (WHO)

Medication error

Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labeling, administration, education, monitoring, and use. [1]

Polypharmacy

The administration of many drugs at the same time or the administration of an excessive number of drugs. (WHO). Even though there is no agreed-upon numeric threshold to define polypharmacy, the term is commonly applied in situations where patients take five or more medications.

The Home Care Pharmacist project

A novel initiative in the Municipality of Tromsø (Norway) aiming to integrate on-site, full-time salaried pharmacists into interprofessional teams in local home care settings.

Innovation

An idea, a technology, or a practice that an organization is using for the first time regardless of the innovation's newness as measured by the lapse of time since its first discovery or use. [2] The term is often used interchangeably with «intervention» which refers to practices designed to improve a specific health problem.

Knowledge translation

A dynamic and iterative process that includes the synthesis, dissemination, exchange, and ethically sound application of knowledge to improve health, provide more effective health services and products, and strengthen the healthcare system. (CIHR)

Adoption

A decision to use an innovation depending on knowledge of an innovation, awareness of an unmet need, and the decision that a certain innovation may meet the perceived need and will be given a trial. [3]

Adopters

Frontline staff working at the operational level of a healthcare organization. Includes first-level leaders.

Implementation

Any deliberately initiated attempt to introduce new patterns of collective actions in health care aiming to normalize these actions in a professional healthcare practice. [4]

Implementation science

The scientific study of methods to promote the systematic uptake of innovations into routine use. [5]

Implementation research

The scientific study of implementation, i.e., the study of how and why innovations work or fail in real-world settings. [6]

Determinants of implementation

A broad class of environmental factors that are considered powerful in their aggregate effects.

Implementation strategies

Specific actions that help ensure that an innovation is effectively integrated into a setting. [7]

Implementation outcomes

The effects of deliberate and purposive actions to implement new treatments, practices, and services. [8]

Context

A set of characteristics and circumstances that consist of active and unique factors within the environment in which change is introduced. [9]

Conceptual model:

A simplified, visual representation of a situation or problem that shows key concepts, relationships, and assumptions involved. [10] Conceptual models are not fixed. They require revisions and expansions to keep up to date.

List of papers:

Paper 1: Bø Karl-Erik, Halvorsen Kjell H., Risør Torsten, Lehnbom Elin C.

Illuminating determinants of implementation of non-dispensing pharmacist services in home care: a qualitative interview study.

Scand. J of Prim. Health Care, Jan. 2023, DOI10.1080/02813432.2023.2164840

Paper 2: Bø Karl-Erik, Halvorsen Kjell H., Le Anna Yen-Ngoc, Lehnbom Elin C.

Barriers and facilitators of pharmacists' integration in a multidisciplinary home care team: a qualitative interview study based on the normalization process theory.

BMC Health Services Research, April 2024, DOI10.1186/s12913-024-11014-y

Paper 3: Bø Karl-Erik, Halvorsen Kjell H., Lehnbom Elin C.

Intervention description of pharmacist-facilitated medication reviews (MR) in Nordic primary care settings: a scoping review.

1 Introduction

1.1 Demographic shifts: life expectancy and population aging

People are living longer. Global life expectancy has improved from 46.5 years in 1950 to 71.7 years in 2022 and is projected to rise to 77.3 by 2050. [11] This remarkable gain in lifespan is recognized to be one of the major achievements of the 20th Century. [12] However, low fertility rates have accelerated a shift towards older ages in the global population.

Population aging is the increase in numbers and proportion of people who are 65 years and over. [13] In 1950, this age group did not exceed 11% in any country. In 2050, it is expected to reach 38%, a transition recognized as a demographic problem with significant implications for medical and social care. [14]

Notwithstanding the last century's advancements in public health and medical treatment, the prevalence of disease in the older population has generally increased over time. [12,15] Furthermore, it has been estimated that more than 60% of the population aged 65 and over have a coexistence of two or more chronic conditions, also known as multimorbidity. [16] Since medical treatment is the most common intervention in healthcare, population aging drives medication-related challenges such as polypharmacy, medication errors, and adverse drug events (ADE). [17-20] Furthermore, the higher prevalence of chronic diseases and multimorbidity increases patient volumes, necessitating more frequent and comprehensive healthcare services. This has serious implications for primary care providers as the first line of care coordination. [21]

1.2 The evolution of pharmacist services

Traditionally, the pharmacist workforce has been dedicated to the compounding, supplying, and dispensing of pharmaceuticals. Their clinical role rarely extended beyond verifying prescriptions for accuracy, ensuring correct dosages, and providing medication counseling. However, the entry of the pharmaceutical's industry mass production of medications allowed pharmacists to become more involved in patient care. [22]

The reorientation of pharmacists from providing pills to patient-centered care followed the pharmaceutical care movement, initiated by Hepler and Strand in the US in the early 1990s. This new paradigm for pharmacy practice was accelerated by an increase in medication errors, compromising patient safety and driving healthcare costs. [23]

1.2.1 Pharmacists in Primary Care Settings

Primary care settings are considered high-risk situations for medication errors. [24] The strategic move of integrating pharmacists in primary care settings has been driven by the progressive shortage of resources (e.g., general practitioners) and increasing patient demands. [25,26] Countries such as the US, Canada, and the UK have been pioneers in this paradigm shift in healthcare, involving pharmacists in medication-optimizing activities in GP practices, and long-term care facilities. This shift represents a broader move towards more comprehensive, patient-centered, and interprofessional care models that emphasize preventive care and chronic disease management.

1.2.2 Clinical pharmacist services

Services provided by pharmacists in settings outside community pharmacies are often referred to as non-dispensing pharmacist interventions. They comprise a range of pharmacist-facilitated activities and services that go beyond the traditional role of dispensing medications. Clinical pharmacist services are recognized as a subset of non-dispensing pharmacist services generally referring to direct patient-centered activities.

1.2.3 Challenges of clinical pharmacist services

1.2.3.1 Clinical pharmacists' competencies

Clinical pharmacists need to have a different skill set compared to pharmacists working in community pharmacies. As pharmacists increasingly enter settings of patient-centered, clinical work it is crucial to ensure they are well-equipped to effectively contribute within interprofessional healthcare teams. [27] This involves not only deepening their knowledge of pharmacology but also expanding their competencies in areas such as communication and personalized medicine. Clinical pharmacists work together with healthcare professionals from various disciplines, sharing responsibilities and decision-making to achieve optimal patient outcomes. In the face of complex clinical cases, they need to be able to assess situations (quickly) and find effective solutions. However, studies on how pharmacists act in these settings show that they tend to give advice that is clerical and technical rather than clinically useful. [28,29] Researchers from Canada have turned their attention toward pharmacists' traits, asking whether these might be the ultimate barrier to taking on new responsibilities. [28,30] Their interest in this topic stems from the realization that, despite growing opportunities, the integration of clinical pharmacist services into new practices has been slow and incomplete.

Even in situations where identified barriers such as time constraints and limited support have been removed, sustained practice change was not achieved. [28]

1.2.3.2 The complexity of clinical pharmacist services

Clinical pharmacist services are versatile, encompassing chronic disease management, patient education, and active management of medications. Pharmacist-facilitated medication reviews (MedRevs) aim to enhance the appropriateness of medications, ultimately benefiting the patient. However, the term 'medication review' is often misleadingly used to imply a standardized, universal procedure. In reality, a MedRev involves multiple interprofessional activities designed to optimize the safety and effectiveness of medication use. [31] The scope and nature of a MedRev can vary significantly, influenced by factors such as access to clinical data, patient involvement, and the specific objectives of the review. [32] Furthermore, the variety of activities making up the content of a MedRev can be conducted by different healthcare professionals, including pharmacists, physicians, and nurses. Data from several studies suggest that MedRev interventions are the most frequently provided services among clinical pharmacists practicing in primary care settings. [33-36] Unfortunately, they are also consistently poorly described, making it impossible to replicate the results as described in outcomes studies. [37-39]

1.2.3.3 Failing to consider the impact of organizational culture

In response to the challenges posed by an aging population, the World Health Organization (WHO) advocates the implementation of MedRevs to address the challenges of inappropriate polypharmacy. [19] However, the WHO highlights that overlooking organizational culture is a primary reason for the unsuccessful adoption and implementation of MedRevs. Similarly, the European Stimulating Innovation Management of Polypharmacy and Adherence in The Elderly (SIMPATHY) consortium has highlighted the importance of assessing organizational culture when implementing medication safety interventions. [40]

1.3 The Norwegian setting

Regarding population aging, Norway faces challenges similar to those of other Western countries. By 2030, the number of people aged 65 and over will surpass the number of children under the age of 19. The number of people aged 70 and over is expected to double by 2060, reaching approximately 1.4 million, making up 23% of the population. [41] As health costs rise, one approach to reducing expenditure has been to downshift care, i.e., moving services from secondary health levels (hospitals) to primary health levels (primary care).

However, these cost-saving efforts tend to increase the work pressure on primary care providers. At the same time, the primary care sector is facing significant challenges due to workforce contraction. [42,43]

1.3.1 Norwegian primary care settings

Norwegian Municipalities are at the lowest level of public administration and are responsible for providing healthcare services such as GPs, nursing homes, and home care nursing. Local governance and democracy influence how healthcare issues are prioritized. However, the national government establishes guidelines for municipal responsibilities through acts and reforms.

1.3.1.1 Homecare services and assisted living facilities

The Norwegian government wishes to increase patient-centered healthcare to enable older adults to live at home as long as possible, regardless of their functioning or health issues. [44] At present, approximately 200.000 Norwegians receive homecare services, typically involving help for activities of daily living (ADL). More than half of these recipients are aged 67 and over and medicines management is an important aspect of their ADL. [45]

Homecare services are most commonly provided to patients in assisted living facilities. [46] Residents in these settings typically live in apartments or rooms with an associated staff base and require less intensive care compared to patients in nursing homes. Home care is also provided as ambulatory services to people living in their own homes.

Table 1 provides a non-exhaustive list of Norwegian primary care providers, including only the characteristics that are of importance in this dissertation. In contrast to GP practices and nursing homes, assisted living facilities do not have designated physicians overseeing the health of their residents. Patients eligible for home care services must turn to their GP when they need services such as medical consultation or refilling of prescriptions. Consequently, the staff in assisted living facilities must interact with multiple GPs located at different GP practices.

Table 1: Characteristics of Norwegian Primary Care Settings

Primary care setting	GP practices	Nursing homes	Home care services
Short description	Provides GP services to everyone in the municipality. Co-located staff.	Health and care services for individuals in need of 24-hour attendance (mostly older adults). Co-located staff.	Assisted living facilities with co-located staff, or ambulatory health and care services in the home.
Co-located physicians?	Yes.	Designated, not necessarily co-located.	No. Patients are attended to by their GPs.

1.3.2 Norwegian pharmacists

Most pharmacists in Norway (approximately 70%) work in community pharmacies where they dispense medications and provide medication counseling. In addition, they provide a handful of pharmacist-led cognitive services (PLCS) such as seasonal flu vaccination, inhalation guidance, and New Medicine Services. [47]

Despite the increasing complexity of clinical cases and future perspectives of low staffing, there are no governmental policies to implement pharmacist services or integrate pharmacists in settings outside of community pharmacies. Unlike countries where clinical pharmacists are routinely part of primary care teams, in Norway, this is extremely uncommon. According to a recent report, ten Norwegian municipalities have hired pharmacists (n=15) in primary care settings. [48] These pharmacists primarily engage in administrative roles, focusing on systems-level work and policy development.

1.3.3 Norwegian pharmacy practice research

Despite the growing interest in expanding the scope of practice for Norwegian pharmacists beyond dispensing services, research on this topic shows a significant lack of studies. Even fewer studies explicitly apply implementation theories and frameworks. [49-53] Performing a search combining terms for implementation (Implementation Science/ OR “Diffusion of

innovation"/ OR implementation OR integration), pharmacists (Pharmacists/ OR pharmacis*), and Norway (Norway/ OR Norway OR Norwegian) in Ovid Medline retrieved five relevant articles. As such, the research in this dissertation has identified a niche in Norwegian pharmacy practice research, following exemplars from countries such as the US, Canada, and the UK. Furthermore, it is in line with guidelines for developing complex interventions as recommended by the Medical Research Council. [54]

Health policies have an essential role in influencing healthcare access, quality, and health outcomes. [55] In their white paper describing the National Health and Coordination Plan 2024-2027, the Norwegian government highlights the importance of implementation science in healthcare research and has committed to providing dedicated funding to implementation projects. [56] Consequently, implementation science is recognized as an appropriate discipline when conducting future research on improvements in Norwegian primary care settings.

1.3.4 The Home Care Pharmacist project

In the absence of a national policy for integrating pharmacists into primary care, the municipality of Tromsø pioneered a project to introduce pharmacists as full-time, salaried members of home care teams. In 2020, the County Governor awarded innovative funding to employ a pharmacist in one home care setting for a limited duration. This funding supported the provision of on-site pharmacist services to approximately 150 home care patients over three years, from April 2020 to March 2023. The Home Care Pharmacist project aimed to enhance patient safety and quality of life through services such as MedRevs and the education of healthcare professionals. This initiative represents the first of its kind in Norway, and the majority of the research in this dissertation is directly related to this innovative approach of adopting pharmacist services in a home care setting.

1.3.4.1 Stakeholders, program planners, and adopters:

For the purpose of this dissertation, stakeholders are defined as any individual, group, or organization that has an interest in, is affected by, or can influence the decision-making and activities of a project. They can come from various sectors and levels within and outside an organization.

The roles of different stakeholders are important to consider when introducing changes in healthcare, and it can be useful to distinguish between the program planners (decision-makers) and the adopters. [3] Effective implementation requires close collaboration between

these two groups. In the case of the Home Care Pharmacist project, program planners were positioned at a higher hierarchical level of the healthcare organization, writing the grant proposal and specifying the aim and objectives of integrating pharmacists in the home care setting. However, program planners were not directly involved in the process of adopting pharmacist services in each specific home care setting. Conversely, the adopters of these services, namely the frontline staff working at the operational level of the organization, were excluded from the planning process. These frontline staff members are the key stakeholders who will ultimately decide whether to adopt the pharmacist services. Their decision to embrace this innovation depends on their understanding of the innovation and how well it meets their needs. Adopters include first-level leaders who are responsible for frontline management. First-level leaders are essential in bridging the gap between the program planners' decision (e.g., introducing pharmacist services) and successful adoption and implementation.

1.4 Improving patient care

1.4.1 Introducing changes in healthcare settings

The primary goal of an innovation is to offer a new and better solution compared to existing options. Even though innovations are frequently adopted into healthcare settings they do not automatically produce the expected impact or outcomes. This is often referred to as the "knowledge-to-practice" gap. Ironically, in the era of evidence-based medicine (EBM), a paradigm that emerged to ensure that clinical decisions are informed by the best available scientific evidence, one of the most consistent findings from health services research is the inability to effectively translate evidence into routine practice. [57] A frequently cited estimate highlights this challenge, suggesting that it takes 17 years for 14% of original research to benefit patients. [58]

The process of making innovations useful to patients is often referred to as knowledge translation. The process of translating EBP into real-world settings is often conceptualized on a continuum of three related but distinct processes: diffusion, dissemination, and implementation, also known as "letting it happen", "helping it happen", and "making it happen", respectively. [59] Diffusion ("letting it happen") is the most commonly applied strategy, managing innovation through uncoordinated and unplanned efforts. Relying on a natural course of communication among stakeholders to encourage and convince a social group to adopt an innovation, diffusion is resource-efficient but also emergent and the least

likely to produce the expected outcomes. [60] Dissemination ("helping it happen") is a slightly more active process, involving planned strategies such as the distribution of educational materials and the conducting of workshops to promote the new practice. Implementation ("making it happen") is the most comprehensive approach, comprising scientific, active, and purposeful efforts to successfully sustain innovations in practice.

1.4.2 Implementation

The term 'implementation' exhibits considerable semantic versatility within the literature, describing both a process (implementation) and an action (to implement) respectively. This duality, coupled with the existence of multiple definitions, underscores the complexity of the concept and its varied interpretations across different contexts.

Implementation is not merely about adopting or initiating an innovation but ensuring that it is adapted to local contexts, effectively integrated, and sustained over time to achieve the desired outcomes. It requires ongoing management and continuous assessment. For this dissertation, implementation is defined as any deliberately initiated attempt to introduce new patterns of collective actions in health care aiming to normalize these actions in professional healthcare practice. [4] Following this definition, implementation is regarded as a continuous accomplishment rather than a final outcome. It concerns how people collectively act in the environment they work together. Consequently, making innovations sustainable is more about collective work than individual behavior. The definition highlights "deliberately", meaning that innovations need to be formally defined, consciously planned, and intended to lead to an (improved) outcome. This statement is in line with other definitions of implementation, stressing that innovations should have a proven value. [2,61]

1.4.3 Implementation science

Implementation science is defined as "*the scientific study of methods to promote the systematic uptake of research findings and evidence-based practices into routine use."* [5] This research approach is critical for narrowing the research-to-practice gap, ensuring that scientific advances lead to tangible benefits in public health and clinical care.

Implementation research is the scientific study of implementation, i.e., the study of how and why innovations work or fail in real-world settings. The development of implementation as a distinct field of research has been driven by the acknowledgment that effective implementation does not occur spontaneously. [6] Unlike basic research or research on efficacy

or effectiveness, implementation research is essential for ensuring that innovations are not only theoretically sound but also practically viable. [62]

Figure 1 outlines the relationship between distinct concepts and stages of the implementation process. Introducing new practices is an iterative and dynamic process of reciprocal actions and interactions. Each stage has implications for whether the process should continue or regress. The double-ended arrows indicate the bidirectional nature of implantation. The broken lines indicate reduced impact, illustrating that the expected outcomes are less likely to occur when choosing strategies of diffusion and dissemination. Determinants of implementation, implementation strategies, and implementation outcomes are elaborated on in the following sections.

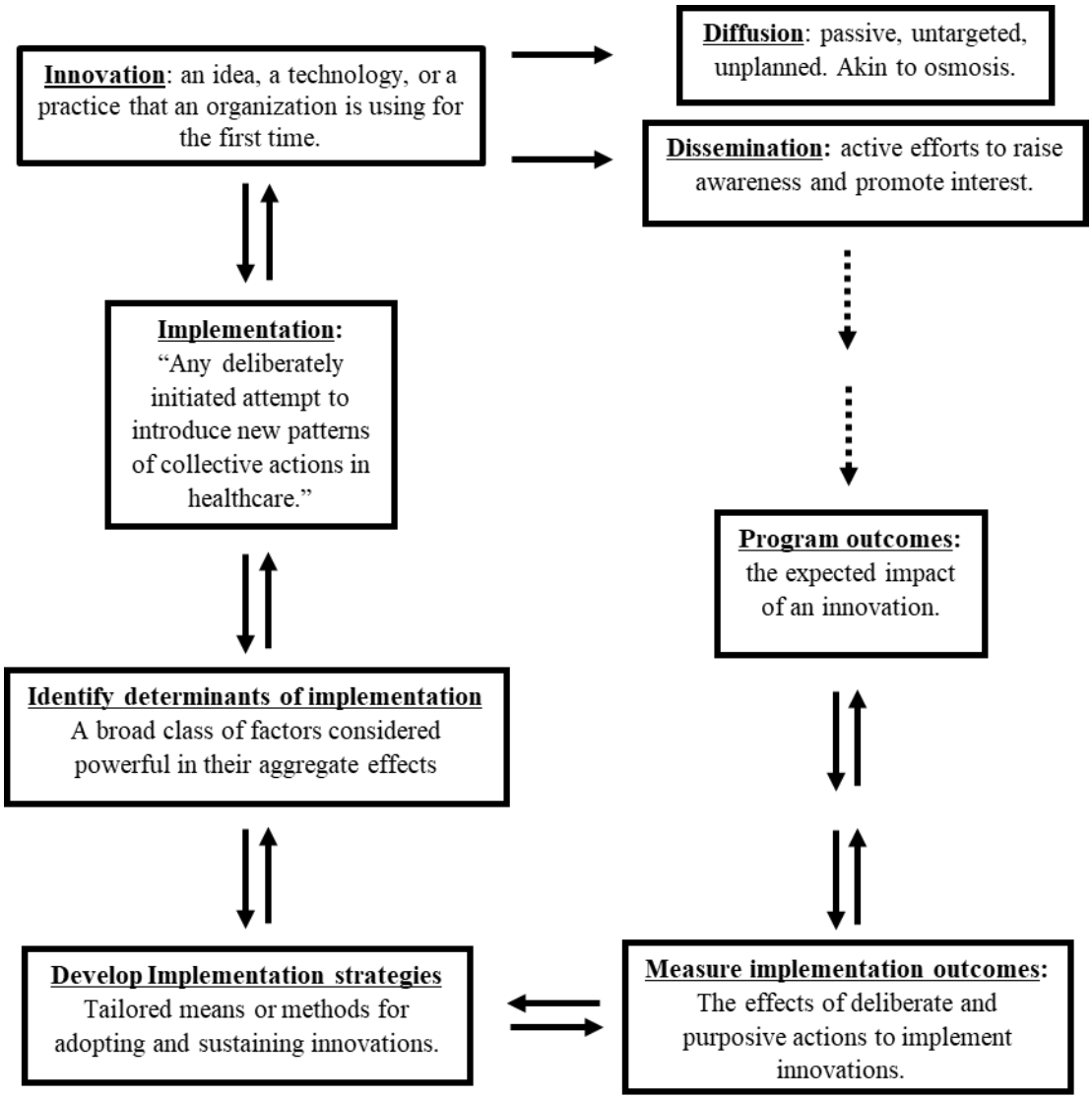

Figure 1: Model of sustainable improvement in healthcare.

1.4.3.1 Determinants of implementation

Determinants of change are a group of environmental factors whose aggregate effects are considered deterministic to implementation outcomes and ultimately innovation outcomes. [63] They are the conditions that must be in place or need to be overcome, to make change happen. Often referred to as barriers and enablers/facilitators, determinants describe a broad range of contextual elements that might enable or hinder the implementation process. In implementation science, context and determinants of change are interdependent concepts. Consequently, determinants exist across different levels of a context as described in Table 2.

Determinant frameworks can help identify barriers and facilitators of the implementation process. [64,65] They provide tools to support and inform on the design of implementation strategies. However, the proposed determinants compiled in these frameworks are general

("one size fits all") and draw on the experiences of the originators' own experiences. [66] As such, these frameworks do not take into account the causal mechanisms of determinants. This shortcoming has implications for researchers and implementers aiming to understand what causes a determinant to exist in the first place.

1.4.3.2 Implementation strategies

Implementation strategies are specific actions that help ensure that innovation is effectively integrated into a setting, constituting the "how to" component of practice change. [7] They are developed to overcome identified barriers, aiming to improve implementation outcomes by addressing the specific challenges of an implementation process. To enhance the conceptual clarity of implementation strategies, it is important to name, define, and operationalize each one, making their connection to implementation determinants and outcomes clear. However, they are often poorly designed, failing to address key contextual determinants. [67]

1.4.3.3 Implementation outcomes

Implementation outcomes are defined as the effects of deliberate and purposive actions to implement new treatments, practices, and services. [8] Conceptually distinct from, yet related to, innovation outcomes, implementation outcomes focus on how well the innovation is adopted. Serving as proximal indicators of implementation success, these outcomes correspond to different phases of the implementation process, Table 3. For instance, implementation outcomes such as acceptability and appropriateness may be more prominent in the early phases of adoption.

1.4.4 Contexts in implementation

The term 'implementation' is often politically charged, assuming that healthcare settings are static and that change efforts should focus on aligning the context with the innovation. [68] However, viewing the context as a fixed backdrop overlooks the dynamics of the social environment and its interactions with the innovation. Context encompasses a set of characteristics and circumstances that consist of active and unique factors within the environment in which change is introduced. [9] In their scoping review of 17 implementation frameworks, Nilsen et al. identified 12 context dimensions of three specific context levels, i.e., micro level, meso level, and macro level. [69] Table 2 provides an overview of how implementation science relates context dimensions to the different levels of a healthcare organization. The research in this dissertation pertains to context dimensions of the meso-level of a healthcare organization. Dimensions of particular interest are highlighted in bold.

Table 2: Description of context levels and dimensions.Adapted from Nilsen et al. [69]

Context level of healthcare	Context dimension
Micro level **(inner environment)**	Patients
Meso level **(inner environment)**	**Organizational culture** **Organizational readiness for change** **Organizational support** Organizational size and complexity
Marco level **(outer environment)**	Outside influences, e.g., policies.
Multiple levels **(inner and outer environment)**	**Leadership** Social relations and support **Resources, e.g., financial support and personnel** Infrastructure

1.5 The theoretical framework of this dissertation

A theory is a *"system of ideas that presents a systematic way of understanding events, behaviors, and/or situations".* [70] Theories help simplify complex realities and establish relationships between variables, extending knowledge production beyond the empirical data. [71]

1.5.1 Applying implementation theories and frameworks

Implementation theories are specifically developed or adapted to address the processes and factors involved in the successful translation of EBP into routine practice. They have been defined as *"a robust set of conceptual tools that enable researchers and practitioners to identify, describe, and explain elements of the implementation process and outcomes."* [72] Consequently, implementation theories are dynamic and often evolve as new insights and empirical data emerge from ongoing implementation research.

In general, the research in this dissertation draws heavily on the seminal work of Trisha Greenhalgh[59] and Everett Rogers. [73] It also applies specific implementation theories such as the Normalization Process Theory (NPT) [4] and organizational readiness[74], and implementation frameworks such as the Consolidated Framework of Implementation Research (CFIR) [64], and the Active Implementation Frameworks. [60,75]

1.5.2 The role of organizational theories in implementation

1.5.2.1 Organizational culture and subcultures

According to organizational culture theories, changes in performance depend on cultural shifts. [76] Culture refers to the shared values, beliefs, norms, and practices that shape the behavior and interactions of members within an organization. [77] In essence, a culture is what makes an organization unique from all others. [74]

Organizational subcultures develop within the smaller environments of an organization, e.g., departments or teams. The cultures of these organizational microsystems are shaped by a collection of diverse and ever-changing individuals, each acting independently to make their own free choices. More importantly, subcultures have an intrinsic ability to resist changes through the process of self-organization. When facing innovations perceived as disruptive, individuals or teams can decide to maintain the status quo rather than assimilate the innovation into the system. [78] As such, the phrase «how we do things here» highlights the

everyday actions and decisions that, collectively, define each microsystem's character and identity.

1.5.2.2 Organizational readiness for change

Organizational readiness for change is a concept that refers to the extent to which the members of an organization are cognitively and practically prepared to implement changes and innovations. [79] It refers to the collective willingness to pursue changes, involving the attitudes and motivation of both leadership and staff. Furthermore, readiness pertains to the resources, skills, and knowledge available within the organization. In this dissertation, readiness for change is related to specific teams within an organization.

1.5.2.3 Teams and leadership influence organizational readiness

The research in this dissertation revolves around (healthcare) teams. Teams are the smaller constituents of an organization. They are typically made up of a handful of people who are aware of each other and can help and interact with each other. [80] The individual members of this microsystem are brought together to achieve a common goal or complete specific tasks, working collaboratively within the structure of an organization

Leadership is a multifaceted organizational construct, but it plays a pivotal role in creating safer work environments and in facilitating the implementation of new healthcare practices. [81] Leaders play a crucial role in developing readiness for change by setting the tone and model of behavior and clearly presenting the mission and vision of the organization. Through their actions, decisions, and communication, leaders reinforce the values and norms that define the organizational cultures and subcultures.

1.5.2.4 Temporal dimensions of the implementation process

Stage theories describe the process of organizational change as occurring in distinct, sequential stages. [82] Each stage targets specific tasks, challenges, and strategies that must be tailored to effectively promote change at each phase. The stages help to structure the implementation process, making it more manageable and systematic.

Several implementation theories and frameworks similarly conceptualize the implementation process, defining stages of exploration, preparation/installation, (initial or full) implementation, and sustainment. [83-85] These stages provide a roadmap for systematically implementing new practices in healthcare settings. Each stage builds on the previous one, ensuring that the implementation is well-planned, executed, and sustained effectively.

In 2012, Meyers et al. synthesized essential phases across implementation frameworks to identify and describe activities believed to constitute an effective implementation process. [86] Their research resulted in the development of the Quality Implementation Framework (QIF), consisting of four phases and 14 critical activities related to the implementation process. Each phase and activity are presented in Table 3. Implementation activities of particular interest to this dissertation are highlighted in bold. The developers of the QIF emphasized that ten of the steps in the QIF should be assessed before implementation begins, i.e., at the stages of contemplation before deciding to adopt and implement. Consequently, the transition from Phase 2 to Phase 3 marks the watershed between initiation and implementation. [85]

Table 3: Phases in implementation.Adapted from Meyers et al. [86]

Phase	**1**	**2**	**3**	**4**
Name	**Exploration**	**Preparation**	**Implementation**	**Sustainment**
Feature	**Initial considerations**	**Creating a structure for implementation**	**Ongoing structure once implementation begins**	**Improving future applications**
Activities	**1. Needs assessment** **2. Readiness assessment** **3. Assessment of innovation fit.** 4. Adaptation 5. Obtain buy-in 6. Build capacity **7. Allocation of resources** **8. Staff training**	9. Creating implementation teams 10. Developing an implementation plan.	11. Coaching and supervising. 12. Process evaluations. 13. Create supportive feedback mechanisms	14. Learning from experience
Duration	Typically, 2-5 years			

Even though the process of change is depicted as linear, in practice, teams frequently find themselves moving back and forth between stages as they learn from their experiences and encounter various challenges. [87] Consequently, it should be accepted that change processes require a long time to produce the expected outcomes. Based on evaluations of implementation projects, pre-implementation phases, i.e. phases of initial considerations preceding the decision to adopt a new practice, can be expected to last for several years. [85] Notwithstanding the desire for quick success, a decision to proceed to the next phase should be considered only after completing the first phase, ensuring that all necessary information and preliminary assessments are thoroughly conducted. [84]

The timing of the implementation process can influence its outcomes, as multiple change initiatives coinciding within an organization can lead to change fatigue, i.e., stress and burnout. [69]

1.6 The scope of this dissertation:

1.6.1 Towards a model for pharmacist integration:

The introduction has emphasized the need for innovative thinking and new approaches to tackle the healthcare challenges posed by an aging population. It noted that pharmacists are increasingly integrated into primary care teams but have yet to fully assume the responsibilities associated with their expanded clinical roles. Moreover, the introduction has underscored that changes and improvements in healthcare depend on the context and that specific determinants will influence the feasibility of sustainable change.

As the first of its kind in Norway, the municipality of Tromsø initiated a program of integrating pharmacists into their local home care settings. In the absence of regulatory support and national backing, the research in this dissertation aimed to develop a conceptual model for enhancing the implementation of pharmacist services in Norwegian home care settings. For this dissertation, a conceptual model is understood as a simplified representation of a situation or problem that shows key concepts, relationships, and assumptions involved. [10] It serves as a visual representation that can help guide research questions, methods, and analysis. Conceptual models are not fixed. They require revisions and expansions to keep up to date.

1.6.1.1 Identifying determinants of implementation

In the realm of introducing sustainable change in healthcare, the role of context is paramount. Paper 1 conducted a needs assessment of the adopters in one home care unit to identify determinants of change. A needs assessment examines the discrepancy between 'what is' and 'what should be,' serving several important purposes: it provides a rationale for the necessity of an intervention, aids in designing an intervention that precisely targets the identified problem, and lays the groundwork for developing a comprehensive implementation plan. [3,88,89] This plan includes strategies for overcoming potential barriers and capitalizing on facilitators.

In Paper 2, organizational readiness for change was assessed within one home care unit. This is an important step in the implementation process, as it informs the development of effective implementation strategies, ensures the efficient use of resources, and enhances the overall likelihood of successful change.

1.6.1.2 Assessing the intervention integrity of MedRevs:

Paper 3 (manuscript) assessed the intervention reporting of pharmacist-facilitated MedRevs in Nordic primary care settings. MedRevs are the most frequently provided EBP among clinical pharmacists practicing in primary care settings. To produce the expected outcomes of this intervention, it is critical to know the details of how an intervention works. Without a clear description, it becomes difficult to dissect which elements are effectively working and how they interact to produce outcomes. This clarity is foundational not only for assessing and understanding the intervention's success but also for informing future implementations and processes of scaling improvement services to new settings.

2 The aim of this dissertation

Aiming to develop a conceptual model for enhancing the implementation of pharmacist services in Norwegian home care settings, the research focused on identifying determinants of change.

The research conducted as part of this dissertation has resulted in two published articles (Papers 1 and 2) and one manuscript (Paper 3) currently under review.

In paper 1, titled “Illuminating determinants of implementation of non-dispensing pharmacist services in home care: a qualitative interview study”, qualitative data was collected to answer the following research questions:

1. What are the current issues within medication management?

2. How do workflows influence the implementation process?

3. How do the new services align with existing systems and practices?

In Paper 2, titled “Barriers and Facilitators of Pharmacists’ Integration in a Multidisciplinary Home Care Team: A Qualitative Interview Study Based on the Normalization Process Theory”, qualitative data was collected to investigate:

1. What are non-pharmacist healthcare professionals’ knowledge, beliefs, and expectations of the pharmacist and the pharmacist services?

2. What are the pharmacists’ expectations and experiences using their competencies within a home care setting?

3. How do leaders engage and organize team members in integrating a new profession and work methods?

In Paper 3, titled “Intervention description of pharmacist-facilitated medication reviews (MR) in Nordic primary care settings: a scoping review” the aim was to explore the completeness of intervention description of pharmacist-facilitated MedRevs in Nordic primary care settings. The objectives were to investigate:

1. Whether researchers provided a rationale for the performing MedRev

2. Whether the components of the intervention were described in sufficient detail for replication.

3. The reporting of strategies to improve fidelity, and/or any assessments of fidelity.

3 Methods

Figure 2 illustrates how the different research projects of this dissertation relate to successful implementation as described by Metz et al. [90] It is also the starting point of the conceptual model presented at the end of this dissertation.

Papers 1-3 aimed to contribute to the development of a conceptual model of implementation, potentially overcoming implementation barriers and eventually achieving the expected outcomes of the Home Care Pharmacists project. Papers 1 and 2 explore how contextual elements influence the implementation and integration of pharmacists and pharmacist services in a Norwegian home care setting. Paper 3 investigates the intervention description of pharmacist-facilitated MedRevs in Nordic primary care settings.

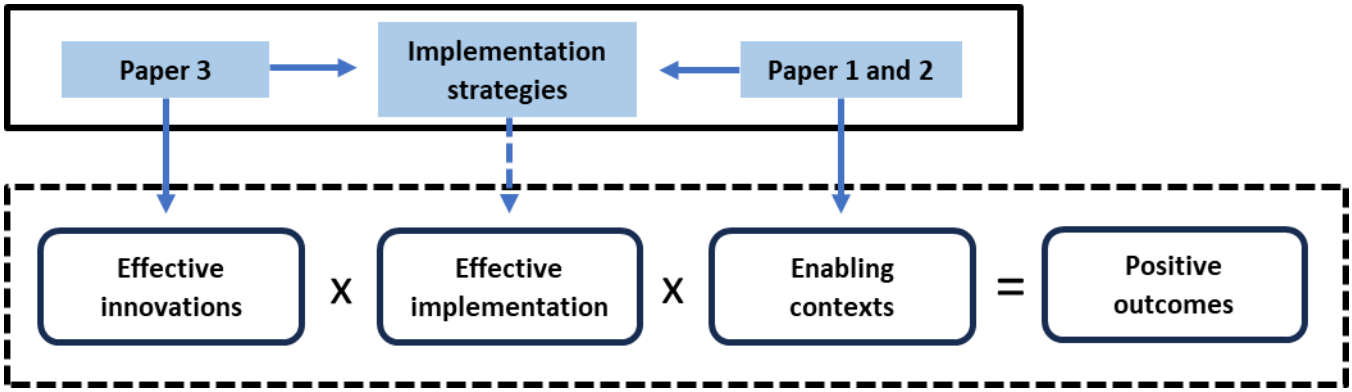

Figure 2: Illustration of how Papers 1-3 fit within the model of successful implementation.

Table 4 presents a methodological overview of the research in this dissertation. Papers 1 and 2 report on qualitative research studies, while Paper 3 reports on a knowledge synthesis. In the completion of this PhD dissertation, various implementation theories and frameworks guided the planning process, informed the methodological approaches, and were integral in interpreting the findings.

Table 4: Methodological overview of included papers

Paper	Design	Material/participants	Theories/ frameworks	Examples
1	Individual interviews	Nine healthcare professionals (registered nurses, auxiliary nurses, social educators)	Implementation theories, determinant frameworks.	Diffusion of innovations theory, Greenhalgh framework, CFIR[1]
2	Individual interviews	Nine healthcare professionals (first-level leaders, pharmacists, nurses)	Implementation theories, organizational theories.	NPT[2], Organizational readiness
3	Scoping review	16 included studies	Implementation frameworks	AIF[3] and TIDieR[4]

3.1 Papers 1 and 2

Papers 1 and 2 performed a diagnostic analysis of the innovation and setting to identify determinants of change. This is considered an important assessment in implementation because it is likely that strategies to move an innovation into practice are more effective if they address key determinants. [87]

3.1.1 Research design

Data was collected using qualitative interview methods. Semi-structured interviews are useful for studying human behaviors, opinions, and experiences, and consequently, appropriate methods to gain insights into determinants of implementation. [8,91,92]

[1] Consolidated Framework of Implementation Research

[2] Normalization Process Theory

[3] Active Implementation Frameworks

[4] Template for Intervention Description and Replication

Papers 1 and 2 pertain to different phases of the Home Care Pharmacist project. The timelines in Figures 3 and 4 provide an important backdrop for understanding the dissimilar dynamics of healthcare practice and scientific research.

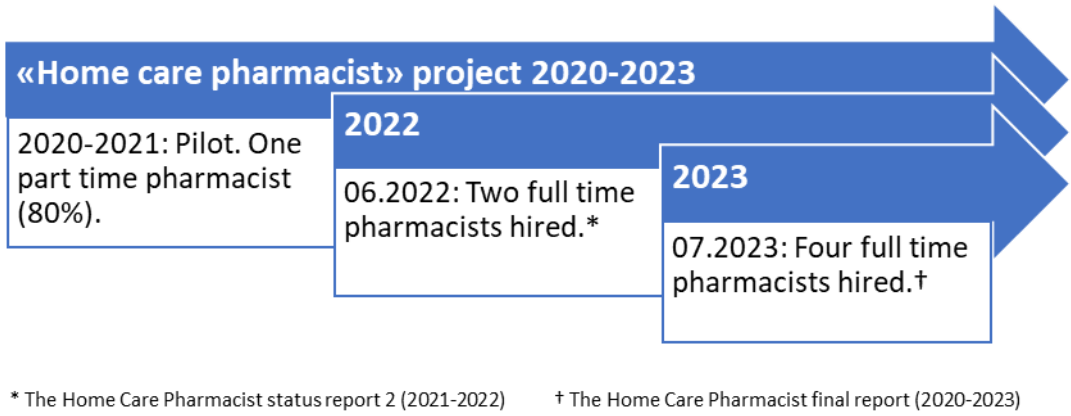

Figure 3: Timeline and milestones in the Home Care Pharmacist project

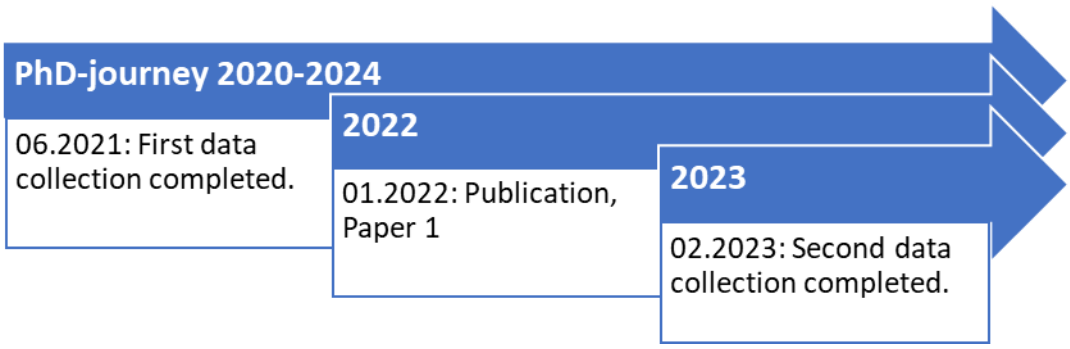

Figure 4: Timeline and milestones of the PhD journey

Data for Paper 1 was collected during the first year of the Home Care Pharmacist project (2020-2021). At this early and exploratory phase of the project (see Table 3), one on-site salaried pharmacist was engaged to perform patient-centered activities (e.g., MedRevs), and to educate healthcare professionals on medication work.

Data for Paper 2 was collected in November 2022- February 2023. At this point, the municipality of Tromsø had already decided to employ two pharmacists regularly in the home care setting. Still, within the timeframe of the Home care pharmacist project, the process had accelerated from exploration to implementation (see Table 3). Consequently, the research in Paper 2 focused on investigating how the pharmacist services were delivered and operated within the host setting. This included investigating the internal dynamics of program execution, the processes used, the resources allocated, and the interactions among program planners and adopters.

3.1.2 Recruitment of participants

The recruitment process in Papers 1 and 2 was inspired by Malterud et al.'s concept of Information power, and included elements of convenience and purposive sampling strategies. [71] The concept of information power is elaborated on in section 5.2.2.

3.1.3 Data analysis:

The interpretation of text data was informed by Braun and Clarke's guidelines for thematic analysis. [93] Data was analyzed using a pragmatic bottom-up approach, starting at a low level of abstraction. Detailed descriptions are provided in Papers 1 and 2. Applying implementation theories and frameworks, the process was both inductive and deductive.

3.2 Paper 3: scoping review

3.2.1 Research design

A scoping review is a systematic approach to charting or mapping a broad research question. It typically aims to clarify key concepts in the literature, identify evidence gaps, and/or inform future research, and is considered particularly useful when the primary research is complex and heterogeneous. [94,95] Notwithstanding this flexibility, scoping reviews are systematic and expected to be reproducible and transparent in their methods. [96]

Paper 3 was developed following a University of Toronto libraries workshop on systematic reviews, consulting with a librarian at the Gerstein Science Information Centre (Toronto, Ontario Canada).

3.2.2 Search strategy, study selection, and synthesis

The scoping review was conducted in adherence with Arksey and O'Mally's framework for scoping studies. [97] Each step in the framework is elaborated on in the following sections.

3.2.2.1 Identifying the research question

Our research question aimed to investigate the completeness of the intervention description of pharmacist-facilitated MedRevs in Nordic primary care settings. After identifying the research question, work continued to develop minimum searchable concepts. Each concept was operationalized by gathering synonyms. Figure 5 provides an example of early iterations in the work of developing searchable concepts for the scoping review. The abbreviations in the Venn diagram relate to the search language in the Ovid Medline database.

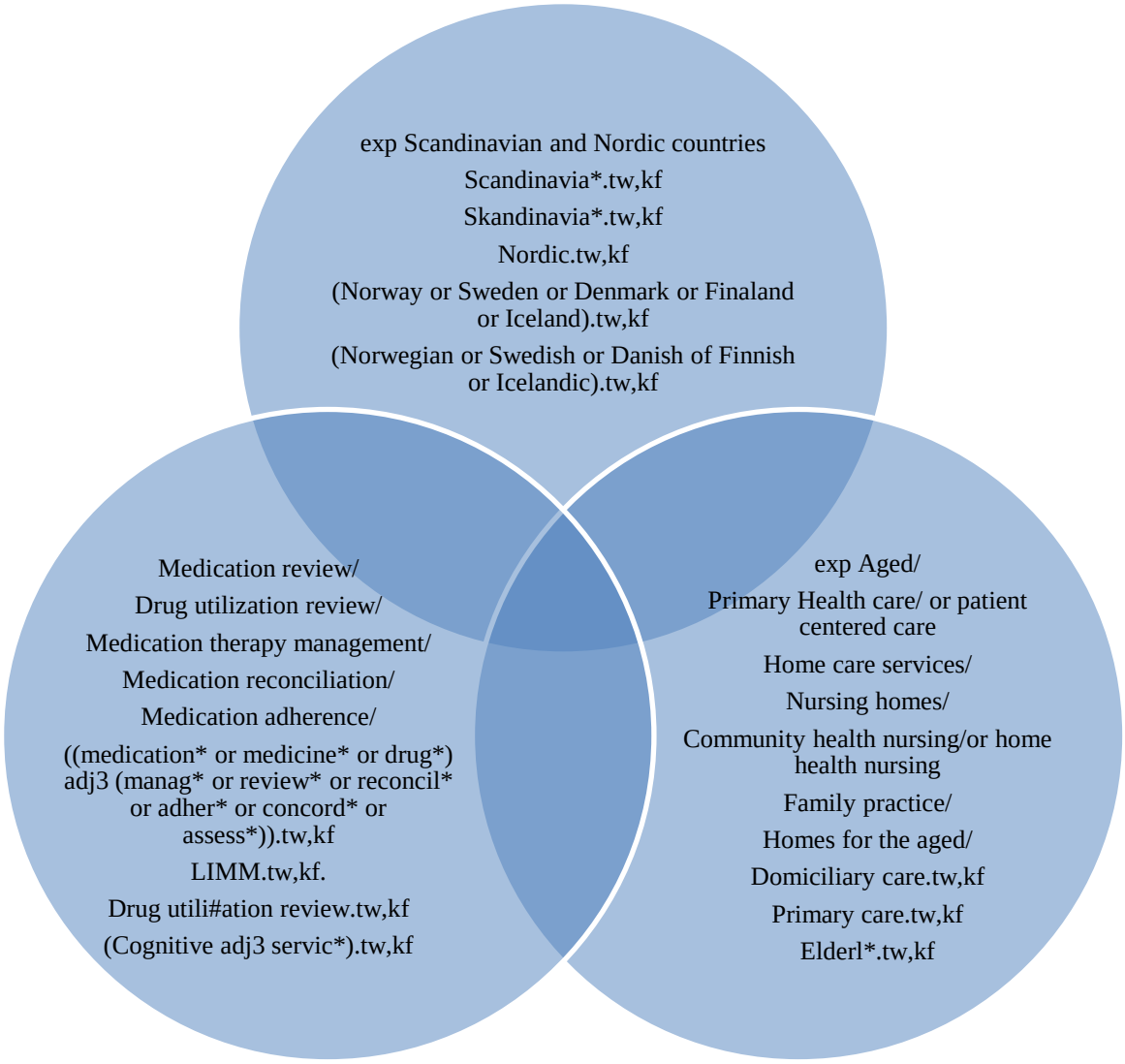

Figure 5: Venn diagram presenting searchable concepts.

A test set consisting of ten articles was put in place to help develop the search strategy. The test set was made up of a collection of articles, purposively acquired to meet the eligibility criteria. The articles in the test set provided relevant subject headings and search words. Furthermore, they validated the search strategy, exposing the sensitivity of the search string.

Text-mining tools such as PubReminer and Yale MeSH analyzer were utilized to find additional search terms, increasing the precision of the search string.

3.2.2.2 Identifying relevant studies

For a scoping review, methods guidance requires searching a minimum of three subject-specific databases. For the best overall coverage in health sciences, nursing, and qualitative research, the databases Ovid Medline, Embase, and Ebsco Cinahl were selected. The original

search string was developed in Ovid Medline. See appendix x. The validated search string was translated from Ovid Medline to Ovid Embase, Ebsco Cinahl, and Web of Science using the Polyglot search Translator. [98] The translation was evaluated, e.g., by assessing the scope notes of subject headings and investigating each database's field codes. Table 5 provides an example of the translation process of one of the search concepts.

Table 5: Translating search concepts across subject-specific databases.

Ovid Medline	**EBSCO Cinahl**	**Ovid Embase**
1 Medication review/ 2 Drug utilization review/ 3 Medication therapy management/ 4 Medication reconciliation/ 5 ((medication* or medicine* or drug*) adj3 (manag* or review* or reconcil* or adher* or concord* or assess*)).tw,kf.	1 MH "Medication review" 2 *n.a* as subject heading. (TI "drug utili?ation review" OR AB "drug utili?ation review" OR SU "drug utili?ation review") 3 MH "Medication management" 4 MH "Medication reconciliation" 5 (((TI medication* OR AB medication* OR SU medication*) OR (TI medicine* OR AB medicine* OR SU medicine*) OR (TI drug* OR AB drug* OR SU drug*)) N3 ((TI manag* OR AB manag* OR SU manag*) OR (TI review* OR AB review* OR SU review*) OR (TI reconcil* OR AB reconcil* OR SU reconcil*) OR (TI adher* OR AB adher* OR SU adher*) OR (TI concord* OR AB concord* OR SU concord*) OR (TI assess* OR AB assess* OR SU assess*)))	1 *n.a* as subject heading (Emtree). 2 Drug utilization review/ 3 Medication therapy management/ (*includes medication reconciliation*) 4 n.a as subject heading (Emtree). The term is included in the Emtree medication therapy management. 5 ((medication* OR medicine* OR drug*) ADJ3 (manag* OR review* OR reconcil* OR adher* OR concord* OR assess*)).tw,kf.

All databases were searched on January 24, 2024. Supplementary searches were made in a Scandinavian database (Sewmed+) using the MesH-term "medication review", and by reference tracking and purposeful manual searching. All citations were exported to the Endnote desktop.

3.2.2.3 Selecting studies

Duplicates were removed using the Endnote de-duplication tool and by manually assessing all articles. A deduplicated selection of citations was uploaded to the online software Rayyan® for screening, applying the eligibility criteria.

3.2.2.4 Charting the data

Data from the included studies was extracted using the TIDieR checklist[99]. Additional data as required by the PRISMA-ScR checklist was extracted. [100]

3.2.2.5 Collating, summarizing, and reporting the results:

The results of the scoping review were organized and reported according to the items in the TIDieR checklist. A detailed description of the results can be found in Paper 3.

3.3 Ethical considerations and data management approval

The Norwegian Centre For Research Data, NSD (now SIKT, Norwegian Agency for Shared Services in Education and Research), approved the Data Management Plan for the research in this dissertation.

The research project was reviewed and determined not to fall within the scope of the Norwegian Health Research Act. Consequently, formal ethics approval was deemed unnecessary by the Regional Committee For Medical Research Ethics Northern Norway, Regional Etisk Komite (REK) Tromsø, reference number 131464). Appendix 1.

All participants signed an informed consent form, after receiving written and verbal information about the research. Participants were informed that they could withdraw from the study at any time without providing a reason.

4 Summary of findings

4.1 Paper 1

Illuminating determinants of implementation of non-dispensing pharmacist services in home care: a qualitative interview study.

Paper 3 aimed to illuminate contextual determinants of the implementation process by answering the following research questions:

1. What are the current issues within medication management?

2. How do workflows influence the implementation process?

3. How do the new services align with existing systems and practices?

4.1.1 Determinants of implementation

Our diagnostic analysis of the setting revealed that the most prominent challenge was high workloads. Low and fluctuating staffing levels, lack of key personnel, and high employee turnover created high-stress environments making it difficult for healthcare personnel to comply with procedures. Furthermore, the conditions lead healthcare workers to feel overburdened and challenged in effectively managing their responsibilities.

Structures within the broader healthcare system, such as non-integrated information systems and the lack of on-site physicians, render the patient data handover process cumbersome. These disjointed systems compelled employees to devise immediate, though non-standard, solutions for medication-related challenges. While these informal practices may provide temporary relief and appear practical, they jeopardize medication safety, care quality, and regulatory compliance.

4.1.2 Determinants related to the innovation (pharmacist services)

Most participants welcomed the pharmacist to carry out medication work in the setting. In general, pharmacists were perceived as better skilled to perform tasks such as medicines reconciliation and medication reviews. Some participants stated, however, that when staffing levels were sufficient there was no need for a pharmacist.

4.1.3 Conclusion

Paper 1 identified that insufficient staffing levels lead to challenges in the process of handling medication-related work. Consequently, the most pressing need to solve medication-related problems appeared to be adequate staffing. Even though pharmacists might be one solution to this problem, staffing ratios cause unfavorable conditions for the implementation of new practices. Furthermore, several medication-related challenges described by the participants concerned latent issues, probably persisting until systemic changes are in place.

4.2 Paper 2

Barriers and facilitators of pharmacists' integration in a multidisciplinary home care team: a qualitative interview study based on the normalization process theory.

Paper 2 aimed to identify barriers and facilitators to optimal utilization of pharmacist services within an interprofessional team by answering the research questions:

1. What are non-pharmacist healthcare professionals' knowledge, beliefs, and expectations of the pharmacist and the pharmacist services?

2. What are the pharmacists' expectations and experiences using their competencies within a home care setting?

3. How do leaders engage and organize team members in integrating a new profession and work methods?

Applying the NPT, the results from this research aimed to identify workplace readiness to integrate the pharmacist and implement the pharmacist services. The NPT views integration as the contingency of successful implementation work. Determinants were related to the teams within different wards at one home care unit (meso-level context). The research was conducted after the stakeholders of the Home Care Pharmacist program decided to employ on-site pharmacists on a full-time basis.

4.2.1 Conceptualizing new work methods

Both nurses and first-level leaders reported that they did not have any prior experience working with pharmacists or any in-depth knowledge of pharmacist competencies. In general, non-pharmacist participants (i.e., healthcare personnel except pharmacists) expected pharmacists to be assigned non-clinical medication work such as the double checking of

medications and tasks associated with managing the medication room, e.g., ordering, storing, and inventorying. Even though this expectation conflicted with the pharmacists' anticipation of performing clinical work, it aligns with the preference of the adopters. If the innovation does not meet the host setting's needs, such as freeing up more time for nursing, successful adoption and implementation are unlikely to occur.

4.2.2 Engaging in, enacting, and reflecting on the new work methods

The lack of role clarity within the interprofessional team was reported as a prominent determinant of the implementation process. In general, first-level leaders did not feel compelled to facilitate the integration of the pharmacists, as they were neither empowered nor adequately informed about the implementation process. Moreover, the lack of information led to confusion about who was responsible for the day-to-day managing of the pharmacist services, and overseeing their implementation in the home care unit. Both leaders and pharmacists reported the lack of a pharmacist job description, making it difficult to coordinate interprofessional care.

Despite having no experience working with pharmacists, and very little knowledge of the pharmacists' competencies, most participants welcomed the new healthcare profession to be integrated within interprofessional teams across all home care wards.

4.2.3 Conclusion

Paper 2 identified significant knowledge gaps as a primary barrier to the effective integration of pharmacists within the home care setting. First-level leaders had insufficient knowledge of the pharmacist services, lacking clarity on how to effectively utilize them. Additionally, they were uninformed about the intended role of the pharmacists. Conversely, pharmacists were not adequately informed about the specific needs of each home care setting. This mutual unfamiliarity among all parties involved hindered effective collaboration and integration of the pharmacist services. Overall, insufficient knowledge across different levels of the team emerged as a critical obstacle, possibly impeding the successful implementation. The finding underscores the necessity for having clear and detailed job descriptions, comprehensive training, and orientation programs to bridge knowledge gaps and facilitate smoother implementation processes.

4.3 Paper 3

Intervention description of pharmacist-facilitated MedRevs in Nordic primary care settings: a scoping review.

Paper 3 aimed to explore the completeness of intervention descriptions of pharmacist-facilitated MedRevs in Nordic primary care settings. The objectives were to investigate:

1. Whether researchers provided a rationale for performing MedRevs.

2. Whether the components of the intervention were described in sufficient detail for replication.

3. The reporting of strategies to improve fidelity, and/or any assessments of fidelity.

Box 1 explains each TIDieR item. Table 6 provides an overview of the intervention reporting of the included studies in the scoping review. The color-coding system helps differentiate reported items (green), from partly reported items(yellow) and not reported items(red). As indicated in Table 6, intervention items 5, and 8-12 most commonly lacked description.

Box 1 Adapted TIDieR checklist

1. BRIEF NAME: Provide the name or a phrase that describes the intervention.
2. WHY: Describes any rationale, theory, or goal of the elements essential to the intervention.
3. WHAT (materials): Describes any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers.
4. WHAT (procedures): Describes each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.
5a. WHO (expertise): For each category of intervention provider describe their expertise.
5b. WHO (qualifications): For each category of intervention provider describe their background.
5c. WHO (training): For each category of intervention provider describe specific training given.
6. HOW: Describes the modes of delivery (e.g. face-to-face) and whether it was provided individually or in a group.
7. WHERE: Describes the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.
8. WHEN and HOW MUCH: Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.
9. TAILORING: If the intervention was planned to be personalized, titrated or adapted, then describe what, why, when, and how.
10. MODIFICATIONS: If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).
11. HOW WELL (Planned): Describes strategies used to maintain or improve fidelity (how and by whom)
12. HOW WELL (Actual): Describes the extent to which the intervention was delivered as planned (if adherence or fidelity was assessed)

Box 1: TIDieR checklist. Adapted from Hoffmann et al. [99]

Table 6: Assessment of intervention description

TIDieR Items with short descriptions	1 Name	2 Why?	3 What?	4 What?	5a Who?	5b Who?	5c Who?	6 How?	7 Where?	8 Dose	9 Modifications	10 Modifications	11 How well?	12 How well?
Auvinen 2021														
Brandt 2014														
Davidsson 2011														
Dobszai 2023														
Fog 2017														
Granas 2019														
Halvorsen 2010														
Halvorsen 2019														
Kari 2018														
Kersten 2013														
Lenander 2018														
Lenander 2014														
Lenander 2017														
Milos 2013														
Modig 2016														
Wickmann 2022														

4.3.1 Conclusion

Overall, included outcomes studies reported poorly on the pharmacists' competencies and training, the dose and duration of the intervention, and intervention fidelity. This lack of intervention reporting makes it difficult for healthcare providers and program planners to act on the findings of these studies.

5 Methodological considerations

Research methodology refers to the overarching strategy and rationale of a research project. Influenced by underlying and fundamental theories of ontology and epistemology, methodologies guide how researchers go about discovering or constructing knowledge claims in their specific field, including the choice of research methods, data collection, and analysis techniques. [101] Research methods have been referred to as "the nuts and bolts of research practice", i.e., the actions and procedures putting a methodology into practice. [101,102] Any given method can produce valid or invalid data depending on the circumstances. [103] The matter in question is the inferences drawn from them.

Papers 1-2 were planned as implementation research. Implementation theories and frameworks guided the development of research questions, interview questions, and the analysis of data. Similarly, Paper 3 applied an implementation focus, originally planning to use the term "implementation" as a search concept. However, using search terms for implementation decreased the sensitivity of the search string, failing to retrieve papers in the test set. This challenge has been described in other systematic reviews applying an implementation science perspective. [104,105]

5.1 The validity of qualitative research

Validity is conceptualized in different ways across and within research disciplines, and there is no "one size fits all" approach to assessing the quality of knowledge claims. Even within the perceived unified paradigm of qualitative research, sharing epistemological characteristics, there is no consensus on how to apply quality criteria. [106] For this dissertation, validity is defined less in terms of procedures and more in terms of understanding. [103] It is understood as the strength and soundness of the research findings, i.e., whether they reflect the phenomenon of interest.

5.2 Developing the research project

According to Kvale et al., validation of qualitative research should be an ongoing exercise, permeating the entire research process. [107] They outline the systematic planning of an interview study in seven distinct stages: thematizing, designing, interviewing, transcribing, analyzing, verifying, and reporting. The subsequent paragraphs will elaborate on how the validity of Papers 1 and 2 was ascertained at each stage (except the reporting stage), and how

these relate to Maxwell's three pillars of quality: descriptive validity, interpretive validity, and theoretical validity. [103]

5.2.1 Thematizing

This is the very beginning of the qualitative research process in which the purpose of an investigation is stated. At this stage, it is important to develop a conceptual and theoretical understanding of the phenomena to be investigated (in the case of Papers 1 and 2: medication work and pharmacist services). This includes obtaining knowledge of the setting of interest and the local language and routines of the potential interviewees. Getting to know the setting, and the mechanisms and "lingo" within it, can help the researcher comprehend a phenomenon from the perspective of the participants (an emic perspective), reducing the chances of misinterpretation.

In the planning of Papers 1 and 2, a fair amount of time was spent reading qualitative methodology and theory, qualitative pharmacy research, and eventually, implementation science and theory. Furthermore, the research settings (home care units) were visited several times, observing the work of both nurses and pharmacists, reading medication work procedures, and participating in staff meetings.

5.2.1.1 Reflexivity

Reflexivity in research represents self-awareness and is metaphorically described as the knower's mirror. [108] Reflexivity requires researchers to share their preconceptions (the researchers' «backpack») and establish meta positions, i.e., apply strategies to avoid becoming too personally invested in a project. This entails considering how their perspectives, and backgrounds shape the research project. It resonates with Joseph Maxwell's notion that the validity of qualitative data is always relative to the perspectives of the inquirers and that an account inferred from research is always related to something outside that account. [103]

Having extensive experience in managing community pharmacies, preconceptions include my beliefs about leadership and leadership styles, and organizational structures and hierarchies Being a pharmacist, with prior experience in providing pharmacy services to nursing homes and community dwellings, I was acquainted with these settings, their medication work, and medication work terminology.

In the research of Papers 1 and 2, I felt obligated to avoid the pitfall of producing knowledge claims advocating for pharmacist services in primary care settings. This position was held throughout the entire research project.

In Papers 1 and 2, meta positions were established by positioning the qualitative inquiry in the realm of neo-positivistic methodology. [109] Following this epistemological assumption, we aimed to chart key aspects of the phenomena under investigation, producing mainly descriptive accounts rather than making abstractions to a higher level of interpretation. Furthermore, I believe applying implementation theories and frameworks made our research more transparent. [108]

5.2.2 Designing

Designing an interview study involves planning the activities to be performed during the research process. This includes becoming familiar with conducting and analyzing interviews and learning the "craft" of qualitative research. [110] During the first year of my PhD journey, I acted on this advice and signed up for a course in qualitative interview methods. In this course, I completed all stages of an interview research project (i.e., planning, interviewing, transcribing, analyzing, and reporting). Designing an interview study also concerns aspects of time and resources, e.g., the number of interview subjects needed. During data collection for Papers 1 and 2, the transcription and initial analysis were completed immediately after conducting each interview. The stepwise analysis made it possible to successively consider the need for additional data to answer the research aim and objectives. Furthermore, it kept the researchers from encountering the 1000-page (transcription) problem. [111]

5.2.2.1 Recruitment

When determining a tentative number of participants in Papers 1 and 2, the decision was guided by the concept of information power. [71] The information power of a sample depends on the research question (broad or narrow), participants' knowledge of the research topic (dense or sparse), and the use of theories and/or theoretical frameworks (applied or not). According to this concept, a study that formulates a broad research question without support from any theoretical perspectives and recruits participants with limited knowledge would require a larger sample size to achieve sufficient information power. Conversely, a study that formulates a narrow research question, applies a theoretical perspective, and recruits participants with extensive knowledge typically requires a smaller sample size. In Paper 2, the decision to include mainly team leaders was based on the assumption that they held

information highly relevant to the research question. Furthermore, the application of the NPT gave the research theoretical support, helping explain how the findings could be related to the implementation of complex interventions. These intentional decisions in the recruitment process, in combination with narrow research questions, indicated that sufficient information power could be achieved with fewer participants.

5.2.3 Interviewing

The information obtained from thematizing the interview study lays the foundation for designing the interview guide. As mentioned in the previous paragraph, we took precautions to ensure that Papers 1 and 2 (planned and performed by pharmacists) did not end up merely advocating for pharmacist positions in Norwegian primary care settings. Furthermore, data collection was conducted right after pharmacists had been introduced into the two research settings. In these early phases of a novel improvement project, people tend to view the situation in an overly favorable light ignoring potential negatives or flaws. Consequently, in Paper 1, the focus was intentionally deflected from the pharmacist when scripting the research questions. The role of the interviewer aimed to be neutral, not expressing his/her perspectives on the research topic.

The quality of scientific knowledge depends on epistemological position (methodology) rather than the choice of a specific research method (e.g., interviews). Theories of knowledge are present in every research project, either as actively adopted frameworks or as tacit assumptions. [102] In Papers 1 and 2, the research methodology resembled neo-positivism. [109] This methodology holds that the interviewer and the interviewee can have a common understanding of the research topic and that the interviewer can describe this topic accurately through language. Furthermore, it holds that the interviewer can avoid influencing interviewees. Adhering to this methodology, research questions were broad, aiming to provide the interviewees with an opportunity to speak freely on the subject (e.g., “Can you tell me about medication work?”). The interview guide was scripted to avoid academic language and to minimize the use of conceptual questions (e.g., questions related to concepts of implementation science). Furthermore, interview techniques such as affirmative inquiry/interpretive questions were applied to make sure the interviewees' statements were understood correctly.

5.2.4 Transcribing

Transcribing research interviews is the process of transforming a conversation into text. Our work with Papers 1 and 2 involved repeatedly listening to audio recordings, and making significant and iterative efforts to provide a correct description of the interviewee's statements. All interviews were transcribed near verbatim, omitting speech pauses, tone of voice, or any «hmm» or «uhh» as they were considered unimportant concerning our aims and objectives.

"Descriptive validity", concerns the factual accuracy of an account, i.e., making sure statements in an interview are neither misheard, mis-transcribed, nor neglected. [103] In principle, they are matters that can be resolved given access to proper means such as a good quality tape recorder. During the data collection process of Paper 1, interviews were conducted via Microsoft Teams®. Issues concerning descriptive validity (sound quality, and internet connection) were immediately addressed and interviews were resumed by repeating questions or the last part of the interview back to the interviewee. Working on Paper 2, two researchers transcribed all interviews separately, ultimately comparing and discussing the compatibility of the transcripts. This decision was made to enhance descriptive validity.

"Interpretive validity" goes beyond providing valid descriptions. It refers to the accuracy with which researchers represent and account for the meanings and perspectives of the participants in a study. Knowledge claims are constructed by researchers, and the validity of these claims depends on how well they are grounded in the perspectives of the people whose meanings are being examined. [103] Consequently, interpretive validity concerns whether researchers are in a position to infer meaningful accounts from the words of the people studied. In Papers 1 and 2, the researchers' familiarity with medication work, pharmacist services, and the operational practices of home care personnel, provided them with an 'inside the group' perspective. This familiarity facilitated the achievement of interpretive validity in data analysis.

5.2.5 Analyzing and verifying

Analysis, like the assessment of validity, does not belong to a separate step in the research process but rather permeates the entire investigation. Data-inferred topics and patterns (i.e., themes) can be identified before, during, and after all interviews are transcribed. [93] However, the bulk of the examination happens after the data collection has ended and all interviews have been transcribed.

Papers 1 and 2 were analyzed adhering to a generic, theoretically independent framework for analyzing qualitative data. [93] Keeping the aims and objectives in mind, the entire data corpus (all collected data) was coded, applying a bottom-up approach, starting from individual data points and building up to overarching themes. Working systematically through the entire text in each transcript, paying equal attention to every sentence, identified codes were organized into overarching themes. Each interview was analyzed before conducting the next, using field notes to document ideas and potential themes. Codes and themes were iteratively revised during the process.

5.3 Pragmatic and theoretical validity

Pragmatic validity concerns the practical implications of knowledge claims, bridging the gap between theories and actions. As such, pragmatic validity relates to concepts of transferability and relevance. The pragmatic concept of validity produces a commitment to act on findings, "*instigating change (…) rather than circle endlessly around interpretations and deconstructions*." [112] Even though this construct provides a strong incentive to value actions over words, applying theories to explain the implications of an account can improve the practical usefulness of knowledge claims. The interconnection of the two constructs will be elaborated on in the next paragraphs.

During the work on Paper 1, the accounts exhibited a high degree of descriptive and interpretive validity, closely resembling the utterances and perspectives of the interviewees. However, it was not immediately clear how the research findings could be translated into action-oriented knowledge claims. Upon questioning the meaning of the accounts, it was discovered that they could address questions of practice change and implementation. Consequently, the decision to apply implementation frameworks was not driven by the researchers' theoretical competencies but rather emerged from challenges in achieving pragmatic validity in the research. Questioning the accounts prompted us to consider the use of theoretical filters to clarify them, thereby enhancing their theoretical validity and transforming them into usable knowledge.

Pragmatic validity also pertains to whether knowledge claims lead to actual changes in practice. This depends on whether the subjects in a setting find the knowledge claims both useful and credible. Such validation can be considered the ultimate test of their pragmatic validity. The final question of practical applicability involves political and ethical concerns; who is to decide the direction of a change? [112] This question resonates with aspects of

organizational culture, a topic thoroughly debated in the discussion of findings of Papers 1 and 2.

6 Discussion of findings

The findings in Papers 1-3 describe how the expected impact of pharmacist interventions is imbalanced by elements in their host setting. In general, the research identified determinants of the implementation and integration of pharmacist services in a Norwegian home care setting. The findings provide a foundational reference point for the development of tailored implementation strategies in the Home Care Pharmacist project. Furthermore, the methodology in this dissertation presents a baseline guiding future research and actions on pharmacy practice in Norwegian primary care settings. As such, the findings substantiate the importance of looking to implementation science when attempting to change healthcare practices. The novelty of the research is reflected by the use of implementation theories and frameworks.

6.1 Papers 1 and 2

6.1.1 Assessing the fit of innovations:

The findings in Papers 1 and 2 raise questions about the compatibility of pharmacist services with the existing workflows and infrastructure of the settings, as well as their alignment with the needs and priorities of each home care unit. They demonstrate that it is a fallacy to assume that pharmacist services will automatically integrate into settings where medication work is routine. Two recent examples from similar improvement projects underscore the importance of assessing the fit of new services. They demonstrate that the impact of an innovation depends on how well it is integrated into the operational and cultural fabric of an organization. In the first example, a comprehensive medication management service (CMM) was discontinued because the intervention turned out to mismatch the overarching goal of the healthcare organization. The project was abandoned after a year of significant efforts, even though the specific settings seemed to be motivated and have capacity. [113] In a very similar project, one component of a Medicines Management (MM) intervention caused the implementation to halt while the intervention was redesigned. The intervention component, a phone call to the patient informing them of their new medicines, was considered simple at the planning stage. However, this sub-intervention turned out to be compounded by several other activities such as obtaining the correct medication history from separate medication lists maintained by diverse healthcare professionals. [114] These two examples demonstrate that an approach that fails to fully engage with the context's complexities is less likely to achieve the desired outcomes Consequently, program planners should perform a fit assessment in each

setting eligible for pharmacist integration. This critical step is often overlooked in improvement projects.

6.1.2 Facilitators of the implementation process

Papers 1 and 2 also identified that the pharmacist services were most welcomed in the settings. This was a collective impression, possibly facilitating the implementation process. However, this finding might be attributed to social-desirability bias, i.e., individuals giving responses they find favorable to the outcome of a study. The data collection in Papers 1 and 2 was conducted during the early phases of the pharmacist integration process. In this initial adoption phase, there is generally a high level of excitement and optimism among staff and stakeholders about the potential benefits of an innovation. This enthusiasm can be driven by the novelty of the change and the anticipation of positive outcomes, e.g., reduced workload. Other distinct features of this early engagement include a momentary willingness to deprioritize regular tasks, and a temporary increase in performance (not sustainable unless the practice is supported by additional resources).

6.1.3 Paper 1: conducting a needs assessment

The findings in Paper 1 identified the root causes of medication-related challenges, including high workload, staff turnover, and stress. These key factors diverted health personnel's attention from adhering to medication safeguards and guidelines, prompting them to create workarounds and duplicate efforts, such as repacking automated dose-dispensed medications. The challenging work environment triggered frequent interruptions and distractions during medication work, primarily due to coworker inquiries.

The research in Paper 1 performed a needs assessment to inform on the innovation planning of the Home Care Pharmacist project; findings primarily identified barriers to completing medication work following standard operating procedures (SOP). This assessment is conceptually different from a needs assessment of the *implementation process*, which aims to identify determinants of adopting and implementing innovations. [115] However, the determinant “high workload” is a barrier equally applicable in both situations, impeding the quality of medication work *and* the implementation process. A systematic integrative review of 36 studies with moderate to high methodological quality reported that staff experiencing high workloads or insufficient staffing negatively impacted the implementation of EBP. [116] Conversely, it found that resource allocation following change initiatives was associated with implementation success. These results are supported by a systematic review investigating the

characteristics of healthcare organizations struggling to improve quality. In this study, insufficient staffing and high turnover were prominent features of hospitals grappling with performance improvement. [117] Research has shown that staffing influences the implementation of pharmacist services as well. In the process of implementing a post-discharge pharmacist home visit, Ensing et al. reported that dedicated resources and support from the organization were important facilitators. [118]

In implementation science, conducting a needs assessment is considered a critical starting point when contemplating a new intervention. This can help both planners and adopters compare the current status to one that is more desirable. [86] Moreover, the sustainability of an innovation hinges on how well it matches the needs of the host setting. [85] In the planning of Paper 1, the idea was that the findings would inform program planners on how to proceed with the Home Care Pharmacist project. Staying within the realm of implementation science, a logical next step in this phase of exploration would be to consider whether pharmacist services were the ultimate match for the needs of the home care unit (Figure 1, Table 3). However, by the time the reporting of Paper 1 was completed, the municipality of Tromsø had already decided to hire two pharmacists permanently. As such, the question was not longer how to best solve the medication-related problems as identified in Paper 1, but rather how to adapt the pharmacist services to fit the needs in the setting. One of the main objectives of the Home Care Pharmacist project was to increase the volume of interprofessional MedRevs, aiming to reduce ADEs among home care patients. However, this intervention is very resource-demanding and likely to cause additional strain on already scarce resources. [119] Based on the findings in Paper 1, the suggestion would be to change the focus from reducing ADEs to addressing the shortage of nursing resources. Reallocating medication work from nurses to pharmacists would be a strategy that frees up time for nursing. Alternatively, program planners could distribute resources more effectively across the organization to aid first-level leaders and pharmacists in achieving the Home Care Pharmacist project's primary aim of increasing MedRev volumes.

6.1.4 Paper 2: conducting a readiness assessment

Assessing readiness is an essential step in the implementation process, ensuring that the organization is fully prepared to undertake and sustain the necessary changes. One critical aspect of readiness is motivation (to engage in change). This is reflected in several theoretical constructs of organizational readiness, e.g., "Change valence", [79] "Tension for change" [59], and

in what John P. Kotter refers to as "(Not) Establishing a great enough sense of urgency". [120] These three constructs relate to whether organizational members collectively value the impending changes enough to invest and engage in the implementation process.

Implementation is collaborative work, and problems arise when there is an uneven commitment to the process among individuals making up a team. [79] Teams are the smaller units of an organization in which the adopters of an innovation are located. In Paper 2, the adopters included home care staff such as nurses, assistant nurses, and first-level leaders. The pharmacists represented the innovation. The team's decision to adopt pharmacist services, such as MedRevs, depends on their understanding of the innovation - what it is, how it works, and whether it adds value to existing practices. Additionally, the decision hinges on the team's ability to organize the work and assign new roles to each participant. [68] The resolution of these questions will ultimately determine whether pharmacists are successfully integrated into the interprofessional team. The key to success lies in knowledge.

Everyone on a team has to know at least something about what the others are doing, respect that contribution, and adapt their input accordingly.
Trisha Greenhalgh

6.1.4.1 Sense-making in implementation

Sense-making refers to how individuals and teams understand changes and new information. [121] This process of understanding and conceptualization is essential in the process of adopting and implementing innovations in healthcare. [4] Furthermore, a team's ability to integrate and use new knowledge has been positively associated with organizational performance improvement. [122]

Lack of knowledge was a prominent finding in Paper 2. This unawareness made it difficult for team members to organize and engage in interprofessional work. Furthermore, non-pharmacists struggled to understand the pharmacist's services and to assess their potential value to the team. This finding is not surprising, given that Norwegian pharmacists' roles have traditionally been confined to dispensing medicines in pharmacy settings. Due to their history of working mostly in isolation from other healthcare professionals, there is a limited understanding of their full professional capabilities.

The findings in Paper 2 indicate that the introduction of pharmacists into the interprofessional team resulted in significant role ambiguities. This confusion occurs when there is a lack of clarity about expectations, responsibilities, and the rationale behind the decisions within a team. Home care staff had little knowledge of the pharmacist profession and were unaware of their role within the team. Pharmacists were unfamiliar with the existing work methods and priorities of the team. Furthermore, they did not have any job description. First-level leaders were unclear about their role in the integration process. The lack of communication regarding the rationale for the integration decision, made by program planners, exacerbated the confusion. These findings will be discussed in the following sections.

6.1.4.2 The role of first-level leaders

First-level leaders are instrumental in the practical execution and day-to-day management of new practices including supervising entry-level employees and promoting effective team functioning. [116,123] Furthermore, they are not likely to invest time in the organization's implementation process unless they perceive a direct benefit to their setting. [124] Healthcare leaders have also been found to be unsupportive of changes that occur unexpectedly or without prior communication. [125] Consequently, trying to implement an innovation without the support of first-level leaders is an invitation to failure.

In Paper 2, the majority of participants were first-level leaders who knew little or nothing about their roles in the integration process. Furthermore, they lacked a full understanding of the pharmacists' competencies and struggled to align pharmacist services with existing workflows. Most were also unaware of the rationale behind the decision to integrate pharmacists into the interprofessional team, which contributed to their reluctance to engage in the process. Additionally, some questioned whether the introduction of pharmacists would decrease or increase their workload, citing concerns about the complexity of the new work methods.

The way leaders influence an implementation process depends on their level of authority within an organization. Program planners (decision-makers) set the stage for implementation by providing strategic direction, resources, and systemic support. However, the findings in Paper 2 indicate that the collaboration between program planners and adopters has been sub-optimal. These findings emphasize the need to actively link the program planners to the adopters when innovations are introduced in healthcare settings. Indeed, implementation frameworks and guidelines emphasize the role of a dedicated team to coordinate and facilitate

activities of implementation. [87] This can be achieved by establishing a steering team including both program planners and adopters. In addition, the process could be supported by external experts providing knowledge of implementation science and practice and organization and systems change methods. [126] Even though the composition of this steering team will vary depending on the size of the project and the budgetary possibilities, it should not be assumed that front-level staff can carry out this work without any external support.

6.1.4.3 Lack of role clarity: pharmacists

Pharmacists lacked job descriptions and training, leaving them to determine their service focus independently without understanding the setting's priorities, complicating interprofessional work. Additionally, applicants for the pharmacist positions did not need clinical expertise or experience, and there were no standard operating procedures for conducting MedRevs. In combination, the findings illustrate a deficit in knowledge dissemination and training. Furthermore, they identified a lack of knowledge as the causal mechanism behind several barriers to implementation.

A well-defined job description helps integrate a new team member by clarifying their role within the broader team structure. Without it, the new member may not fully understand their responsibilities, expectations, or the scope of their role. This lack of clarity can lead to confusion and inefficiency, as they may struggle to prioritize tasks and contribute effectively. Additionally, ambiguity in roles can lead to gaps in care, delayed services, or duplication of efforts, all of which negatively impact patient care. Several studies investigating pharmacists expanding their scope of practice or entering new territories highlight the importance of role clarity. [127-130]

6.2 Paper 3: Pharmacist-facilitated Medication Reviews

6.2.1 It works! But what is "it"?

The famous saying "An apple a day keeps the doctor away" encapsulates the timeless wisdom that regular consumption of nutritious food can contribute to good health and diminish the need for medical attention. Notwithstanding that apple are packed with vitamins, fibers, and antioxidants, the saying doesn't explicitly state how the apple achieves its outcome (keeping the doctor away). While generally understood to advocate for eating the fruit, the proverb could be interpreted to mean that apples can promote health in other ways, such as being part of physical activities. Indeed, tossing and catching an apple could be a fun way to encourage light exercise, hand-eye coordination, and even stress relief, all of which are beneficial to one's health. Stating that the apple should be eaten, however, makes it clear that consumption, rather than exercise, is an important part of the intervention causal chain. [131] Conversely, in the absence of a causative link we are left to guess whether exercise, nutrients, or other unspecified components, are the drivers of improved health.

The purpose of implementing MedRev interventions in healthcare is to produce benefits for patients. All the included studies in Paper 3 concluded that their intervention improved the quality of pharmacotherapies, mainly by identifying inappropriate medications. However, the studies did not make any intervention fidelity assessments. Consequently, healthcare providers risk underestimating the intricacy of copying MedRevs, failing to recognize their outcomes as the result of various and mostly unknown inputs. Dixon-Woods et al. refer to this situation as the "cargo cult problem", i.e., trying to replicate positive outcomes without understanding the mechanisms that caused them. [132]

In general, Paper 3 provides valuable insights into how pharmacist-facilitated MedRevs are operated in Nordic primary care settings. The findings illustrate the heterogeneity of these interventions, outlining their distinct characteristics and thoroughness. For program planners reflecting on whether pharmacist-facilitated MedRevs improve patient outcomes, the answer is that it depends. Paper 3 makes clear that these interventions come in several shapes and forms. Replicating their outcomes depends on whether it is possible to reproduce each component of the intervention and deliver the MedRev as intended. It would also require accessing the same infrastructure and intervention providers.

In the process of adopting or scaling MedRev intervention, healthcare providers need to know how to operate them. [2] This is an essential prerequisite for successful implementation and ultimately improving health outcomes. [133] Following the recommendation of developing usable interventions[2], Paper 3 aimed to explore the completeness of the intervention description of pharmacist-facilitated MedRevs in Nordic primary care settings. The findings show that important MedRev information was missing in most included studies, e.g., the description of the pharmacists' experiences and competencies, the dose, intensity, and cost of the intervention, and fidelity assessments of the activities performed during the intervention. Each issue is elaborated on in the following sections.

6.2.1.1 The pharmacists competencies

The findings in Paper 3 show that only two (12,5%) of the included studies provided information on all TIDieR items related to the competencies and training of pharmacists. For example, Wickman et al. described the pharmacist interventionists as having a master's degree in clinical pharmacy, or a minimum of 4 years of clinical pharmacy experience, and being trained in conducting MedRevs. [134] This is important information. The outcomes of MedRevs depend on the competencies of the interventionists. Pharmacists involved in delivering MedRevs in randomized controlled trials (RCTs) typically possess extensive experience and expertise in their practice areas. Detailed knowledge of these competencies is essential to assess whether the results from an outcome study are likely to be replicable in new settings.

Pharmacist-facilitated MedRevs are interprofessional and consist of multiple interacting activities. Over the past two decades, several studies have explored this heterogeneity. [135-138] Ideally, the characteristics of any other providers involved in delivering the service, including their disciplinary backgrounds, skills, and expertise, should be described. [99]

6.2.1.2 Training and coaching

Enhanced clinical skills can be cultivated through additional clinical training and experience. Regardless of the innovation being implemented, training is recognized as an important implementation driver. [126,139] Furthermore, team training has been found to improve patient outcomes. A systematic review investigating team process behavior on clinical performance found that, across diverse studies, training resulted in increased performance and improved patient outcomes. [140] In Ontario, Canada, pharmacists transitioning from community pharmacies to primary care teams during The Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics (IMPACT) project were offered a program of “re-

skilling" and senior pharmacist coaching to enable them to work in new and unfamiliar environments. [141]

6.2.1.3 Dose, intensity, and cost of the MedRev

In Paper 3, only three (19%) of the included studies provided any information on the cost, dose/duration, and intensity of the MedRevs, making it impossible to consider any economic impact of these services. The costs of MedRev interventions are typically evaluated against the cost savings from reduced hospital admissions due to adverse drug events (ADEs). [142] However, it is critical to exercise caution when assuming that MedRev interventions will result in cost savings, as the effectiveness and economic impact of MedRevs can vary significantly depending on the specific context in which they are implemented. Insofar as the effectiveness of MedRevs is inconclusive, they should be considered a net cost. Consequently, healthcare providers need to appraise the value of MedRevs to outcomes other than clinical. [143]

6.2.1.4 Intervention fidelity

None of the studies included in Paper 3 provided a comprehensive assessment of intervention fidelity, which makes it difficult to attribute outcomes directly to the intervention. [144] Similar findings have been reported for other pharmacist interventions. In a systematic review from 2019, de Barra et al. concluded most of the 86 included trials lacked adequate pharmacist intervention reporting. [39] However, the problem of fidelity assessments is not unique to pharmacist interventions. Summaries of outcome studies show that they rarely assess whether the intervention was delivered as intended. [145] This can lead to inaccurate conclusions about the program's effectiveness and may result in the continuation of ineffective practices or the premature dismissal of potentially beneficial ones.

6.2.1.5 Implementation fidelity

The real-world healthcare landscape is characterized by diverse patient populations, varying provider skill levels, fluctuating resource availability, and a myriad of socio-cultural factors that can influence intervention fidelity and effectiveness. This heterogeneity necessitates adaptable implementation strategies that can accommodate local contexts and system dynamics. While intervention fidelity focuses specifically on the intervention's components, implementation fidelity provides a broader view that encompasses the entire process of implementing the intervention in a real-world setting. Carroll et al. highlight that the relationship between an intervention and its outcome is outside the realm of implementation

fidelity. [146] However, both types of fidelity are interconnected; high intervention fidelity is often necessary for high implementation fidelity but is not sufficient on its own. High implementation fidelity supports intervention fidelity by ensuring that the environment closely matches that of the original intervention.

7 Implications of practice and research

7.1 Implications for practice

7.1.1 A conceptual model for implementation of pharmacist services

Figure 6 presents a conceptual model for adopting and implementing pharmacist services in Norwegian primary care settings. Building on the concept of implementation mapping, the model exemplifies a way to picture possible outcomes and how they can be achieved. [115] Furthermore, it provides a way to organize, connect, and make sense of constructs from implementation science.

The conceptual model is based on the determinants identified in Papers 1-3 and their implications for upstream and downstream activities of implementation. Furthermore, it outlines some of the services provided by the pharmacists in the home care setting, and their expected innovation outcomes. The color coding illustrates the relationship between each construct.

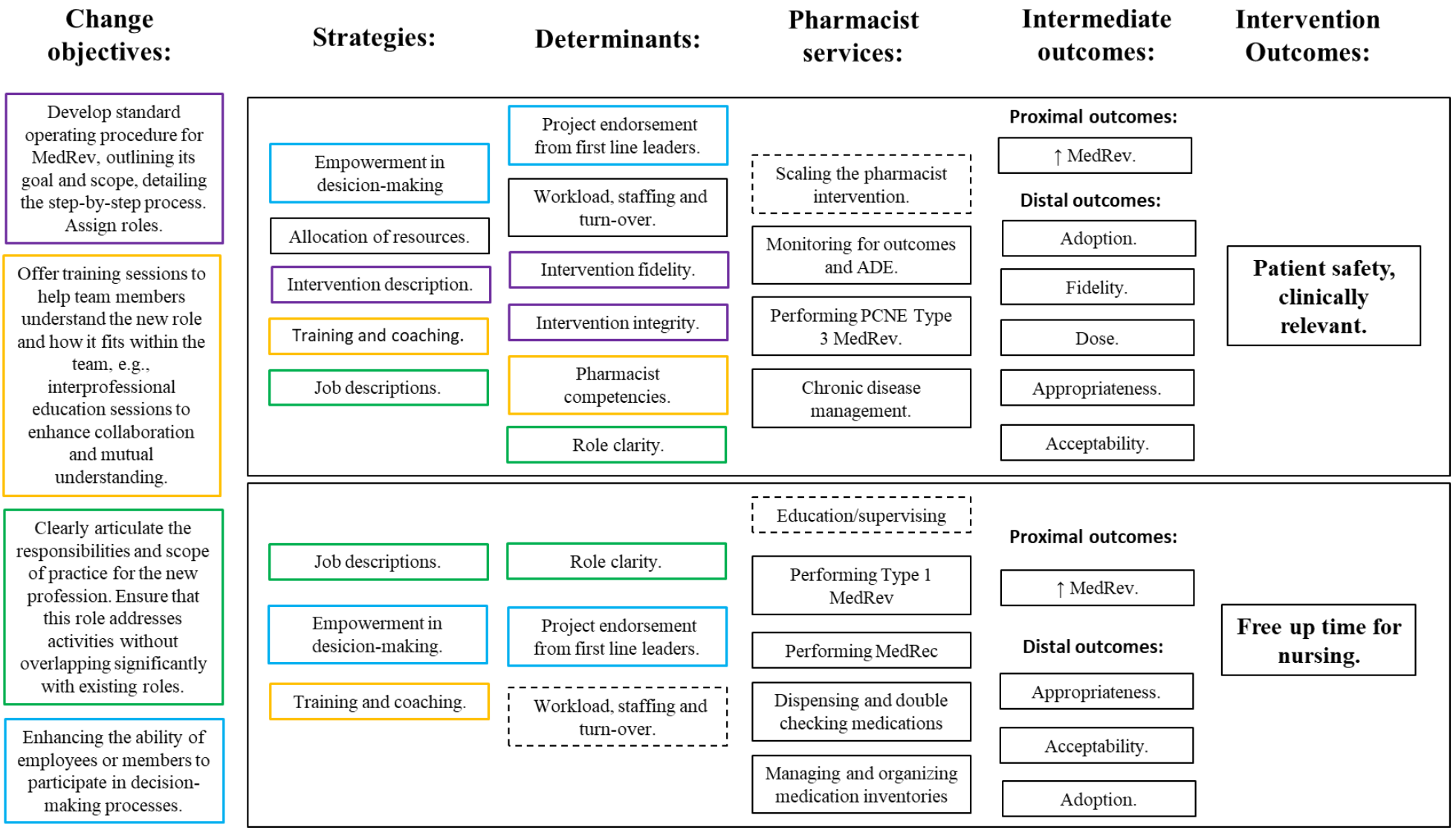

Figure 6: Conceptual model for implementing pharmacist services in primary care settings.

Based on the findings from Papers 1-3, the conceptual model proposes two dichotomous intervention outcomes. As illustrated in Figure 6, different determinants and implementation strategies come into play depending on the purpose of the pharmacists' interventions. When integrating pharmacists into a setting characterized by high workloads and turnover, there will be a tradeoff between fully utilizing the pharmacists' competencies and reducing the overall teamwork burden. According to Pharmaceutical Care Network Europe, advanced MedRevs (Type 3) include assessing medication history, performing patient interviews, and accessing clinical patient data. They are extremely resource-intensive, involving additional efforts from healthcare professionals such as nurses and general physicians. In return, they have the potential to improve patient-related outcomes, which was the overarching aim of the Home Care Pharmacist project. However, producing these outcomes will require extensive work in developing/adapting the intervention, training the interventionists, and addressing implementation outcomes, making sure the MedRev is implemented correctly and consistently (when scaled).

In Papers 1-2, non-pharmacist healthcare professionals expected the integration of pharmacists to reduce their workload, freeing up time for nursing. As illustrated in Figure 6, this expectation resonates poorly with the introduction of advanced MedRevs. Shifting medication-related tasks from nurses to pharmacists, however, could be a plug-and-play solution matching the baseline skills of a pharmacist. Compared to advanced MedRevs, a responsibility transfer from nurses to pharmacists would not require any resource allocation, but rather free up time for nursing.

7.1.2 Recommendations for future work in Norwegian Primary Care Settings

The next paragraphs in this dissertation will make suggestions on how future decision-makers and implementers should go about when adopting pharmacist services. The recommendations are not meant to be understood as sequential steps but rather as general key takeaways for improved adoption and implementation. Furthermore, some of the recommendations have implications for other steps. For example, completing a needs assessment is an antecedent to selecting adopters, as the characteristics of the innovation should align with the needs of the host setting.

7.1.2.1 Create an implementation planning team

The purpose of creating this planning team is to ensure that the process of adopting an innovation is supported by the right mix of stakeholders. Furthermore, the team should be accountable for "making it happen" by providing user-friendly innovations. Including planners and adopters will create a link between people having different opinions on the appropriateness of the innovations. The team should also have members with special expertise in implementation science and EBP. [75] Other members may include expert opinion leaders and champions. [147]

7.1.2.2 Conduct a needs assessment

Healthcare organizations considering the adoption of an innovation often look to others for inspiration. The availability of potentially useful evidence-based practices (EBP) can make the process of improving healthcare services less resource-intensive. [147] However, conducting a thorough needs assessment is the recommended starting point across several theories and theoretical frameworks. [86] Furthermore, a statement of a need should only describe the problem and not hint at any solutions. [82] For example, suggesting building a new gym to make people exercise mixes the need (facilitating exercise) with a solution (building a gym). If the actual need is to increase physical activity, building a gym does not necessarily solve this problem. Organizing community walks might be cheaper and more efficient. If the choice of an innovation precedes this diagnostic analysis of the host setting, a needs assessment can be conducted to investigate the challenges of the implementation process as well. In either case, the findings from the need assessment will give insights into the current situation and guide the actions to achieve expected outcomes. However, the subjective nature of a "need" makes it necessary for the assessment to include both factual descriptions of a problem and the opinions of those with a vested interest in the problem and its solutions.

7.1.2.3 Choosing adopters

For an innovation to be successful, the characteristics of the adopters are important. Whether the innovation already exists as an EBP or is developed *ab initio*, program planners need to choose innovation adopters wisely. Norwegian primary care settings typically include GP practices, nursing homes, and assisted living facilities (home care services). These different environments have different cultures and subcultures. Choosing staff involves asking questions regarding organizational readiness. Selecting a setting or team that is conducive to accepting and integrating new practices will improve the chances of implementation. [121] Moreover, the innovation in question must fit the needs of *each* host setting (they are not the

same across) This need should be thoroughly assessed when choosing the adopters for an innovation, preferably by using research methods such as qualitative interviews. [91]

7.1.2.4 Identify outcomes and conduct a readiness assessment

Working with an intervention such as the pharmacist-facilitated MedRev, i.e., mostly replicating an EBP in a new setting, program planners will likely turn their attention toward its effectiveness (Figure 6). This exclusive focus on clinical outcomes, e.g., reducing ADE, is a famous pitfall in implementation. If an intervention should fail, is important to know whether this was due to an ineffective intervention or ineffective implementation. Considering other more proximal outcomes of the team performance during the process of adopting new practices makes it easier to make a distinction between the two. [8] Even though a decision to adopt has been made, implementation and sustainability do not automatically follow. Implementation outcomes are intermediate outcomes to effectiveness outcomes and can help differentiate between implementation failure and intervention failure.

Identifying determinants of implementation will help address questions of why and how to refine the improvement process. The findings in this dissertation show that members of the interprofessional home care team, including their first-level leaders, needed to increase their knowledge of pharmacist services and the pharmacists' competencies. Conversely, pharmacists needed to gain insight into the existing workflows, priorities, and procedures of the home care setting. In its simplest form, implementation strategies targeting these barriers can be managed pragmatically by arranging interprofessional workshops and training sessions. Moreover, the setting or home care organization could provide continuous opportunities for professional development focused on interprofessional collaboration. To improve role clarity, and avoid over and underutilization of workforce resources, developing clear and written descriptions of each team member's roles and responsibilities should be a priority. It might also be necessary to update job descriptions for all team members to reflect the new team dynamics, and to communicate the revised job descriptions to all team members.

7.1.2.5 Selecting and operationalizing implementation strategies

Developing or choosing appropriate implementation strategies should be a high priority for the implementation planning team. Even though compiled lists of expert-recommended strategies are available, selecting the right strategy for the right improvement effort can be a

challenging task. [7,148,149] Moreover, when applied in practical situations, they tend to be underspecified, obscuring the core components of the strategy. [150]

Several frameworks advocate assessing and specifying the strategies to make them observable, reproducible, and measurable. Michie et al. stress that a strategy should represent the smallest component *"compatible with retaining the active ingredient of change"*. [151] For example, the implementation strategy "training", is too vague and ought to be more narrowly defined. Proctor et al.'s recommendations on the topic are in line with these statements. They advocate naming, defining, and specifying each strategy, making clear what the strategy is, how it is operated, and which implementation outcome it targets. [7] Furthermore, each strategy should be related to an actor, e.g., adopters, to make clear who has to do the work required to change. In Papers 1-2, determinants related mainly to the challenges of initial implementation, such as role ambiguities and mismatched expectations. Consequently, most of the change objectives in Figure 6 relate to program planners and first-level leaders (even though this is not explicitly stated in the figure).

7.2 Future research:

The findings of this dissertation suggest that future projects aiming to integrate pharmacists in primary care settings should incorporate implementation science. Priority should be given to developing working models, explaining whether the introduced changes led to improvement. This approach to narrowing the gap between EBP and enhanced patient health is endorsed by the Norwegian government.

The approach of integrating pharmacists within Norwegian primary care settings is in its infancy. Consequently, the prospects of applying implementation science within Norwegian pharmacy practice research should be favorable. Regardless of the setting, an attempt to improve healthcare should be accompanied by a theory of change, explaining how the activities of the intervention are understood to contribute to a chain of events ultimately solving the problems at hand. [152]

8 Conclusion

This dissertation has identified determinants of adopting and implementing pharmacist services in Norwegian home care settings. Furthermore, it has highlighted the complexity of operating MedRevs to produce clinical outcomes. By choosing an implementation research methodology and combining it with implementation theories and frameworks, the dissertation proposes a conceptual framework for integrating pharmacists into Norwegian primary care settings. In a Norwegian context, the work provides a new way to plan and execute pharmacy practice change. It highlights that an improvement process, adopting new services, should be initiated by a need in the host setting. Furthermore, frontline staff should be empowered in the decision-making when identifying the innovation best suited to solve the problem at hand. The process and work should be facilitated by a steering group consisting of program planners, adopters, and implementation experts.

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Appendix 1: Application REK

Alle skriftlige henvendelser om saken må sendes via REK-portalen

Du finner informasjon om REK på våre hjemmesider rekportalen.no

REK
REGIONALE KOMITEER FOR MEDISINSK OG HELSEFAGLIG FORSNINGSETIKK

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK nord	Monika Rydland	77646140	14.04.2020	131464
			Deres referanse:	

Elin Christina Lehnbom

Följeforksning i kommunhemtjänsten

Forskningsansvarlig: UiT Norges arktiske universitet

Søker: Elin Christina Lehnbom

Søkers beskrivelse av formål:

Tromsø kommune håller på att omstrukturera sitt arbetssätt. Hjemmetjensten är indelad i 5 soner och 1 sone (Midtbyen) har anstatt en farmasøyt som ska ingå i ett tvärprofessionellt team. Dette team ska åka hem till nya hjemmetjenst pasienter innom 72 timmar för att evaluera vilka tjenster de behöver. Farmasøyten ska bland annet bidra med att samstemme legemiddel og gjennomføre legemiddelgjennomgang.
Vi ønsker å evaluere effekten av det nye arbetssätt. I det första delprojektet, vilken denna söknad gäller, ska en stipendiat intervjua det tvärprofessionellt team om hur de jobbar i dag (med fokus på läkemedel) och vad de önskar av en farmasøyt.

REKs vurdering

Vi viser til forespørsel om fremleggingsplikt for ovennevnte forskningsprosjekt mottatt 14.04.2020. Forespørselen er behandlet av sekretariatet i REK nord på delegert fullmakt fra komiteen, med hjemmel i forskningsetikkforskriften § 7, første ledd, tredje punktum.

Veiledning vedrørende framleggingsplikt

De prosjekt som skal framlegges for REK er prosjekt som dreier seg om *«medisinsk og helsefaglig forskning på mennesker, humant biologisk materiale eller helseopplysninger»*, jf. helseforskningsloven § 2. *«Medisinsk og helsefaglig forskning»* er i § 4 a) definert som *«virksomhet som utføres med vitenskapelig metodikk for å skaffe til veie ny kunnskap om*

helse og sykdom». Det er altså formålet med studien som avgjør om et prosjekt skal anses som framleggelsespliktig for REK eller ikke.

Prosjektets formål er i forespørsel om fremleggingspikt beskrevet slik:*«Vi ønsker å evaluere effekten av det nye arbetssätt. I det första delprojektet, vilken denna söknad gäller, ska en stipendiat intervjua det tvärprofessionellt team om hur de jobbar i dag (med fokus på läkemedel) och vad de önskar av en farmasøyt.»*

Prosjektet, slik det er beskrevet i forespørsel og prosjektplan, fremstår ikke som et medisinsk og helsefaglig forskningsprosjekt som faller innenfor helseforskningsloven.

Prosjektet er ikke framleggingspliktig jf. helseforskningsloven § 2.

Vi gjør oppmerksom på at det etter personopplysningsloven må foreligge et behandlingsgrunnlag etter personvernforordningen. Prosjektet må forankres i egen institusjon.

REK forutsetter at deltakerne skal overholde sin lovpålagte taushetsplikt.

Vedtak

Ikke fremleggspliktig

Med vennlig hilsen

May Britt Rossvoll sekretariatsleder

Monika Rydland rådgiver

Paper 1

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RESEARCH ARTICLE

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'Illuminating determinants of implementation of non-dispensing pharmacist services in home care: a qualitative interview study'

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ABSTRACT

Objectives: Medication errors are leading causes of hospitalization and death in western countries and WHO encourages health care providers to implement non-dispensing pharmacist services in primary care to improve medication work. However, these services struggle to provide any impact on clinical outcomes. We wanted to explore health care professionals' views on medication work to illuminate determinants of the implementation success. The research was designed to inform and adapt implementation strategies for non-dispensing pharmacist services.
Design: Semi-structured interview study with nine healthcare professionals.
Setting: Four Norwegian home care wards.
Subjects: Nine healthcare professionals working at different wards within one home care unit.
Main outcome measures: Determinants of implementation outcomes.
Results: Contextual determinants of the implementation process were mainly related to characteristics of the setting such as poorly designed information systems, work overload, and chaotic work environments. The identified barriers question the innovation's appropriateness related to the setting's needs but also provide possibilities for tailoring pharmacist services to local medication work issues. The observable positive effects and the perceived advantage of the pharmacist services are likely to facilitate the implementation process.
Conclusion: Our study provided information on contextual elements that influence the implementation process of non-dispensing pharmacist services. Awareness of these factors can help develop strategies to help the organization succeed in in achieving program outcomes.

KEY POINTS

- The results in this study illuminate barriers and facilitators to the implementation of pharmacist services in a home care setting.
- Existing medication work methods and poor information handover systems are likely to counteract outcomes of the pharmacist services and inflict unfavorable conditions for implementation.
- Healthcare professionals' perception of increased medication work support and confidence in pharmacist skills suggest innovation acceptability and serve as indicators of implementation success.

The identified barriers to improving medication work provide opportunities to develop tailored strategies to enhance the implementation of non-dispensing pharmacist services.

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Introduction

Medication errors are diverse and persistent matters within health care and the associated global cost is estimated to be $42 billion annually [1]. The erroneous use of medications is a leading cause of death and hospitalization in western countries and the prevention of avoidable harm is one of the most pressing issues in the field of patient safety. With an increasingly aging population, the incidence of co-morbidity and polypharmacy make patient care even more challenging as the risk of medication-related injury increases with the number of medications taken [2].

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Adverse events caused by medication errors originate from a multitude of circumstances within both medical practice and medicines management and multifaceted approaches are needed to lower error rates [3]. Non-dispensing pharmacist interventions have proven to be beneficial in the reduction of adverse drug events within hospital settings [4] and pharmacist services are recognized as important measures to identify inappropriate medications and improve patient outcomes [1,5,6]. The integration of pharmacists into multidisciplinary healthcare teams has progressively gained interest but the success of improvement work requires a good fit between the new service and its context [7]. Moreover, the introduction of improvement services in organizations tends to be driven more by solutions and less by problems [8].

Adoption of new healthcare delivery models often requires an altering of existing practices and work methods. Moreover, introducing changes in healthcare is challenging and new, practice-improving services are often put in place without sufficient knowledge of factors that might emerge to influence the expected program outcomes [9]. The delivery context of an innovation and the organizational culture in which the innovation is applied encompass a dynamic network of factors and agents that both interact and act in parallel to each other. As such, opportunities for barriers are widespread and interconnected issues can cause unexpected chains of dependencies for seemingly isolated challenges. Furthermore, health care professionals are not passive recipients of innovation, but rather agents that are involved as important contributors to the process. Their actions, feelings, and attitudes towards the practice change add complexity to the innovation uptake [10].

The term *implementation* signifies a planned and systematic introduction of changes to the existing practices within a setting, often foregone by pre-implementation stages of contemplation, exploration, and decision-making. This comprehensive and active approach to integrating new services is associated with increased success in achieving the desired program outcomes [11]. A pivotal part of the implementation process in healthcare organizations is to gain knowledge on actual performance within a setting as this can reveal potential determinants of innovation success [12]. Moreover, understanding root causes, where they originate, how they are sustained, and whether they are susceptible to the chosen intervention can help develop and tailor services to local needs [13,14]. If the innovation should fail, this assessment can help explain to what degree the context and the implementation process rather than the innovation itself contributed to the failure.

In this study, the aim was to illuminate elements that influence the implementation of new improvement services within a primary care setting.

Materials and methods

The research team and reflexivity

This study was designed to inform on implementation strategies for non-dispensing pharmacist services and to alleviate potential barriers to improved medication work (innovation outcomes). It is part of a quality improvement project which seeks to develop and implement pharmacist services within a home care setting to create a positive change related to medication management. Stakeholders from the municipality health administration were actively involved in the planning of this study.

The research team included one female pharmacist (ECL), two male pharmacists (KEB and KHH), and one male general practitioner (TR). The first author (KEB) was a PhD-student with experience in managing community pharmacies. The rest of the research team (ECL, KHH, and TR) had backgrounds in health services research. All authors were familiar with the health care system and settings in which the research was performed.

The research setting

Home health care services play an important role in preventing avoidable illness and hospitalization. Norwegian home care services are administered by municipalities and granted upon application. Medication work is a large part of this service and medication errors are frequently reported [15].

Data for this study were collected from four wards within one home care unit which, at the time of the study, was the only Norwegian home care unit having employed a full-time pharmacist. This specific approach to the improvement of medication work is novel in Norway, and to our knowledge, the home care setting in which we collected data was the first of its kind.

Study design and data collection

The authors collected qualitative data to answer the research questions:

- What are the issues and challenges within medicines management?

- How do workflows influence the implementation process?
- How do the new services align with existing systems and practices?

To address these questions, the researchers participated in staff meetings (KEB), conducted observation visits with healthcare professionals (KEB), and interviewed healthcare professionals (KEB). The home care settings guidelines and procedures for medicines management were reviewed to better understand each part of the process.

Informants were recruited from within the specific setting of interest. Information regarding the research project was sent *via* e-mail to five ward managers who recruited participants from within their wards. The final composition of informants was a result of both purposive and convenience sampling strategies. Individuals were eligible to participate if they were actively involved in medication work. Moreover, the authors wanted to include health personnel from all five wards to capture potential differences between each site.

The development of the interview guide and the process of interviewing was inspired by a broader sense of phenomenological approach related to Elton Mayos method as described by Kvale, S., and Brinkmann, S [16]. Interview questions were deliberately broad at the start of the interview to avoid leading the participant in any direction, e.g. 'can you tell me about your experiences with medication work?'. The interview guide is provided in Supplementary Appendix A.

Ten healthcare professionals aged 20–60 years signed a consent to participate in our study but one participant dropped out due to illness. As such, a total of nine interviews were conducted. The participants' backgrounds were registered nurses: 4, 'social educators (Norwegian: vernepleier' [1]): 2, auxiliary nurses: 3, and they were not acquainted with the research team.

'Social educator' is a translation of the Norwegian 'vernepleier', a health care professional frequently involved in medication management [1].

Semi-structured interviews were carried out in April and May of 2021. Each interview lasted for 30–45 min and was audiotaped *via* Teams®. All interviews were carried out and transcribed verbatim by one researcher (KEB). Field notes were made after each interview. All participants received a 'thank you' voucher worth €50 upon completion of the interview.

The on-site pharmacist and the non-dispensing pharmacist services

The role of pharmacists in Norway has traditionally been limited to medication dispensing activities within community pharmacies. In general, clinical pharmacist positions are rare, and few attempts have been made to integrate pharmacists into home care settings. Moreover, pharmacy residency programs do not exist in Norway and clinical training can only be obtained through work experience. In the setting we researched, the on-site pharmacist had clinical experience from a previous position.

The scope of the pharmacist services in the research setting was mostly determined by the pharmacist's competencies but to some extent influenced by the healthcare team's total workload. Standard operating procedures regulated parts of the medication work but the pharmacist was empowered to shape the new and innovative role within broader boundaries of improvement work.

Based on pharmacist observation visits and the information provided by the participants in this study we identified the non-dispensing services in the setting to target both patients (basic medication review, medicines reconciliation, education/training) and healthcare professionals (education/training, organization of medication work). The pharmacist's working hours were Monday to Friday from 8 am to 4 pm.

Analysis and theoretical framework

The movement of evidence-based practices into healthcare settings can be depicted as a continuum with two distinct processes on each extreme: 'let it happen' (passive diffusion) and 'make it happen' (implementation) [10]. The results in this study pertain to an ongoing uptake of improvement services in a home care setting and data were collected approximately 12 months into this process. Supplementary Table 1 provides a theoretical lens to the initiation and implementation process in organizations and highlights elements that have been associated with implementation success [8].

Several theories of implementation and complexity were reviewed to better understand how contextual factors might influence the diffusion process and program outcomes of improvement services in healthcare settings [17]. Determinants of implementation are often similarly arranged across different theories and frameworks and related to the following features of an organization: the innovation (a new service or practice), the inner setting (users of the innovation), characteristics

of individuals, the outer setting (regulation, economic structures, policies), and the process [18]. In this study, our data relate to only two of these organizational features: the innovation, and the inner setting. Supplementary Table 2 provides an overview of how constructs from theoretical models can help assess determinants of implementation within these two characteristics of an organization .

The analysis was inspired by a thematic 'bottom-up' approach and consisted of the following steps: reading and re-reading transcripts, identification of meaning units relevant to our research questions, and condensing of these meaning units. Condensed meaning units were coded within each interview and the most relevant codes for our research questions were abstracted and clustered into themes. This process was iterative and carried out for each interview, transcripts were revisited several times during the research process. The results of the individual interviews were compared and ultimately combined in a cross-sectional analysis, and reviewed by all researchers (KEB, ECL, KHH, and TR). In the final stages of the analysis, domains and constructs from determinant frameworks guided the clustering of codes into themes.

Ethics and consent

The research is approved by the Norwegian Center for Research Data (NSD). All participants signed an informed consent document. The document stated that health personnel had the right to withdraw from participation in the research at any time without providing any reason. This information was repeated to participants by the interviewer (KEB) upon completion of the interview.

Results

The findings in this study are organized and related to two contextual domains that overlap between several determinant frameworks: the setting and the innovation [10].

Characteristics of the setting

Workload, stress, and interruptions

Constructs like high workload, time pressure, and stress were reported across all interviews and participants experienced that they more often than not struggled to find time to complete medication management. Some estimated that they spent as much as 50% of their time on medication management and that they consequently had less time to nurse patients. Moreover, participants reported that they experienced time pressure to be the cause of frequent and repeating incidents of medication errors. Other utterances expressed concerns regarding the number of interruptions health personnel experienced during medication management. These interruptions frequently made health personnel unable to complete assignments during their shift:

> Interruptions during medication work are very common: telephones ring constantly and people are knocking on the door to ask questions. (Healthcare provider/P1)

Information handover and communication

Participants reported that information handover from the hospital to the home care setting was troublesome and defective. Moreover, due to a lack of integrated data systems, the reconciliation of medication lists depended on health personnel's ability to gather information by phone and electronic messages. Nurses reported that they had to cross-examine medication lists from the hospital with medication lists from the home care electronic system as well as with the general physician's lists (GP) and lists from the community pharmacy. This work often required making phone calls to the hospital and the GP and some of the informants described that they spent several hours getting the necessary information by phone.

Poor communication was also related to the lack of proximity to a physician. Most informants experienced this as an obstacle to accessing information. Medication list discrepancies were often sought solved by sending electronic messages to the patient's GP. One participant commented:

> If we discover any medication discrepancies we send an electronic message to the GP to resolve the issue. They have a deadline to reply within 5 days and it might take a week before the error is corrected. (Healthcare provider/P3)

Informants reported that additional time was spent sending reminders to GPs urging them to respond to these messages. This situation was perceived as frustrating, and it made it difficult to solve pressing medication-related problems. Fridays were reported to be particularly difficult days to run into any medication-related issues. Any response from the GP would most likely be delayed over the weekend and into the beginning of the next week leaving health personnel and their patients in a situation of insecurity.

Work processes within the home care organization

The home care setting's preferred way of dispensing medication was reported to be automated dose dispensing (ADD). A challenge with this system was that any changes to the patient's medication regimen had to be reported within a deadline to be effectuated and included in the next medication interval. One account in our data described a situation in which a tablet was unintentionally omitted from the patient's ADD for two months. The perception of this system as unreliable caused nurses to spend several hours every other week to make sure the pre-packed multi-doses complied with the latest version of the patient's medication lists. As a result of low flexibility within the ADD system, nurses reported that they spent a fair amount of time re-packing pre-dispensed multi-doses. In case of a discrepancy, which occurred frequently, the pre-dispensed multi-dose was opened, medication removed or added before the multi-dose package or pouch was ultimately sealed and information updated:

> A large part of the day is spent preparing medications. Even though most patients receive pre-dispensed medication discrepancies frequently make us re-dispense or manually dispense the medication, every week on several occasions. (Healthcare provider/P7)

Adherence to medication safeguards and guidelines

According to municipal standard guidelines for medication management, electronic documentation was mandatory for some medication work. A reported problem was that health care professionals in the home care setting did not comply with these guidelines and that steps in the process of administering medication to patients were documented on a vast amount of *ad-hoc* printed paper lists. Some participants described as many as six additional printed lists that were found to be used in parallel to the electronic list. This deviation from the standard electronic documentation made it difficult to keep track of medication errors and medication-related discrepancies:

> We often forget to document administered medication during parts of the day when it is most hectic. This causes us to miss out on whether medication has been administered to the patient or not. (Healthcare provider/P2)

One participant described that medication errors often were reported by word of mouth and thus passed on to someone other than the person that discovered the error. The same participant pointed out that this way of reporting medication errors often led to a situation where errors were not documented at all. Moreover, interviewees highlighted medication errors at the point of administration as a pronounced challenge and that these kinds of errors re-occurred identically. One of the interviewed nurses described why these discrepancies occur:

> Stress, insufficient staffing, and working in the automatic mode. We do not bother to read the text on the medication. Each dose is thoroughly labeled with the name of the patient, name of the medication, day, and time for dosage. You wouldn't think it was possible to mess it up, but we do. (Healthcare provider/P7)

Characteristics of the innovation

The pharmacist as a provider of new skills to the intradisciplinary team

The on-site pharmacist was reported to help increase medication knowledge among health personnel through training and education. Some participants reported that this aspect was one of the key features of a clinical pharmacist service and placed the pharmacist's medicines knowledge above both nurses and GPs based on perceived pharmacological skills. Some participants emphasized the clinical importance of including the pharmacist as part of a multidisciplinary team to be able to handle increasingly complex patients with co-morbidities and polypharmacy. Moreover, the pharmacist's ability to identify and solve medication-related issues, i.e. drug-drug interactions or other challenges related to pharmacology, was reported across several accounts. Reflecting on these issues, one participant expressed satisfaction with the collaboration with *community pharmacists* as well, even though the same participant found comfort in knowing that they now had access to a pharmacist located on-site.

The pharmacist as a target of medication-related inquiries

The scope of medication-related inquiries within the home care setting was reported to be vast and thus access to an on-site pharmacist was perceived as valuable and pertinent. The co-location was reported to be particularly important in situations where it was difficult to contact the patient's GP. Moreover, healthcare workers' ability to speak to the pharmacist face to face was perceived as extremely important across several accounts. As such, participants reported that inquiries previously directed towards physicians frequently were directed toward the pharmacist. Also, some participants described how they evaded medication inquiries and expressed a sense of relief that in the presence of a pharmacist, they were no longer the

target for medication-related questions from colleagues. They justified these actions by assuming that the pharmacist was innately more capable of answering inquiries related to medication work. One participant commented:

> Before we had access to the on-site pharmacist we had to deal with medication-related inquiries on our own. We had to spend time reading, searching online, and writing electronic messages to the GP. Now we use the pharmacist to manage all this work, and it saves us a lot of time. (Healthcare provider/P8)

And:

> When someone approaches me with medication-related inquiries I reply: 'Go talk to the pharmacist, she knows more about this topic than me' (Healthcare provider/P6)

The pharmacist is only one piece in the medication improvement puzzle

Participants reported that the on-site pharmacist had reduced the total workload by actively adopting their work tasks. One example was the medicines reconciliation, which some of the participants associated with a degree of complexity. Despite each step being described in a standard operating procedure, they took for granted that the on-site pharmacist was better skilled to carry out this work.

Even though most participants expressed unanimous satisfaction with the pharmacist's work few accounts articulated neither knowledge of, nor experience with, specific services. Moreover, some utterances were ambivalent about the impact of pharmacist services on medication work improvement; when probed on whether or not the participants would have chosen a pharmacist to improve medication work in the setting some accounts contained an explicit preference for health professions like nurses and physicians in place of the pharmacist. Nurses and physicians were perceived to be able to solve medication-related issues more effectively.

Discussion

Barriers and facilitators related to the provision of non-pharmacist services have been reported for diverse healthcare organizations and specific interventions [19–21]. This study describes healthcare professionals' views on perceived issues and challenges within medication work. It also presents participants' perceptions of the advantage of the innovation, non-dispensing pharmacist services. As such, our data provide information that shed light on the context in which the new services are adopted. Supplementary Tables 1 and 2 provide models from implementation science to help conceptualize how these contextual elements might influence the implementation process and program outcomes.

Stakeholders' satisfaction with the innovation

Certain attributes of a new service tend to be favorable for the implementation process. One innovation feature that has been associated with successful adoption is captured in the theoretical construction of 'relative advantage', i.e. if involved stakeholders perceive a clear and visible advantage of the new services compared to what is currently used, implementation is more likely to succeed [10]. A similar implementation construct, 'acceptability', goes beyond general contentment and highlights that stakeholder satisfaction should be related to particular actions or specific services [22]. Moreover, an assessment of 'acceptability' should be based on the stakeholders' knowledge of and experience with the services content.

The participants in our study articulated both specific knowledge of how the innovative services could facilitate medication work, and an appreciation of access to in-situ pharmaceutical knowledge. They portrayed the pharmacist as a versatile resource and unanimously pointed to optimizing the patients' medication lists as an important component of the pharmacist intervention. Moreover, the benefits of pharmacist services were reported to be observable through social support, increased medication-related knowledge among health personnel, and improved benchmarking on quality indicators. Some accounts in our data compared aspects of medication work before and after the introduction of the innovation with specific examples of how several medication-related processes had improved. Medicines reconciliation was one such process.

Is the situation intolerable without pharmacist services?

Implementation is more likely to succeed if health personnel within a setting is convinced that the innovation or adapted service is urgently needed [10,18]. The implementation construct 'tension for change' relates to how stakeholders perceive the current situation i.e. do they find the situation intolerable or sense an acute need to change? Many of the reported medication issues in our study appeared to be seemingly innovation-stabile, i.e. they did not necessarily

pertain to the absence of pharmacological skills but rather to a stressful environment caused by staffing ratios.

High workloads were perceived as the root cause of medication work challenges and medication errors in the home care setting. Participants reported this core issue to trigger both stress and automaticity, i.e. performing work tasks independent of conscious control and attention. Insufficient staffing, an antecedent of increased workload, was another frequently reported issue and participants stated that staffing-induced stress inflicted an element of chaos on medication work and caused health personnel to pay less attention to procedures and systems safeguards. Low staffing levels were reported as persistent issues in the setting caused by both vacancies and sick leave. Reflecting on this chronic medication work condition, some participants expressed that they would prefer to replace the pharmacist with registered nurses or physicians who had the authority to resolve urgent medication-related issues. These accounts illuminate the legislative boundaries of Norwegian pharmacists' and thus their limits of immediate impact on medication work: unlike physicians, they are not authorized to make any changes to medications, i.e. they cannot prescribe/deprescribe or alter doses. And unlike registered nurses, pharmacists do not have the authority to administer injections. Moreover, these data illuminate how latent and structural characteristics of the setting will influence medication work regardless of innovation delivery. Also, scant resources (e.g. deficient staffing) related to normal routine activities, work overload, and chaotic work environments are recognized to impose challenges to the implementation process [12,23,24].

How do the new services fit with the setting?

Theoretical models like 'appropriateness' and 'compatibility' refer to how well an intervention fits with the setting's latent systems and existing ways of working [18]. Alternatively, the term 'Lack of a cohesive mission', describes situations where actions and procedures within an organization conflict with the mission of the innovation [12]. It is important to emphasize that the assessment of 'fit' relates to the implantation process and, in our case, not to whether pharmacist services can improve medication work in the setting.

Accounts in our research described examples of everyday behaviors that counteracted the stated mission of the innovation, like neglecting to document medication errors and unwillingness to adhere to standard medication work procedures. These malpractices are found to characterize organizational cultures that grapple to improve quality [25] but they also make possible targets for tailored pharmacist services within the home care setting.

A root cause of medication-related issues was the lack of information technology infrastructure in the home care setting; poor information handover made it difficult to obtain an accurate and up-to-date medication list for patients. One medication-work malpractice related to this latent characteristic of the setting was illuminated through the situation in which missing information caused nurses to spend several hours *re-dispensing* machine-packed multi-dose medications every week. Automated dose dispensing (ADD) is a service targeted at people using multiple medications. Medicines are machine-packed into multi-dose units and thoroughly labeled according to the patients' reconciled medication list. Even though there have been raised questions concerning the excellence of the ADD system over the last years, unit dosing is documented to improve rates of medication errors [4]. Moreover, the use of ADD is expected to reduce healthcare professionals' workload, and decrease the medication cost [26]. The act of re-dispensing machine-packed medications is likely to counteract the advantages of ADD and increase the risk of medication error as additional steps are introduced into the medication work process [27]. Moreover, these actions will potentially thwart any preceding medication improvement services made by the pharmacist, e.g. medicines reconciliation [10,19–21,23–27].

Validity of the findings

Data collection

The recruitment process was inspired by the concept of information power [28]. The authors had the opportunity to continue the data collection but chose to stop after ten planned interviews. This decision was based on the fact that our informants had firsthand information about the phenomenon of interest. Moreover, the phenomenon was familiar and well-known to both the participants and the researchers. The authors believe the number of participants was sufficient to provide answers to the research questions. Even though a higher number of informants might provide a stronger foundation for our results, data from a few individuals with first-hand knowledge can provide sufficient information on the core elements of medication work [29].

Thematizing the interview

Data were collected during an early stage of the innovation-decision process and the research setting

encompassed a small number of health care professionals. The on-site pharmacist was well known to everyone in the setting and there were grand expectations of the effects of this novel initiative. Descriptions of the pharmacist as 'mellow' and 'nice' were frequent in most of the participants' utterances. As three of the researchers are pharmacists, we took precautions to avoid the self-assumption that pharmacist services are the sole solution to improved medication safety. We applied an interview technique inspired by a neo-positivistic approach where the interview guide focused on the overarching phenomenon of medication work [30]. Questions were deliberately broad and open-ended to provide a more exploratory function. Utterances regarding the pharmacist and pharmacist services were probed for substance and clarity.

Limitations

As this research is part of a quality improvement project the results pertain only to the setting in which the informants were recruited. Participants were recruited from one home care unit only and there were fewer participants recruited from the more hectic wards within the unit. A possible reason is that they did not have the time to participate. Because of this, we might have missed out on information that could have provided us with additional important perspectives on medication work.

Conclusion

This study illuminated several practice-related issues that are likely to influence the pharmacist's ability to improve the medication work process in the setting. The most intolerable conditions reported by participants in this research, like staffing ratios and poor information handover, were latent and structural characteristics of the organization. These circumstances were reported to cause unfavorable environments for medication work resulting in medication errors, adverse events, and a suboptimal implementation climate. However, downstream issues of these root causes of medication error provide possible targets for tailored pharmacist interventions and might inform implementation strategies to better match the innovation with medication work challenges. Moreover, stakeholders' clear perception of the pharmacist as better equipped to solve medication-related work increases the likelihood of successful implementation.

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Ethical approval

The research is approved by the Norwegian Center for Research Data (NSD), ref. 534999. The study was not eligible for ethical approval, ref. approval number 131464 (Regional Ethical Committee).

Consent form

All participants signed an informed consent document. The document stated that health personnel had the right to withdraw from participation in the research at any time without providing any reason. This information was repeated to participants by the interviewer (KEB) upon completion of the interview

Disclosure statement

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Paper 2

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Barriers and facilitators of pharmacists' integration in a multidisciplinary home care team: a qualitative interview study based on the normalization process theory

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Barriers and facilitators of pharmacists' integration in a multidisciplinary home care team: a qualitative interview study based on the normalization process theory

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Abstract

Background There is a growing recognition of multidisciplinary practices as the most rational approach to providing better and more efficient healthcare services. Pharmacists are increasingly integrated into primary care teams, but there is no universal approach to implementing pharmacist services across healthcare settings. In Norway, most pharmacists work in pharmacies, with very few employed outside this traditional setting. The home care workforce is primarily made up of nurses, assistant nurses, and healthcare assistants. General practitioners (GPs) are not based in the same location as home care staff. This study utilized the Normalization Process Theory (NPT) to conduct a process evaluation of the integration of pharmacists in a Norwegian home care setting. Our aim was to identify barriers and facilitators to optimal utilization of pharmacist services within a multidisciplinary team.

Methods Semi-structured interviews ($n=9$) were conducted with home care unit leaders, ward managers, registered nurses, and pharmacists in Norway, in November 2022-February 2023. Constructs from the NPT were applied to qualitative data.

Results Findings from this study pertain to the four constructs of the NPT. Healthcare professionals struggled to conceptualize the pharmacists' competencies and there were no collectively agreed-upon objectives of the intervention. Consequently, some participants questioned the necessity of pharmacist integration. Further, participants reported conflicting preferences regarding how to best utilize medication-optimizing services in everyday work. A lack of stakeholder empowerment was reported across all participants. Moreover, home care unit leaders and managers reported being uninformed of their roles and responsibilities related to the implementation process. However, the presence of pharmacists and their services were well received in the setting. Moreover, participants reported that pharmacists' contributions positively impacted the multidisciplinary practice.

Conclusion Introducing new work methods into clinical practice is a complex task that demands expertise in implementation. Using the NTP model helped pinpoint factors that affect how pharmacists' skills are utilized in a

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home care setting. Insights from this study can inform the development of tailored implementation strategies to improve pharmacist integration in a multidisciplinary team.

Keywords Qualitative, Pharmacist, Implementation, Home care, Normalization process theory

Background

Primary care services are acknowledged as crucial for promoting the overall well-being of individuals and communities [1]. Serving as the initial point of contact for people with chronic illness, they are often regarded as the backbone of health systems in many countries. Offering holistic and continuous care for patients and their families, accessible and functional primary health services can help reduce the burden of avoidable illness and injury.

It is well established from a variety of studies that primary care services are under severe pressure. The causes of this emerging crisis are multifaceted, with the aging population, growing clinical complexities, and workforce shortages being primary contributors [2]. Addressing these issues necessitates an investment in professional development, and multidisciplinary practices are recognized as a rational approach to better and more efficient patient care. However, ensuring optimal use of human resources and competencies while maintaining the coverage and reach of high-quality services requires a redistribution of labor among healthcare workers.

There is growing recognition of the beneficial contributions pharmacists can make in addressing healthcare challenges and improving patient outcomes [3, 4]. The global challenges of polypharmacy and co-morbidity have expanded pharmacists' scope of practice beyond drug dispensing and countries like the US, Canada, the UK, and Australia have made substantial advancements in utilizing pharmacists' competencies in primary care settings [5]. However, integrating new professions within multidisciplinary teams is a complicated process and evidence suggests that optimal utilization of newly embedded competencies is prone to several barriers [6, 7].

The success of a new program or an intervention is contingent not only on its inherent efficacy but also on the engagement and buy-in of stakeholders, alignment with existing workflows, and the capacity of the system to support change. During the early phases of implementation, staff are generally supportive and committed to a new program. This optimism is partly driven by the anticipation of positive outcomes. However, the chance of relapse or failure is considerable as the day-to-day challenges of implementation become apparent [6].

Sustainability, which refers to the continuation of programs and behaviors beyond the initial stages of adoption, presents a significant challenge in implementation practice [8]. A growing body of literature reflects the active and important role of context in this process [9]. Consequently, recurring evaluations are pivotal to maintaining the benefits of an intervention; analyzing team performance reveals whether change is under way and improvement is recognized [10]. These assessments are important for each new program as implementation strategies are likely to be more effective when they are customized to specific determinants [6].

This study set out to perform a process evaluation of the integration of pharmacists in a Norwegian home care setting. Our aim was to identify barriers and facilitators to optimal utilization of pharmacist services within a multidisciplinary team.

Methods

Norwegian primary care

In Norway, municipalities are at the lowest level of public administration [11]. They are responsible for managing and providing primary care as part of the public health system. Norwegian primary care comprises services such as general practitioners (GP), nursing homes, and home care.

Norwegian home care services

Home care enterprises in Norway provide health and social care services to people who live in their own home or in residencies within a community. The comprehensive process of coordinating, optimizing, and dispensing medications is a major part of these services. Norwegian home care settings are typically organized in the following manners: [12]

1. Community dwellings with a co-located staff (> 50%).
2. Ambulatory services provided to people living in their own homes (15%).
3. A combination of 1 and 2. (14%)

In contrast to nursing homes, physicians are not co-located with the staff base in home care settings. Each home care patient attends to a general physician (GP) of their own choice. Even though GPs play an instrumental role in securing the appropriate use of health services for local communities, human resources in Norwegian home care settings comprise mainly registered nurses, assistant nurses, and assistant healthcare workers.

Health workforce shortages

Like other European countries, Norway is experiencing a severe shortage of nursing personnel, and statistical models predict an under-coverage of 13.000 registered nurses by 2030 [13]. To further complicate this issue,

municipalities grapple with a crisis in GP recruitment [14].

Characteristics of pharmacists working in Norway

Norwegian pharmacists work predominantly in community pharmacies. Community pharmacies are owned by three major international pharmacy chains, each of which is vertically integrated with a pharmaceutical wholesaler. These pharmacies operate as highly commercial businesses and are standalone entities separated from both nursing homes and home care settings. Norwegian pharmacists are not authorized to (de)prescribe medications.

Despite Norwegian health authorities advocating for more focus on reducing medication errors in primary care, there is no national policy for integrating pharmacists in these settings. There have been scattered and moderately successful initiatives to implement pharmacist services within both nursing homes and home care settings [15, 16]. These novel initiatives have been driven by local stakeholders and innovative municipalities.

The normalization process theory (NPT)

The NPT was developed to address the difficulties of implementing complex interventions in healthcare settings [17]. It is concerned with practical problem-solving at the micro-levels of an organization.

May and colleagues describe normalization as *"the embedding of (…) an organizational change as a routine and taken-for-granted element of clinical practice"* [18]. The NPT views the process of embedding and integration of these changes as the contingency of work (implementation). As such, the way work is produced and organized in a setting will affect whether a practice becomes integrated into daily routines. Drawing on findings from empirical studies, the NPT proposes four determinants that influence the embedding of a new practice. Table 1 outlines this study's operationalization of the NPTs determinants as described by May et al [17, 19, 20]. All constructs and sub-constructs are not covered equally in our analysis but the table gives a comprehensive overview of relevant implementation aspects that guided the interpretation of our data.

The concept of integration

The term integration can be operationalized in diverse ways. Walshe and Smith provide a conceptual framework for assessing the degree of integration into a team related to the 'harder' aspects of work, such as job fraction, and access to information systems [21]. This approach to integration assessment is less suited for our study as the pharmacists in our research are full-time salaried, on-site workers.

The NPT relates the terms embedding and integration to the 'softer' dimensions of an organization such as the interplay between the practice itself and individuals in the social environment in which the implementation takes place. Our research pertains to the definition of integration as a result of successful implementation work, i.e., *"the social process of bringing a practice into action."* [22].

Objectives

This study collected qualitative data to answer research questions related to an organization's readiness to utilize the pharmacists' competencies:

Table 1 operationalization of NPT constructs as derived from May et al. [17, 19, 20]

***Coherence*:** **How do participants understand and make sense of the new work methods?**	***Cognitive participation*:** **How do participants commit to and engage in the new work methods?**	***Collective action*:** **How are participants organized to facilitate the enacting of the new work methods?**	***Reflexive monitoring*:** **How do participants appraise and reflect on the new work methods?**
Differentiation: Do the actors perceive the pharmacist services as innovative?	*Initiation*: How are actors motivated to implement pharmacist services?	*Interactional workability*: What is the role of each participant in interacting with the pharmacist services?	*Individual appraisal*: How do actors assess the value and effectiveness of pharmacist services?
Individual specification: How do stakeholders conceptualize pharmacist services?	*Enrolment*: How are actors organized to participate in the new work practice?	*Relational integration*: Does the team have the required knowledge to utilize the pharmacist's services?	*Systemization*: What rationalities underpin the judgments of the pharmacist services (informal/formal)
Communal specification: Is there a shared understanding of the objectives of the pharmacist services?	*Legitimation*: How do stakeholders achieve 'buy-in' for the pharmacist services?	*Skill-set workability*: How are actors trained and organized to implement pharmacist services?	*Communal appraisal*: How do stakeholders collectively judge the value and effectiveness of pharmacist services?
Internalization: Do stakeholders understand the potential and value of pharmacist services?	*Activation*: How are pharmacists' work methods effectively operationalized within the home care setting?	*Contextual integration*: How are resources organized and allocated to support the integration of pharmacist services?	*Reconfiguration*: How are the pharmacist services modified and reconstructed based on evaluations?

- What is the non-pharmacist healthcare professional's knowledge, beliefs, and expectations of the pharmacists and the pharmacist services?
- What are the pharmacists' expectations and experiences using their competencies within a home care setting?
- How do leaders engage and organize team members in integrating a new profession and work methods?

Study design

This was a qualitative interview study designed to inform on implementation strategies to integrate pharmacists into Norwegian home care settings. It was the follow-up of a quality improvement project conducted in a similar setting [16].

The interview questions were developed and inspired by the theoretical constructs in an extended version of the NPT [23]. Questions in the interview guide were related to topics such as expectations to pharmacist services and perceptions of the implementation process. The interviewer (AL), supervised by a fellow researcher (KHH), piloted the interview guide for clarity and training purposes. No guide changes were made following the piloting. The interview guide is provided in Appendix 1.

The research team and reflexivity

The research team included two female pharmacists (AL and ECL), and two male pharmacists (KEB and KHH). The first author (KEB) was a Ph.D. student with experience in managing community pharmacies. AL was a Master of Pharmacy student with work experience in community pharmacies. The rest of the research team (ECL and KHH) were associate professors and had backgrounds in health services research. Three of the authors (KEB, KHH and ECL) had knowledge of and experience in qualitative methodology and qualitative interview research.

All authors were familiar with the healthcare system and settings in which the research was performed.

The research setting

The setting researched in this study was part of a home healthcare organization covering several city boroughs in one of the larger cities in Norway. The home care organization consisted of separate units, each made up of multiple home care wards. Each home care unit was managed by a unit leader, and each ward was led by ward managers.

The research setting decided to hire on-site pharmacists in permanent positions based on an internal evaluation conducted during a two-year pilot phase. This pilot was conducted within the same home care organization, but in a separate unit, and aimed to enhance patient safety by integrating pharmacist services. Although the evaluation provided some anecdotal insights, its limited scope may not have fully captured the complexity of the implementation process. Further, the integration approach during the pilot was pragmatic, resembling what some researchers refer to as *"letting it happen,"* where a process unfolds organically without extensive planning [24].

The intervention

At the time of the data collection, the pharmacists in the setting provided a wide range of services targeting patients, healthcare personnel, and intern students. Some of the more frequently provided services were medication therapy optimizing services such as medicines reconciliation and medication reviews, and health personnel education. The pharmacists did not have any job description, nor were they given any clinical training in advance of their introduction to the home care setting. Their experience levels differed; some had less than a year of experience in the research setting, while others had been working there for two years.

Recruitment and data collection

During the early stages of the research, one of the authors performed visits to units in the home care setting (AL). The purpose of these visits was to invite a strategic sample of informants to attend the research. The recruitment process was completed via e-mail.

Data was collected from one home care unit which consisted of four home care wards. A total of nine interviews were conducted. All interviews were carried out by one researcher (AL), except for one that was carried out by two researchers (AL and KEB). The participants were: registered nurses (2), unit leader (1), ward managers (4), and pharmacists (2). All data was collected at the home care workplace except one interview that was conducted at the university campus. Non-participants were not present. The consent form held information on the main objectives of the research.

The leaders and managers participating in this study were healthcare personnel and formally appointed "mid-level leaders," i.e., individuals who supervise others and manage home care units or wards through a moderate level of authority. For simplicity, both unit leaders and ward managers will be collectively referred to as "home care leaders" in this paper.

Semi-structured interviews were carried out in November 2022 and February 2023. Each interview lasted for 25–70 min and was audiotaped. Field notes were made after each interview. All interviews were transcribed verbatim by two researchers (AL and KEB). All participants received a 'thank you' voucher worth £50 upon completion of the interview.

Data triangulation

Aiming to investigate the home care teams readiness to integrate pharmacists as new members of their collaborative practice, our focus was to interview home care leaders. These individuals are recognized to be key links between the strategic decisions made by program planners and the healthcare professionals who must interact with the pharmacists in everyday work. To achieve a broader understanding of the combined knowledge on the implementation process we decided to include pharmacists and registers nurses.

Data analysis and reporting

Two researchers (AL and KEB) analyzed the entire data corpus separately. The analysis was inspired by a thematic 'bottom-up' approach, i.e., aiming to provide a comprehensive analysis starting at a low level of abstraction. Meaning units relevant to our research questions were identified using a combined approach of inductive data-driven coding and deductive interpretation. Condensed meaning units were coded within each interview and the most relevant codes for our research questions were abstracted and clustered into themes. This process was iterative and conducted for each interview. Transcripts and audiotaped recordings were revisited several times during the research process. Member-checking was not applied in this study.

As the analytical process evolved, the level of abstraction progressed from descriptive to interpretive. At this stage of analysis, identified themes were discussed regularly with co-authors. Ultimately, the results of each interview were compared and combined in a cross-sectional analysis. In the final stages of the analysis, constructs from the NPT guided the clustering of codes into themes. MindManager™ software was used to organize codes and themes during the analysis.

The research was guided by the consolidated Criteria for reporting qualitative research (COREQ) [25].

Results

Coherence

How do participants understand and make sense of the new work methods?

Nurses and home care leaders reported a lack of experience working with pharmacists and were mostly unfamiliar with the pharmacists' skill set. Despite this limited interaction and knowledge, most informants envisioned pharmacists as having distinct and advanced expertise in medication management, potentially exceeding that of nurses and physicians. When asked to elaborate on this statement, one of the leaders found it difficult to point to any specific skills:

> *"I don't know how to explain it. It is too advanced; it is beyond my abilities to address this." (Home care leader).*

The participants in this study had different views on medication challenges within the home care setting. Home care leaders and registered nurses expected pharmacists to take on tasks usually performed by nursing staff, such as 'double checking' dispensed tablets, believing it would allow more time for nursing. This expectation was consistently highlighted by every non-pharmacist interviewee. In contrast, pharmacists showed a preference for patient-focused activities such as medication reviews and reconciling medication lists. While pharmacists were open to new roles, they were reluctant to engage in work they considered more appropriate for other health professions. They also had concerns about the expected volume of non-clinical work. Reflecting on these incompatible expectations, one pharmacist reported having difficulties balancing being helpful with doing meaningful work:

> *"It has been a challenge. There are just so many medication-related issues, and I find it difficult to figure out where to engage, and what to prioritize." (Pharmacist).*

Home care leaders and nurses commonly expressed their expectations of pharmacist services by using the term "quality assurance". This phrase suggests an anticipation that pharmacists would enhance all facets of medication work. Pharmacists reported being familiar with the use of this expression and commented on its vagueness:

> *"They expect us to improve the quality of medication work. But how? They leave it to us to figure that out." (Pharmacist).*

Cognitive participation

How do participants commit to and engage in the new work methods?

Home care leaders commonly reported detachment from the decision-making process regarding the introduction of pharmacists in the home care team. Additionally, they knew little of the pharmacist recruitment procedure which led to a lack of engagement in facilitating integration. They perceived the task of incorporating pharmacists into the home care team as outside their remit, attributing the responsibility for the project to higher-level authorities. This view of pharmacist integration as an externally imposed initiative was consistent among all participants, highlighting a disconnect between decision-makers and the expected implementers:

"The decision is probably made by someone at the town hall" (Home care leader).

And:

"I had no say in this process, we were merely informed about the decision." (Home care leader).

Additional confusion arose from differing views on whether pharmacist roles were temporary for a pilot or permanent. Furthermore, several home care leaders did not perceive the pharmacists as integrated team members but rather as external to their workforce.

In general, the participants in this study called for more empowerment as they reported having little knowledge regarding the implementation process. Moreover, most home care leaders reported that the lack of instructions and guidance caused them to be insecure about their roles and responsibilities in the project. One leader explicitly stated that the implementation process was confusing and that it made it difficult to know how to effectively utilize the pharmacists in everyday work:

"I find it difficult to address how we can utilize the pharmacists' competencies mainly because of the vague implementation process. I imagine that pharmacists, as a profession, have comprehensive skills but I am clueless about what they do." (Home care leader).

Interviewed pharmacists described the implementation process as unclear and found adapting to the new work environment confusing. Some of this insecurity was related to the lack of job-descriptions and standard operating procedures. Non-pharmacist interviewees also expressed uncertainty regarding the pharmacist's job description. Some home care leaders believed a job description might exist within the organization, and that access to this document would have facilitated pharmacist integration. Even though other participants doubted its existence, a pharmacist confirmed that a job description was available and should be accessible to all home care leaders electronically.

Collective action

How are participants organized to facilitate the enacting of the new work methods?

Workforce shortage was reported to be a challenge in the process of integrating the pharmacist into the home care team. The situation of low staffing was perceived as a permanent issue caused by a high personnel turnover and nursing shortages. Several informants stated that the high workload of both nurses and home care leaders made it difficult to include pharmacists in the teams' daily routines. One participant expressed concern that the integration of pharmacists would introduce additional time-consuming procedures, intensifying the strain on already limited resources. Others reported that compared to monodisciplinary work, multidisciplinary work was more demanding. Consequently, they felt that low staffing made collaboration with the pharmacists difficult:

"Collaborating with new or inexperienced colleagues is very time consuming. In situations of low professional staffing, it is often impossible to prioritize engaging in multidisciplinary work with the pharmacist" (Registered nurse).

A challenge reported by most participants was the perceived inequality of access to pharmacist services across the four separate home care wards. Even though the pharmacists were located on-site, the total number of pharmacist positions in the home care unit was not sufficient to cover all wards equally. Consequently, health personnel working at wards co-located with the pharmacist's office reported to have the easiest access to pharmacist services. The pharmacists perceived this situation as worrying as they felt obligated to provide an even number of services across each ward. Moreover, non-pharmacist interviewees reported feeling that they were treated inequitable and that they missed the opportunity to receive medication-optimizing services:

"It would be great to be better acquainted with the pharmacists, but we [a specific ward] feel a bit detached from this initiative and the pharmacist services." (Home care leader).

The perceptions of the pharmacists' role and position in the home care team varied among the participants. However, the interviewed home care leaders were undivided in the perception that the main responsibility for utilizing pharmacist competencies lay with the pharmacists and that they had to rise to the occasion. This assumption was mirrored in the perceptions among the pharmacists as they reported sensing these expectations and feeling the need to prove themselves worthy of a position in the home care setting.

"Reflexive monitoring

How do participants appraise and reflect on the new work methods?

Participants generally welcomed the integration of pharmacists into their teams, often linking their positivity to potential relief in staffing challenges and nursing shortages. Further, they anticipated delegating medication responsibilities to their new colleagues. One participant

humorously compared pharmacists to professors, highlighting their academic capabilities. However, most participants saw pharmacists mainly as consultants for medication inquiries. When specifying the types of medication-related questions that commonly arose, some participants realized that many of these queries were trivial and could be effortlessly answered with a few clicks on a computer.

Although the pharmacists had been working in the home care environment for approximately seven months, most participants reported neither recognizing nor observing any visible changes to the medication-related activities in the setting. One home care leader responded not knowing whether anything had changed, yet another reported that everything remained the way it always had been. However, when asked more specifically about their experiences with the pharmacists, most managers and leaders responded that pharmacists were just recently employed in the setting and that it was too soon to draw any conclusions regarding their performance. Still, they did not hesitate to describe the integration of pharmacists in their home care team as successful. One home care leader explicitly stated that the implementation process was effortless and straightforward.

Despite having very limited knowledge of both the objectives of the implementation process and the scope of the pharmacist services, several participants expressed a predetermined belief in the necessity of the pharmacist integration. A couple of the informants reported that there was a collective decision to support the services regardless of any evidence of effectiveness. The same informants stated there was a joint agenda to persuade decision-makers to scale up the initiative of integrating pharmacists into primary care:

> *"The idea, from the very beginning, was that these services should be integrated into all home care wards. People do their best to influence the decision-makers in higher positions of authority" (Home care leader).*

And:

> *"As long as the higher-level individuals of the organization are convinced and on board with the idea, we are all good" (Home care leader).*

Discussion

This paper applied the NPT to identify aspects of the implementation process that can enable or hinder the integration of pharmacist services within a Norwegian home care setting. Even though some of the constructs in this theory are flexible and open to interpretation, it is considered a comprehensive and robust guide to implementation [20].

How do participants understand and make sense of the new work methods?

The NPT states that implementation is influenced by factors that promote or hinder actors' sense-making of a practice. Consequently, understanding the acts and behaviors that make up this practice is a reasonable starting point for the assessment of an implementation process [26].

In our study, non-pharmacist interviewees seemed to have limited knowledge of the pharmacists' skill levels and difficulties conceptualizing the pharmacist services in detail. Similar challenges are described in a systematic review from 2020 in which Hatton and colleagues reported that a lack of knowledge of the pharmacist role led to misconceptions and consequently hindered integration [27].

Working mainly with compounding and dispensing activities, pharmacists have traditionally focused on their own role in isolation from other health professions. As pharmacists increasingly become part of multidisciplinary teams, they may face challenges due to a history of working separately from nurses and physicians. Further, pharmacist services are complex. They have a high degree of flexibility and can be directed toward diverse groups of stakeholders (e.g., patients, colleagues, and organizations) to impact different outcomes [28]. Lacking a clear description of the intervention and precise definitions of its activities can hinder its usability [29]. Even services such as the medicines reconciliation and the medication review, which appear conceptually uncomplicated, comprise both sub-interventions and several elements of multidisciplinary work [30].

Engagement of stakeholders in the program

According to the NPT, the integration of new work methods within a team depends on efforts to organize the actors and activities implicated in a practice. To support the introduction of new work methods in healthcare it is necessary for program planners to systematically assess whether the intervention suits the organization's needs [24, 31]. Moreover, early and widespread staff involvement can clarify key elements of the implementation and increase commitment to the process [32].

In our study, home care leaders reported having very little knowledge regarding the rationale and objectives of the pharmacist integration program. They expressed being unaware of the reasons why their wards were provided with a new profession and reported not being empowered in this decision. This knowledge gap and the lack of agreed upon objectives resulted in conflicting expectations within the team.

Team management and facilitation are the leader's responsibility. Thus, characteristics of leaders and leadership within an organization can be critical to the improvement and implementation of primary care initiatives [33]. In their research from 2014, Aarons and colleagues identified four dimensions of leadership behavior to support implementation [31]. Two of these dimensions were related to the leaders' knowledge about the practice or innovation, and to being proactive in anticipating implementation issues, respectively. Further, role clarification is recognized as a salient aspect of successful collaborative practices. It is difficult to commit to the implementation process without knowing your formal responsibility, and ambiguities related to the roles of healthcare providers can lead to workplace tension and underutilization of professional expertise [34]. The importance of professional role clarity and identity has been reported in several pharmacist integration initiatives [35–37].

The NPT highlights that it is important to consider how new work methods interact with already existing practices. Consequently, a multidisciplinary team needs to have a shared understanding of the objectives of new practices. However, program planners often view an intervention in isolation from the overall system. A recent UK study illustrates how this tendency to underestimate the complexity of healthcare settings can cause unnecessary pauses and recalibrations of improvement programs [38].

Teams within a healthcare organization often have their habitual routines and work processes. Organizational routines comprise a mix of coordinated and recurrent behavior patterns which reduce the uncertainty and complexity of individual decisions [39]. As such, new and more complex interventions can be conceived as attempts to disrupt existing system dynamics. Our findings indicate that intensive medication tasks, such as medicines reconciliation and medication reviews, were undervalued in the setting. Prior to pharmacist integration, quality reports revealed that only about 10% of patients underwent medication reconciliation. The introduction of this task, now performed more frequently, may hamper established workflows for non-pharmacists. Despite the municipality's and pharmacists' goals to execute these demanding services, nurses and home care leaders appeared to consider them less essential to medication management. To increase the chances of implementation, it is important to address these individual profession-specific goals and shared team goals [27].

How do participants appraise and reflect on the new work methods?

Even though this study identified several implementation issues in the home care team, participants seemed to have an all-over positive attitude towards the pharmacist services. Such optimism could serve as a key facilitator in the implementation process. Nevertheless, this favorable view may stem from the increased resources or the personal attributes of the pharmacist, rather than the services provided. The trend could also be explained by the characteristics of early implementation stages in which stakeholders are generally more supportive towards a program. Additionally, the presence of social-desirability bias, where individuals tend to give responses they believe are more favorable or acceptable, may have influenced these positive reports.

Our findings show that even in the absence of any supportive evidence, some participants stated that there was a broad hierarchical consensus that the new practice was "there to stay". These findings are interesting as they touch upon common yet less scientific approaches to adopting innovations in organizations. Compared to nursing homes and home care settings, Norwegian pharmacists are more commonly integrated in hospital wards. Social network theories describe how healthcare organizations tend to look to organizations of similar size and character when they contemplate whether to take on a new practice or service [39]. In addition, individual "champions" or "experts" can exert great influence on this decision. These networking activities might cause a 'bandwagon phenomenon' where effective and less effective interventions spread amongst like-minded organizations. In contrast, implementation science argues that the process of implementing new practices should originate from a solid evidence base, evolve with underpinning program theories, and adapt to context [40, 41].

Strengths and limitations

The process of integrating pharmacists in multidisciplinary practices outside community pharmacies in Norway is understudied. To the authors' knowledge, this research is the first to apply implementation theories to assess the embedding of pharmacists in Norwegian primary care. Moreover, it is one of the first to apply the NPT in this context. The study's theoretical underpinning increases the pragmatic validity of the findings making them valuable in the development of implementation strategies for similar projects.

This study has several limitations. It could be considered a limitation that this study only included a small group of participants from one home care unit. Notwithstanding the seemingly scanty sample size, the participants provide a high degree of information power [42]. Additional participants who could have been recruited include decision-makers and leaders at the higher levels of the local health government, as their insights could have contributed significantly to addressing the study's objectives.

As pointed out by several of the participants, the period in which the pharmacist services had been provided in the researched setting was relatively short. At the time of data collection, the pharmacists had been employed for approximately 7 months. However, the timing of the research was intentional and in compliance with the study's aim and objectives. The NPT relates the embedding and normalization of new practices explicitly to the work and efforts involved in the implementation process. Consequently, performing this research at an early stage of integrating the pharmacists in the new setting can provide important information on how to adjust and improve future work.

Implementation theories have limited empirical evidence to support the premises on which they are developed [43]. In the planning of this study, the researchers looked to an extended version of the NPT [23]. By choosing to follow an explicit theory, this study held a preconception that certain events and behaviors are important determinants of the way an intervention can impose the desired changes within an organization. Further, its generic applicability to diverse interventions such as guidelines, diagnostic tools, and collaborative work made it difficult to report equally on every aspect and construct of the theory. Moreover, the theoretical scope of the NPT is narrow and does not consider the effectiveness or quality of a new work method. New practices that are not routinely embedded in everyday practices can still be useful and have value to stakeholders within an organization.

Generalizability and transferability of the results

This study applies the NPT to investigate how knowledge and behaviors within a home care team can influence the sustainability of newly adopted pharmacist services. We believe our methodology and findings are highly relevant for similar programs. However, determinants of change may arise from different layers and aspects of the context and could be associated with various phases of the implementation process [44]. This complexity makes it difficult to assume that determinants are generalizable.

Conclusion

Integrating new professions and work methods into clinical practice poses a challenging task that requires implementation skills. The current study conducted a process evaluation of pharmacist integration in a Norwegian home care setting and identified barriers and enablers to the utilization of pharmacist competencies. Our findings emphasize the importance of explicitly defining the collective objectives of pharmacist services in each setting and empowering middle management to drive this process forward. Additionally, clarifying and delineating the scope of practice for each member of the team can mitigate role confusion and intra-professional power struggles.

The evaluation of pharmacist services largely revolves around clinical outcomes and effectiveness. We strongly recommend using implementation theories and frameworks to support the introduction of new practices in healthcare settings. Further, we advocate a focus on process outcomes to better understanding the causal pathways of intervention success and failure.

Abbreviations

NPT Normalization process theory
GP General practitioner

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-024-11014-y.

Supplementary Material 1

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Author contributions

This research represents work completed as part of a doctoral dissertation of KEB. ECL and KHH were supervisors. AL was a master student at the Institute of Pharmacy, UiT The Arctic University of Norway. KEB, KHH, AL and ECL contributed to study design and conceptualization. KEB and AL contributed to data collection and all authors contributed to the analysis. KEB wrote the main manuscript text and prepared Table 1. All authors reviewed the manuscript.

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Data availability

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author(s) used chat.uit.no to improve readability and language. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Ethics approval and consent to participate

The study was submitted to the Regional Committee For Medical Research Ethics Northern Norway (REK Nord Tromsø, reference number 131464). REK Nord considered the study not to be within the scope of the Norwegian Health Research Act, and approval was deemed unnecessary. All participants signed an informed consent document, and the study was conducted according to the Helsinki declaration.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Publisher's Note

Paper 3

Bø, K.-E., Halvorsen, K.H. & Lehnbom, E.C.

Intervention description of pharmacist-facilitated medication reviews (MR) in Nordic primary care settings: a scoping review

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Karl-Erik Bø: conceptualization, methodology, investigation, formal analysis, writing- original draft, Writing- review & editing, project administration.

Kjell H. Halvorsen: conceptualization, formal analysis, writing- review & editing, supervision.

Elin C. Lehnbom: conceptualization, methodology, formal analysis, writing- review & editing, supervision.

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Declaration of interest:

The authors report there are no competing interests to declare.

Declaration of Generative AI and AI-assisted technologies in the writing process:

During the preparation of this work, the author(s) used chat.uit.no to improve readability and language. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Ethics and consent:

Ethical approval is not required for this scoping review as it involves the synthesis of published data from existing studies rather than the collection of primary data from human participants.

Structured abstract:

Background:

Multicomponent interventions are increasingly utilized to tackle the complexity of aging and co-morbid patients. However, descriptions of effective interventions are generally poor, making it difficult for healthcare providers and decision-makers to implement successful programs.

Objectives:

This study aimed to highlight the transferability of pharmacist-facilitated medication reviews (MR) by evaluating the description of the separate components that make up the intervention.

Methods:

We performed a scoping review of studies reporting on pharmacist-facilitated medication reviews in Nordic primary care settings. Medline, Embase, CINAHL, and Web of Science were searched on January 24, 2024. We used Arksey and O'Mally's methodological framework for scoping studies and applied the Template for Intervention Description and Replication (TIDieR) checklist to evaluate intervention reporting.

Results:

Sixteen studies were included in this scoping review. The studies were conducted in Sweden (n=7), Norway (n=6), Finland (n=2), and Denmark (n=1). In general, information on the participating pharmacists' expertise, qualifications, and training was lacking in most studies. This is problematic since the characteristics of the intervention provider can influence program outcomes. 13 studies did not provide any information related to intervention cost, dose, or duration, making it challenging to estimate the economic impact of the intervention. Only one study made an (incomplete) evaluation of intervention fidelity. Conversely, 15 studies lacked information on this topic which can lead to inaccurate conclusions about the program's effectiveness and may result in the implementation and continuation of ineffective practices.

Conclusion:

Decision-makers are increasingly expected to consider complex interventions and successful implementation hinges on clear and complete intervention descriptions. We recommend that pharmacy trials use reporting checklists to increase the replicability and transferability of effective interventions.

Keywords:

Medication review, pharmacists, primary care, Nordic, implementation, TIDieR.

Introduction:

In the process of adopting, replicating, and scaling up evidence-based interventions, it is critical to know the details of how the intervention works. [1] This is particularly true for complex interventions with multiple interacting components. However, intervention studies often emphasize outcomes without adequately detailing the interventions. [1,2] Moreover, the ways in which context challenges the transferability of trial results receive little attention. This lack of explicit reporting hinders the understanding of what contributes to an intervention's success or failure.

Medication reviews (MRs) can be described as a systematic assessment of a patient's pharmacotherapy to optimize drug treatment and improve patient outcomes. [3] The endorsement of this intervention is robustly backed by the World Health Organization (WHO) and is considered particularly important in situations of complex pharmacological treatments. Notwithstanding its increasing popularity, "medication review" is an umbrella term used for a wide range of multifaceted interventions. [4,5] The comprehensive scope of this service is illustrated in a recent study where the authors present a list of 28 medication review interventions with diverse inputs and activities. [6]

Even though the MR rely heavily on listing tools for optimal pharmacotherapy their most prominent feature is the human-to-human interaction. Interprofessional collaboration is a salient aspect of the MR, and the intervention generally includes patient interviews, counseling, and follow-ups. In human-based interventions, the "evidence" of a program is built into what practitioners do as they deliver

the service. There can be both un-named and un-measured components involved in an intervention that produces observed effects. [7] Consequently, the outcomes of MRs are contingent on characteristics of the practice settings and any additional inputs, e.g., efforts and resources provided by research teams or stakeholders, not considered a part of the intervention. [8-10]

MRs involving pharmacists have been successfully implemented in both inpatient and outpatient settings in countries such as the US, Canada, and the UK. Even though several studies show that these interventions can prevent, identify, and solve medication-related problems their ability to improve clinically relevant outcomes is not consistently supported. [11-13] Furthermore, the methodological quality of evidence on MRs is reported to be moderate or low. [14-16]

Pharmacist-facilitated MR in Nordic Countries:

The Nordic region, including Sweden, Denmark, Finland, Iceland, and Norway, has a population of approximately 27.8 million. [17] Notwithstanding these countries' similar healthcare funding structures, their priorities and services vary. The interest in involving and integrating pharmacists in Nordic primary care settings has only emerged in the last couple of decades. [18-22] Although Sweden, Denmark, and Finland have established these services in certain localities, pharmacist-facilitated MRs are still evolving in Nordic countries.

Robust research findings enable healthcare providers and decision-makers to make informed choices about modifying and improving current practices. However, it is difficult to build on, or replicate, research findings without a comprehensive description of an intervention's separate components and activities. Moreover, being left unclear about how and why an intervention works can lead to an underestimation of the time, effort, and resources required to implement it.

This study aimed to explore the completeness of intervention description of pharmacist-facilitated MRs in Nordic primary care settings.

Materials and methods:

Study design:

We performed a scoping review to investigate the intervention reporting of pharmacist-facilitated medication reviews in Nordic primary care settings. Scoping reviews are suitable for mapping areas of research literature to identify gaps in the evidence base. Unlike systematic reviews, they seek to explore and describe rather than to produce critically appraised evidence. [23]

Our research was guided by Arksey and O'Mally's methodological framework for scoping studies. The framework describes a five-step approach when scoping literature: 1. Identifying the research question. 2. Identifying relevant studies. 3. Study selection. 4. Charting the data. 5. Collating, summarizing, and reporting the results. [24]

Identifying the research question:

This research aimed to explore the completeness of intervention descriptions of pharmacist-facilitated MRs in Nordic primary care settings. The objectives were to investigate whether researchers provided a rationale for the performing MRs, and if the components of the intervention were described in sufficient detail for replication. Further, we wanted to investigate the reporting of strategies to improve fidelity, and/or assessments of fidelity. The "Usable innovations" theoretical framework, developed by the Active Implementation Research Network (AIRN) guided the advancement of our research questions. [7] This framework outlines the initial steps of implementing new programs. The term "usable innovations" refers to new technologies or work methods that are not only proven effective but also clearly defined and operationalized so that they can be implemented consistently and effectively in practice. [25] A usable innovation needs to have a precise explanation of its causal pathway to impact the expected program outcomes, a clear description and operational definitions of the innovation's essential functions, and a practical assessment of the performance of the practitioners who are using the innovation. Essential functions, also called core components or active ingredients, are the features that make an intervention successful.

Intervention reporting in eligible studies of this scoping review was assessed using the Template for Intervention Description and Replication (TIDieR) checklist. [26] The checklist contains minimum recommended items for intervention description related to theory and rationale, essential components of the intervention and context, as well as aspects of modifications and fidelity.

Identifying and selecting articles:

The search string was developed from three concepts and validated against a test set of pre-defined articles of specific relevance. Text mining tools such as the Yale MeSH analyzer and PubReminer were used to adjust the search string concepts to retrieve the articles in the test set. The translation of the validated Ovid Medline search string for use in Ebsco CINAHL, Ovid Embase, and Web of Science, was guided by the Polyglot Search Translator. [27] All databases were searched on January 24, 2024. The electronic search strategy for the Ovid Medline database is provided in Appendix 1.

All search results were exported to Endnote desktop for duplication removal. Duplicates were removed using the Endnote de-duplication tool, and by manually assessing all the retrieved articles. De-duplicated articles were uploaded to the online software program Rayyan® for screening. All titles and abstracts were screened by one researcher (KEB). Screening questions were developed based on eligibility to enhance clarity during the title and abstract screening process. Articles lacking descriptions of 1. a medication review intervention, 2. involvement of pharmacists, and 3. a primary care setting were excluded. When in doubt, the articles were included for a second round of screening.

Additional searches were made in Swemed+, a bibliographic database that contains articles from the Nordic countries/Scandinavian journals in medicine and healthcare using the MeSH-term “medication review”. This database ceased to be updated in 2020.

Citation searches were performed to locate additional studies, mainly by investigating knowledge synthesis and umbrella reviews on similar topics, e.g., on medication reviews [4,28-31] and the implementation of pharmacist services in outpatient settings. [32-34]

Eligibility criteria:

This scoping review included Nordic studies that were peer-reviewed and published from January 2010 to January 2024. Only studies describing pharmacist-provided MRs in outpatient settings were included. Studies were excluded if they described MRs conducted in community pharmacies or by community pharmacists; if they were unavailable in English, Swedish, Danish, or Norwegian, and if they were conference proceedings or abstracts, posters, or comments, letters, and opinions.

Charting the data:

Extracted data included author, country, study design, characteristics of the intervention, and setting. In addition, the study aim, and conclusions were extracted to highlight outcomes and illustrate the importance of describing the intervention (in detail). Extracted data are presented in Tables 1 and 2.

This study used the TIDieR checklist, a 12-item checklist developed by an international group of experts, to assess intervention reporting. to assess intervention reporting. The 12-item checklist was adapted by specifying the item related to the reporting of interventionists' expertise, qualifications, and training into three separate items. [5] Consequently, the 12-item checklist was developed into a 14-item template. The adapted TIDieR checklist is provided in Box 1. As recommended by Hoffman et al. we used the checklist in conjunction with the TIDieR guide. [26]

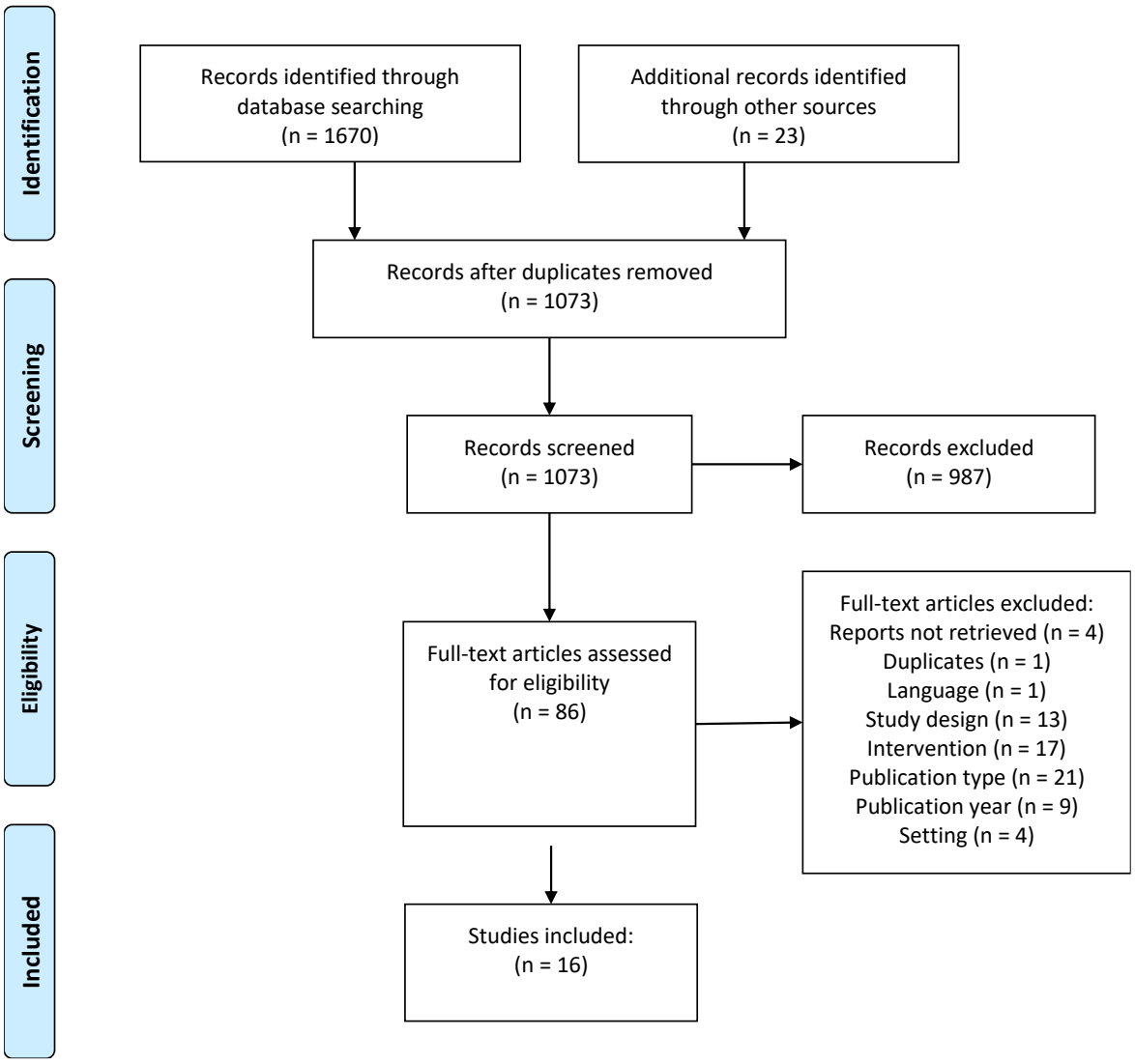
Results:

Collating, summarizing, and reporting of the results:

Article selection:

A total of 1670 titles were identified, yielding 63 potential studies. Additional records were identified through citation searches and hand searching (n=23). The total number of included studies was 16. The studies were conducted in Sweden[35-41] (n=7), Norway[42-47] (n=6), Finland[48,49] (n=2), and Denmark[50] (n=1). Figure 1 displays the steps in the study selection process. A complete version of the PRISMA flow diagram is provided in Appendix 2.

186 Figure 1: Steps of the study selection process



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188 Box 1 Adapted TIDieR checklist

189 1. BRIEF NAME: Provide the name or a phrase that describes the intervention.
190 2. WHY: Describes any rationale, theory, or goal of the elements essential to the intervention.
3. WHAT (materials): Describes any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers.
4. WHAT (procedures): Describes each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.
5a. WHO (expertise): For each category of intervention provider describe their expertise.
5b. WHO (qualifications): For each category of intervention provider describe their background.
5c. WHO (training): For each category of intervention provider describe specific training given.
6. HOW: Describes the modes of delivery (e.g. face-to-face) and whether it was provided individually or in a group.
7. WHERE: Describes the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.
8. WHEN and HOW MUCH: Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.
9. TAILORING: If the intervention was planned to be personalized, titrated or adapted, then describe what, why, when, and how.
10. MODIFICATIONS: If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).
11. HOW WELL (Planned): Describes strategies used to maintain or improve fidelity (how and by whom)
12. HOW WELL (Actual): Describes the extent to which the intervention was delivered as planned (if adherence or fidelity was assessed)

Table 1: Study characteristics of the included studies:

Author (year)	Country	Study design	Intervention Framework provided	Medication review level	Setting
Auvinen (2020)	Finland	Randomized Controlled trial (RCT)	Yes	Type 3	Home care centers
Brandt (2014)	Denmark	Development and test	No	Type 2b	General practice
Davidsson (2011)	Norway	Prospective study	No	Type 2b	Nursing home
Dobszai (2023)	Sweden	Cohort study	Yes	Type 2b	Community-dwellings
Fog (2017)	Norway	Observational before/after	No	Type 2b	Nursing home
Granas (2019)	Norway	Descriptive	Yes	Type 2b	Community-dwellings
Halvorsen (2010)	Norway	Descriptive	No	Type 2b	Nursing home
Halvorsen (2019)	Norway	Descriptive	No	Type 2b	Nursing home
Kari (2018)	Finland	Longitudinal RCT	No	Type 3	Home dwellings
Kersten (2013)	Norway	RCT	No	Type 2b	Nursing home
Lenander (2018)	Sweden	Cross-sectional study	Yes	Type 2b	General practice
Lenander (2014)	Sweden	RCT	No	Type 3	General practice
Lenander (2017)	Sweden	Cross-sectional study	Yes	Type 2b	General practice
Milos (2013)	Sweden	RCT	Yes	Type 2b	General practice
Modig (2016)	Sweden	Descriptive	Yes	Type 2b	General practice
Wickman (2022)	Sweden	Retrospective, descriptive	Yes	Type 2b	General practice

Characteristics of included studies:

Study characteristics are provided in Table 1. The interventions described in the included studies were mostly multidisciplinary. However, pharmacists conducted a review of the patient's pharmacotherapy in all studies. Other team members such as nurses, assistant nurses, and physicians were involved in activities such as symptom assessments, patient interviews, counseling, and follow-ups.

The included studies in this scoping review tended to remark about the MR as a uniform service. However, referring to "medication review" imprecisely describes the multiple components of the

intervention. The Pharmaceutical Care Network Europe has classified medication reviews as simple, intermediate, and advanced based on their complexity and patient involvement. [51] The most basic type of MR is based solely on medication history (Type 1). Intermediate MR type 2a includes medication history and patient interviews, while intermediate MR type 2b includes medication history and clinical data. Advanced MR (type 3) includes medication history, patient interviews, and clinical data. The description of each study's MR level according to this classification was not explicitly stated in the included studies. However, an assessment of PCNE MR level was made based on the information provided. All studies reported having access to clinical data and medication histories. However, only three studies reported including patient interviews as part of the intervention, i.e., performing advanced type 3 MRs. [37,48,49] Studies that did not report conducting patient interviews were categorized as intermediate type 2b MRs.

Using the TIDieR checklist, we discovered that the intervention descriptions did not always correspond directly with the checklist details. As most TIDieR items comprise several sub-elements it was sometimes difficult to decide whether an item was reported or not. However, as the checklist is considered to contain a minimum of recommended items to describe an intervention, we required every sub-element to be described for an item to be considered "reported". Likewise, we considered items "not reported" when studies provided no information on any sub-element.

Figure 2 provides a visual representation of the completeness of intervention descriptions in the included studies of this scoping review. We scored the items as reported (green), partly reported (yellow), and not reported (red). The complete TIDieR checklist is provided in Appendix 3.

221 Figure 2: assessment of intervention reporting.

222

Reported	
Partly reported	
Not reported	

223

TIDieR Items with short descriptions	1 Name	2 Why?	3 What?	4 What?	5a Who?	5b Who?	5c Who?	6 How?	7 Where?	8 Dose	9 Modifications	10 Modifications	11 How well?	12 How well?
Auvinen 2021														
Brandt 2014														
Davidsson 2011														
Dobszai 2023														
Fog 2017														
Granas 2019														
Halvorsen 2010														
Halvorsen 2019														
Kari 2018														
Kersten 2013														
Lenander 2018														
Lenander 2014														
Lenander 2017														
Milos 2013														
Modig 2016														
Wickmann 2022														

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Description of the intervention and its materials and procedures (TIDieR items 1-4)

A brief name and description were found for all interventions. Even though most studies referred to the intervention simply as "(clinical) medication reviews" [35,37,38,40-46,49,50] or "drug review" [47], some studies referred to conceptual frameworks in naming their intervention, e.g., the Finnish Interprofessional Medication Assessment model (FIMA) [48], the Lund Integrated Medicine Management model (LIMM) [36,39], and the Integrated Medicine Management model [44].

Item 2 of the TIDieR checklist covers the rationale, theory, and goal of the intervention. A program theory explains how a program contributes to both intermediate results and the observed outcomes. [52] Furthermore, it can help identify which elements of an intervention are essential and which are optional or less important. Table 2 provides an overview of the background (theory), study aim (goal), and study conclusions.

In most studies, the intervention logic assumes that medication-related problems are prevalent and can be identified through an assessment of the patient's pharmacotherapy. International evidence of similar interventions, and/or outcomes produced by similar interventions in healthcare settings were used to underpin this rationale. Several studies emphasized that the evidence supporting medication reviews to provide clinically relevant patient outcomes is inconclusive. [35,42,43,47-49]

Despite MRs' multifaceted and interprofessional nature, most studies did not assess the importance of the intervention's separate components. Only one study specified an intervention component they considered to be essential for producing the expected outcomes. [49] Another study discussed the challenge of determining the contribution of separate intervention components to the observed outcomes. [37]

Most studies reported, or partially reported, intervention materials. Overall, the authors provided comprehensive descriptions of intervention materials such as criteria lists, assessment tools, databases, and access to medical records and clinical data. However, none of the studies described any material used in the training of pharmacists conducting the pharmacotherapy reviews.

All studies provided some information on the procedures, activities, and processes used in the intervention. Several studies referred to frameworks to describe the components of their intervention, e.g., FIMA [48], LIMM [35,36,38-41], and IMM [44]. Non-standardized intervention descriptions outlined its sequence of steps and defined each team member's role.

256 Table 2: Rationale for and goal of the medication review:

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Author (year)	TIDieR item 2: Rationale, theory, or goal that underpins the intervention or the components of a complex intervention	Aim of study	Conclusion
Auvinen (2020)	Improving medication quality may support the elderly's functioning. An interprofessional team approach is advantageous when assessing patients with multimorbidity and complex medications.	Testing whether the intervention influenced the number of drugs, drug-drug interactions, risk of drug-induced impairment, medication-related risk load, and PIM.	The intervention improved several aspects of medication quality for home care patients.
Brandt (2014)	An explicit rationale for the MR is not provided. “In studies of the effect of MR the tools used to perform the MR are vaguely described or not described at all. “	To describe and test an MR practice model tailored to the general practice setting.	The model was found to be workable and produced recommendations with high acceptance rates (82%)
Davidsson (2011)	Inappropriate prescribing is associated with increased morbidity, hospitalizations, mortality, and cost. Pharmacist-conducted MR shows promising but not conclusive results.	To examine the effect of multidisciplinary, systematic MR on prescribing quality and to evaluate if drug changes were maintained over time.	Multidisciplinary MRs were effective in improving the quality of drug treatment in nursing home patients by reducing the number of drugs and the number of DRPs.
Dobszai (2023)	The cost of drug-related problems (DRP) in elderlies. DRP can be prevented, and the MR can contribute to preventing and reducing DRP.	To evaluate the MR regarding the clinical relevance of the pharmacists’ recommendations and the implementation of the recommendations by the GP.	The high portion of clinically relevant recommendations from pharmacists emphasizes the importance of MRs to avoid DRPs.

Fog (2017)	Elderlies have an increased risk of adverse drug reactions (ADR). MRs can improve the quality of drug therapy in nursing homes even though there is a lack of evidence on their effects related to 'hard' outcomes.	To describe DRP identified through multidisciplinary MRs and the interventions that were carried out to resolve them, as well as changes in drug use that followed the MRs.	The MR resulted in overall less drug use, most pronounced for psychotropic drugs and opioids, and in a closer follow-up to optimize the potential benefits of the drug use.
Granas (2019)	A MR should be provided regularly [in patient groups who are more likely to be prescribed potentially inappropriate medication (PIM)] to determine adherence, and to monitor effects, adverse effects, and interactions.	To describe how interdisciplinary MR may improve pharmacotherapy (…) using medication reviews and interdisciplinary case conferences. This should contribute to more rational pharmacotherapy (…)	Medication reviews and interdisciplinary case conferences improved pharmacotherapy (…).
Halvorsen (2010)	The prevalence of DRP is high in nursing homes. Studies have shown that MRs in nursing homes are effective in identifying DRP. Pharmacists' involvement in MR has been shown to positively impact medication quality.	To describe an innovative team intervention to identify and resolve DRP in nursing homes.	The intervention was suitable to identify and resolve drug-related problems in nursing homes.
Halvorsen (2019)	Polypharmacy leads to medication-related problems (MRPs). MRPs are associated with hospitalizations, morbidity, mortality, and decline in QoL. MRs have shown promising results in reducing MRPs.	To describe a stepwise, pharmacist-led MR in combination with an interdisciplinary team collaboration to identify, resolve, and prevent MRPs in nursing homes. (…)	The pharmacist-led MR service was highly successfully piloted with many prevented and solved MRPs.
Kari (2018)	A substantial portion of clinically relevant DRPs identified in MR are discovered by interviewing the patient. The evidence base of MR is not conclusive, but the	To examine how critical patient involvement is in pharmacist-led MRs and in identifying the most significant clinical DRPs.	Patient involvement is essential when identifying clinical DRPs. Poor therapy control, nonoptimal drug use, and intentional or unintentional nonadherence might otherwise be missed.

	intervention has been shown to reduce DRPs and increase medication knowledge.		
Kersten (2013)	Polypharmacy and inappropriate prescribing are common in nursing home residents and increase the risk of ADRs and hospitalizations. Clinical pharmacists have been reported to identify a large number of DRPs but the effect of pharmaceutical interventions on relevant patient-oriented outcomes is largely unexplored.	To investigate if reduced anticholinergic drug burden, facilitated by pharmacist interventions, could improve cognitive function in nursing home residents.	Pharmacist-initiated drug changes did not improve cognitive functions in nursing home residents.
Lenander (2018)	Elderly patients (…) risk suffering from DRPs, and a substantial portion of hospital admissions among elderly are due to adverse drug events (ADE). One way to prevent DRP among elderlies is to carry out MR.	To evaluate the effect of MR in elderly patients in primary care in relation to total drug use and potentially inappropriate drug use, and to describe drug-related problems.	MRs performed in everyday care are one way of improving drug use among elderlies. The use of potentially inappropriate medications decreased after MR.
Lenander (2014)	Elderly patients (…) risk suffering from DRPs, and a substantial portion of hospital admissions among elderly are due to adverse drug events (ADE). Provision of MR for elderlies with polypharmacy [often: > 5 medications] has produced favorable effects.	The primary aim was to assess whether a pharmacist intervention would decrease the number of drugs and the number of DRPs. (…)	The addition of a skilled pharmacist to the primary care team may contribute to reductions in the number of drugs.
Lenander (2017)	Antipsychotic drugs should be used with caution among elderly patients. However, the prescription of	To assess the effects of MRs on antipsychotic drug use in elderly patients. (…)	MRs appear to offer one useful strategy for reducing excessive use of these drugs.

	antipsychotics in this patient group seems to be high. MR provides a possible strategy to improve the situation.		
Milos (2013)	Aging is known to be associated with increased risk of DRPs, higher morbidity, and higher numbers of hospital admissions. Multidisciplinary MR has proven to reduce the number of psychotropic drugs in nursing homes.	The primary objective was to assess a structured model of care by studying the impact of pharmacist-led MR on the number of patients using potentially inappropriate medications (PIMs).	MR involving pharmacists in primary health care appears to be a feasible method to reduce the number of patients with PIMs, thus improving the quality of pharmacotherapy in elderly patients.
Modig (2016)	Aging is known to be associated with increased risk of DRPs, higher morbidity, and higher numbers of hospital admissions. A majority of DRPs are preventable. Team-based MR can prevent and solve DRPs.	To evaluate the quality of the clinical pharmacy service to primary care using structured MR, focusing on the clinical significance of recommendations made by the pharmacist.	The high portion of clinically significant recommendations provided by pharmacists when performing team-based MRs suggests that these clinical pharmacy services have the potential to increase prescribing quality.
Wickman (2022)	Elderly patients are prone to polypharmacy which leads to a higher risk of DRPs. MRs can identify and resolve DRPs.	To describe the group of patients considered in need of a pharmacist-led MR, as well as their outcomes regarding DRPs and involved medications.	A majority of the selected patients had at least one DRP. Patients with impaired renal function or polypharmacy may need special attention.

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Description of the pharmacist's expertise, qualifications, and training (adapted items 5a-5c)

The interventions described in the included studies were interprofessional, comprising efforts from nurses, assistant nurses, physicians, and pharmacists. However, the objectives of this study pertain to the process of reviewing patients' pharmacotherapies which was provided by pharmacists, and we relate items 5a-5c in the adapted TIDieR checklist exclusively to this profession.

The level of detail reported on pharmacists' expertise, qualifications, and training was consistently low across most studies. Furthermore, descriptions of these items were brief, typically comprising a couple of sentences. Only five studies reported, or partly reported, information on all three items. [35,37,41,48,49] One study provided information on two items. [39] Five studies reported, or partly reported, information on only one item [36,38,43-45], and five studies did not provide any information on any item. [40,42,46,47,50]

Description of the intervention's mode of delivery, setting, and dose (TIDieR items 6-8)

Information on the intervention mode of delivery (item 6) was provided indirectly rather than explicitly stated. As the MRs in the included studies were interprofessional, there were different modes of delivery for the separate components of the intervention. Face-to-face activities with the patient, such as symptom assessments, and patient interviewing were performed by both nurses and pharmacists. Pharmacists independently conducted the pharmacotherapy reviews, likely without the involvement of other healthcare personnel. Interprofessional case conferences following patient contact and the reviewing of patients' pharmacotherapy were reported to be face-to-face interactions.

Intervention setting was reported across all studies, e.g., "nursing home" or "community dwellings". However, the included studies did not elaborate on location details or any specific facilities or infrastructure required to perform the intervention (item 7). Descriptions of "when and how much" (item 8) related mostly to the research study period, e.g., *"the study was performed during a 15-*

month period". Despite the limited value of this information, items 7 and 8 were scored as "partly reported" if studies reported on the study setting and research period.

In general, descriptions concerning intervention frequency, intensity, and dose were not reported. Information on intervention duration was reported in only three of the studies. [37,48,50] Other studies provided details on the intensity and dose of the intervention, e.g., *"pharmacists conducting the MRs may have been extra thorough in their work since they knew they were part of a study"*. [35,41] Authors considered that this increased "dose" of the intervention possibly affected study outcomes. Other authors indicated that the intervention was part of everyday practice and provided without additional resources. [36-38]

Descriptions of intervention modifications and fidelity (TIDieR items 9-12)

According to the TIDieR guide, tailoring relates to whether the intervention was planned to be provided identically to every patient. As specified in the TIDieR checklist, this concerns the reporting on intentional flexibility, i.e., the possibility of customizing the intervention to obtain the appropriate dose for each patient. None of the included studies provided any information on planned intervention flexibility (item 9).

Unforeseen events might happen during the study making it necessary to alter components of the intervention. Modifications of the intervention (item 10) relate to any changes or adjustments made at the study level. Only three studies described modifications made during the study period. [36,38,49]

Items 11 and 12 address intervention fidelity. This involves describing strategies to maintain or enhance intervention delivery, and assessing whether the intervention was delivered as planned. Fidelity reporting extends beyond providing a receipt of the intervention to describe "how well" the intervention was received or delivered. Seven studies reported some strategies to maintain intervention fidelity. These strategies involved descriptions of the pharmacists' competencies and training [39,41,48,49], as well as the intervention dose. [37,50] However, most studies reported on

intervention results rather than describing the extent to which the intervention was delivered as planned.

Discussion:

Our investigation of the reporting of pharmacist-facilitated MRs in Nordic primary care settings indicates that they lack intervention clarity. These findings are in line with the results of research investigating the reporting of similar interventions. [5,53] In general terms, the description of and the rationale for the intervention (items 1-4) and how and where the interventions were delivered (items 6-7) were reported or partly reported in most studies. Missing intervention information related most frequently to pharmacists' expertise, qualifications, and training (items 5a-5c), descriptions of intervention frequency, intensity, and dose (item 8), and intervention flexibility and fidelity (items 9-12).

What is the rationale for providing medication reviews in Nordic outpatient settings?

A common approach to quality improvement in healthcare is to do what others do. [54] However, attempting to replicate multicomponent interventions with a previous evidence base requires an understanding of the essential functions of the original intervention and the interplay between the original intervention and its context. [55] Even though national or regional guidelines in Nordic countries recommend performing medication reviews, adaption and tailoring to local conditions are always necessary. [56] Moreover, recognizing the theoretical assumptions that underpin the intervention is pivotal. [57,58]

All the included studies in this scoping review performed an impact evaluation of a new intervention. When performing this kind of research, the overarching objective is to advance knowledge and improve outcomes. The results from experimental studies often inform healthcare practitioners and decision-makers about new and effective programs. Indeed, most of the included studies in this scoping review advocate MRs as a service to optimize medications and improve patient safety. However, MRs mostly impact softer outcomes, or *"measurable variables with an indirect or*

unestablished connection to" [59] to target outcomes such as adverse events, quality of life, or mortality. [60-64] This is partly reflected in the terminology of some of MR end results, such as *potentially* inappropriate medications (PIM) or *possibly* omitted medications (POM).

An assessment of the cost-benefit of MRs is outside the scope of this study. However, the progressively aging and co-morbid population drives health expenditures making it increasingly important to spend money wisely and to implement services with a solid evidence base. An important economic aspect to assess in implementation is the affordability of healthcare services, i.e., whether an intervention can be afforded regardless of its effectiveness. [65] Only three studies in this scoping review made any assessments of the cost of the intervention. Conversely, 13 studies did not provide any information related to intervention cost, dose, or duration, making it challenging to estimate the economic impact of the intervention. The absence of cost data hinders decision-makers from prioritizing healthcare investments knowledgeably.

Descriptions of pharmacists' expertise, background, and specific training:

The characteristics of the intervention provider can impact the outcomes of the intervention. Important aspect to address includes specific skills, expertise, and experience required by the providers. Such information was poorly described across most studies.

Pharmacists have different educations, levels of expertise, and abilities. Even the personal traits of pharmacists, such as insecurity and fear of new responsibilities, are known to influence how they perform in pharmacy practice. [66] Consequently, terms such as "pharmacists" or "clinical pharmacists" do not sufficiently describe the competencies of the intervention provider. Additional information such as "vast experience" does not necessarily make their expertise more precise.

The training of participating health personnel is a critical component of successful program implementation. Providing tuition and coaching is important to ensure competence, enhance confidence, and maintain intervention fidelity. Educating stakeholders on the new program can help facilitate adaptation and improve the development of strategies for implementation.

Planned intervention versus actual intervention:

Intervention fidelity is a multidimensional construct on both quantitative and qualitative components of a treatment or program. Generally, intervention fidelity refers to the methodological strategies used to monitor and enhance the reliability and validity of interventions [67] Poor fidelity makes it difficult to attribute outcomes directly to the intervention, leading to inaccurate conclusions regarding its effectiveness. This may result in the implementation and continuation of ineffective practices or the premature dismissal of potentially beneficial ones.

Descriptions of strategies to improve and assess intervention fidelity were poorly reported in the majority of trials. This is unfortunate since all studies concluded that their interventions successfully produced the intended outcomes (see Table 2) However, poor fidelity reporting is not a new phenomenon, and our results are in line with the findings from similar studies. A 2018 systematic review deemed pharmacist interventions in asthma management as unimplementable due to inadequate intervention fidelity. [68] A scoping study evaluating the implementation of multidisciplinary practices to improve pharmacotherapy, e.g., MR, found that none of the included studies evaluated fidelity. [69] Even though intervention fidelity and implementation fidelity focus on different processes they are closely related. It is difficult to achieve high implementation fidelity with low intervention fidelity. Notwithstanding the limited possibility of providing necessary intervention details in the primary paper, authors should describe the activities and state where the information is located. [26]

Naming the interventions according to standardized terminologies such as FIMA of LIMM made it easier to conceptualize the scope of MR. However, studies using the “Pharmacotherapeutical Symptom Evaluation, 20 questions” (PHASE-20) tool as part of their MR reported inconsistently on its application. [35,36,40,41] This variability underscores the need for explicit reporting on the administration of standardized tools, as the mode of collection can influence the quality and nature of the data obtained. Furthermore, using standardized terminologies such as the PCNE classification can make it easier to identify the foundation of the intervention, e.g., patient interview, medication history,

and/or clinical data. Reporting frameworks specifically designed for pharmacist interventions exist, e.g., Descriptive Elements of Pharmacist Intervention Characterization Tool (DEPICT2). [70]

Limitations:

This scoping review has several limitations. The terms used in the search strategy are homonyms. Their amorphous nature makes it likely that our search failed to retrieve relevant information on the topic. In some studies, it was difficult to conceptualize the pharmacist's responsibilities within an interprofessional practice. Studies failing to explicitly mention the pharmacists' role in the intervention were excluded. Furthermore, using the TIDieR checklist to evaluate intervention reporting proved challenging, as the details provided did not always clearly align with the checklist items. Similar problems have been reported in other studies. [5,71]

A further limitation is that MRs conducted by community pharmacists were not eligible for inclusion. Primary care settings in Finland and Denmark have established viable collaborative medication review practices with community pharmacies. [72,73] Several studies on MRs performed by community pharmacists were identified but excluded during the study selection process. This was mostly for pragmatic reasons but also because we were reluctant to include any fee-for-service (FFS) payment model as they tend to give monetary incentives to provide treatment.

Conclusion:

This study provides an overview of how Nordic studies describe pharmacist-facilitated medication reviews in primary care settings. In general, the trials we reviewed did not make any fidelity assessments, nor did they provide information on the dose and cost of the intervention. Whether each trial's reporting is sufficient for other settings to replicate its positive outcomes might depend on the objectives of different stakeholders. However, insufficient detail about the intervention may lead to misinterpretation of cause and effect.

Decision-makers are increasingly expected to consider complex interventions and successful implementation hinges on clear and complete intervention descriptions. Furthermore, understanding

the context of an intervention is key to successful delivery. Consequently, we recommend that pharmacy trials use reporting checklists, e.g., the TIDieR, to increase the replicability of pharmacist interventions such as the MR.

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Declaration of interest:

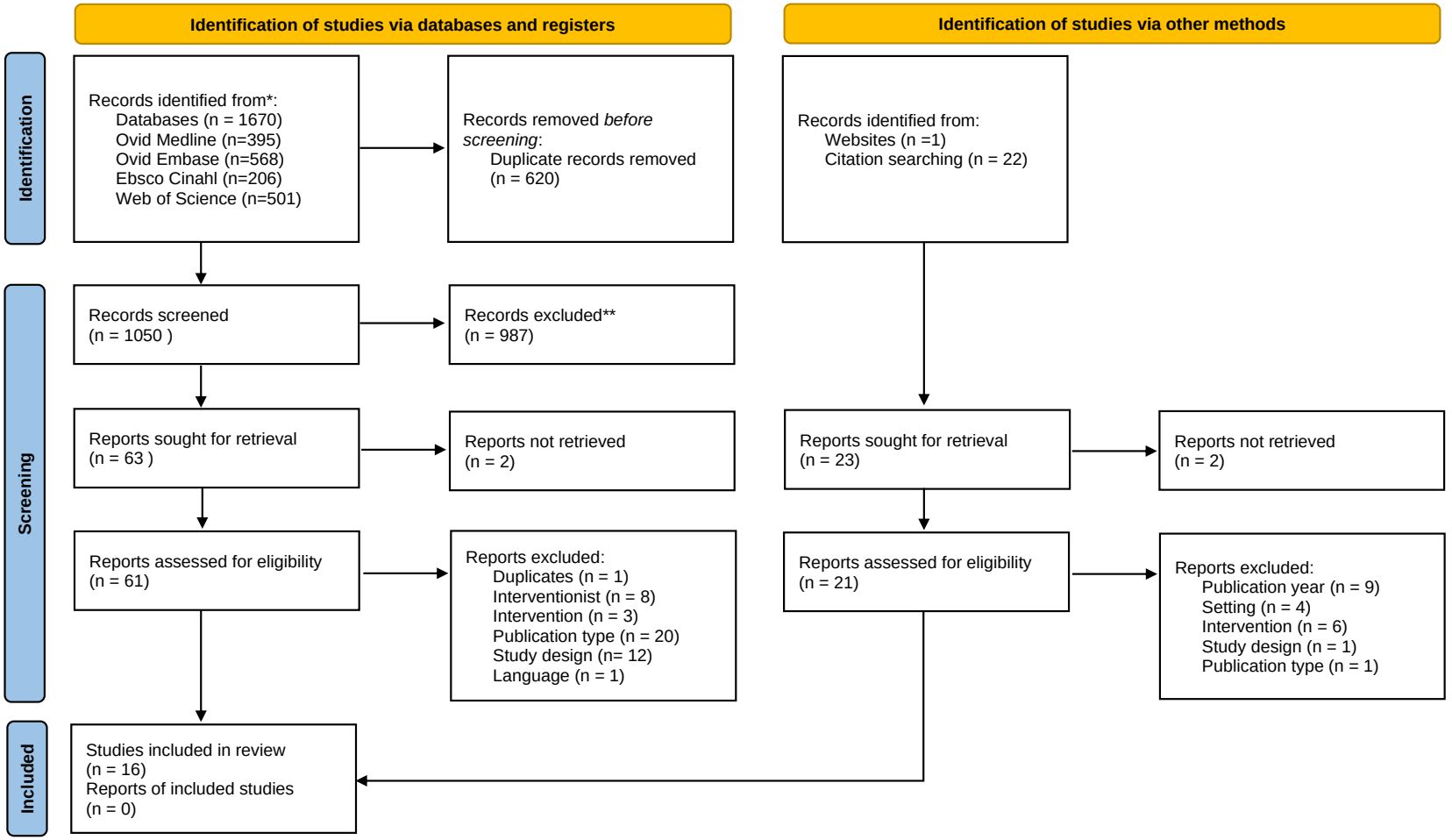
The authors report no conflict of interest.

Appendix 1: Ovid Medline search string

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions 1946 to January 24, 2024

#	Searches	Results from jan 24 2024
1	"medication review"/	145
2	"Drug Utilization Review"/	3881
3	Medication Therapy Management/	2811
4	Medication Reconciliation/	1577
5	((medication* or medicine* or drug*) adj3 (manag* or review* or reconcil* or concord* or assess*)).tw,kf.	75990
6	LIMM.tw,kf.	13
7	Drug utili#ation review.tw,kf.	416
8	(Cognitive adj3 servic*).tw,kf.	547
9	exp Aged/	3480165
10	primary health care/ or patient-centered care/	114363
11	Home Care Services/	36658
12	exp Residential facilities/	58927
13	community health nursing/ or home health nursing/	20143
14	Family Practice/	67380
15	nursing homes.tw,kf.	20568
16	home care.tw,kf.	22631
17	patient-centered care.tw,kf.	8312
18	primary care.tw,kf.	149962
19	Domiciliary care.tw,kf.	360
20	Elderl*.tw,kf.	302052
21	exp "Scandinavian and Nordic Countries"/	222814
22	Scandinavia*.tw,kf.	10451
23	Skandinavia*.tw,kf.	1
24	Nordic.tw,kf.	9310
25	Nordisk.tw,kf.	1018
26	(Norway or Sweden or Denmark or Finland or Iceland).tw,kf.	150400
27	(Norwegian or Swedish or Danish or Finnish or Icelandic).tw,kf.	127480
28	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	81433
29	9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20	3843882
30	21 or 22 or 23 or 24 or 25 or 26 or 27	333745
31	28 and 29 and 30	549
32	limit 31 to yr="2010 -Current"	395

Appendix 2: PRISMA flow chart



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: http://www.prisma-statement.org/

Appendix 3: Adopted TIDieR cheklist

		Auvinen 2020		Brandt 2014		Davidsson 2011		Dobszai 2023		Fog 2017		Grenas 2019		Halvorsen 2010		Halvorsen 2019	
	TIDieR ITEM BRIEF NAME	Where located*†		Where located*†		Where located*†		Where located*†		Where located*†		Where located*†		Where located*†		Where located*†	
1.	Provide the name or a phrase that describes the intervention.	2	ref.13	1		10		2		330		1517		83		2	
	WHY																
2.	Describe any rationale, theory, or goal of the elements essential to the intervention.	2		3		9-10		2	ref.9	329-330		1517		83		2	
	WHAT																
3.	Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g. online appendix, URL).	2	ref.13	1, 3-4	ref.8-23	10	ref.13-16	2	ref.15	330	ref.8-11	1517-18	ref.14,21	83	ref.13-18	4	ref.19-26
4.	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.	2		2-3		10		2		330		1517-18		83		2-4	
	WHO PROVIDED																
5a	Who? (expertise) Describe pharmacists expertise	2		?		12		2		?		?		?		?	
5b	Who? (qualifications) Describe pharmacists background	2		?		?		2		?		?		?		?	
5c	Who? (training) Describe specific training given.	2		?		?		?		330		1517		83		?	
	HOW																
6.	Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.	2		1, 6		?		2		330		1517-18		83		3	
	WHERE																
7.	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.	2-3		2-4		10		2		330		?		82		1	
	WHEN and HOW MUCH																
8.	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.	2		2-3,6		10		2, 6		330		?		?		?	
	TAILORING																
9.	If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.	?		?		?		?		?		?		?		?	
	MODIFICATIONS																
10.	If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).	?		?		?		?		?		?		?		?	
	HOW WELL																
11.	Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.	2		6		?		?		332		?		?		?	
12.	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.	?		?		?		?		?		?		87		?	

† If the information is not provided in the primary paper, give details of where this information is available. This may include locations such as a published protocol or other published papers (provide citation details) or a website (provide the URL).

* Primary paper page or appendix number

Reviewers- use "?" if information about the element is not reported/not sufficiently reported.

[1] Hoffmann T, Glasziou P, Boutron I, Milne R, Perera R, Moher D, Altman D, Barbour V, Macdonald H, Johnston M, Lamb S, Dixon-Woods M, McCulloch P, Wyatt J, Chan A, Michie S. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ. 2014;348:g1687.

		Kari 2018		Kersten 2013		Lenander 2018		Lenander 2014		Lenander 2017		Milos 2013		Modig 2015		Wickman 2022	
	TIDieR ITEM BRIEF NAME	Where located*†		Where located*†		Where located*†		Where located*†		Where located*†		Where located*†		Where located*†		Where located*†	
1.	Provide the name or a phrase that describes the intervention.	2049		272		2		181		160		236		42		2	
	WHY																
2.	Describe any rationale, theory, or goal of the elements essential to the intervention.	2049		272		2-3		180-181		160		236-239	ref.18	42		2-3	
	WHAT																
3.	Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g. online appendix, URL).	2049	ref.11,22	272	ref.16-19	3,7	ref.14,26	181	ref.7.21, 22-23	160-161	ref.10-13	238-238	ref. 7,18	42	ref.11	2	ref.10,11
4.	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.	2049-51		272		3,7		181		160-161		238-239		42		2	
	WHO PROVIDED																
5a	Who? (expertise) Describe pharmacists expertise	2050		?		2		181		160		237		?		7	
5b	Who? (qualifications) Describe pharmacists background	2050		?		?		181		?		?		?		7	
5c	Who? (training) Describe specific training given.	2049	ref.11	?		?		184		?		239		?		7	
	HOW																
6.	Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.	2050-51		272		3,7		181		160		238		42		2	
	WHERE																
7.	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.	2049-51		?		3,7		181		161		239		?		2	
	WHEN and HOW MUCH																
8.	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.	2049-50		272		3		181, 183-184		?		237		?		7	
	TAILORING																
9.	If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.	?		?		?		?		?		?		?		?	
	MODIFICATIONS																
10.	If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).	2050		?		7		?		164		?		?		?	
	HOW WELL																
11.	Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.	2050		?		2-3		181		?		237, 239		?		7	
12.	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.	?		?		?		?		?		?		?		?	
† If the information is not provided in the primary paper, give details of where this information is available. This may include locations such as a published protocol or other published papers (provide citation details) or a website (provide the URL).																	
* Primary paper page or appendix number																	

Reviewers- use "?" if information about the element is not reported/not sufficiently reported.

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